Monetary policy transmission in Mexico: an overview and banking channels insights using granular data

Banco de México

Introduction

In Mexico, monetary policy transmits to real activity and prices primarily through channels affecting the exchange rate, inflation expectations and the yield curve (ie the interest rate channel). In addition, although banking-related channels (through both credit and deposits) are relatively weaker due to the country's low level of financial inclusion and credit penetration, the monetary policy reference rate remains a crucial factor driving the behaviour of bank lending and deposit interest rates. In contrast, other channels, such as those related to asset and debt holdings (which include cash-flow and balance-sheet effects), are less relevant due to the low proportion of households and firms directly affected.

This short note provides a general overview of Mexico's monetary policy transmission mechanisms. The first section briefly describes the most effective transmission channels in the country, presenting qualitative evidence on their importance. The second section provides quantitative evidence on the effect of policy rate adjustments on output, prices, and the exchange rate. Using the results from several structural vector autoregression (SVAR) models, the section highlights three key findings: (i) output and inflation respond to monetary policy adjustments in a manner consistent with international evidence, both in terms of timing and magnitude; (ii) economic sectors that are more sensitive to exchange rate variations, such as merchandise, exhibit stronger price and real activity responses to monetary policy adjustments compared with more domestically driven sectors, such as services; and (iii) not enough evidence exists to suggest that the monetary policy transmission mechanism has suffered significant changes in recent years, particularly when comparing the periods before and after the Covid-19 pandemic.

Finally, the third section explores in more detail the banking channels of monetary policy transmission. Even when these may be less powerful than other channels due to the country's low level of financial inclusion and credit penetration, we document that banking channels are present and important for those firms and households that have deposits and credit with the banking system. Indeed, changes in the policy rate, to a large extent, drive adjustments in the interest rates for bank loans and deposits, although with heterogeneity between firms and households. These results suggest that as higher levels of financial and credit penetration are achieved in Mexico, the banking channels of monetary policy would be expected to become more relevant.

Overview of main transmission channels

As a small open economy with a high degree of trade openness, Mexico's **exchange rate plays an important role in the transmission of monetary policy**.[1] In recent years, the exchange rate has been notably influenced by the interest rate spread between Mexico and the United States particularly during periods of low financial volatility. In this vein, a high interest rate spread, adjusted for volatility, tends to appreciate the Mexican peso, as this currency becomes more attractive to market participants.

For example, in 2023, when the interest rate spread remained elevated amid low financial volatility, the exchange rate appreciated by 13.2% over the year. This appreciation helped to reduce production costs of tradable good sectors, such as merchandise, contributing to a decline in the inflation rate of these goods. Specifically, merchandise inflation dropped from 11.09% in December 2022 to 4.89% in December 2023, and further to 2.39% by November 2024, reckoning a lower level than before the pandemic. In the second half of 2024, the exchange rate experienced heightened volatility driven by both domestic and external factors, leading to a depreciation of the Mexican peso. In this context, the central bank has remained vigilant regarding the potential inflationary effects of this recent depreciation.

It is important to note that while the interest rate spread is partially influenced by Banco de México's decisions, the central bank conducts monetary policy solely to fulfil its primary mandate of price stability. Consequently, it does not target a specific level for the interest rate spread or the exchange rate. In fact, Mexico's flexible exchange rate regime is a cornerstone of the country's macroeconomic framework. This regime acts as a shock absorber, enabling the central bank to remain focused on its primary objective of maintaining price stability.

The **inflation expectations channel** is also one of the most effective monetary policy transmission channels in the country. This mechanism has been tested during various episodes, especially since Banco de México adopted the inflation-targeting regime in 2001. Despite the severity of certain episodes, such as the recent one related to the pandemic and geopolitical tensions, central bank actions have successfully contributed to keeping long-term inflation expectations stable and anchored close to the target. In this vein, recent evidence shows that long-term inflation expectations comply with different properties of anchoring (Banco de México (2023b)). As a result, they are stable, as professional forecasters' revisions are infrequent and of low magnitude. Additionally, these expectations are unresponsive to inflationary surprises or changes in short- and medium-term inflation expectations.

The anchoring of long-term inflation expectations results from the credibility that the central bank has built over the years through its commitment to fulfil its primary mandate of price stability. During the most recent inflationary episode, Banco de México's timely and decisive actions have further reinforced this commitment. This anchoring also serves as indirect evidence of the effectiveness of monetary policy,

[1] Mexico's degree of trade openness is three times that of the United States. Indeed, exports plus imports as a proportion of GDP in Mexico has averaged 76% in the last 10 years. Over the same period in the United States. this ratio has fluctuated between 20 and 30%.

since only in a regime where there is confidence in the central bank's ability to maintain low and stable inflation can expectations remain firmly anchored.

The **interest rate channel** is another effective monetary policy transmission channel. Empirical analysis shows that changes in the policy rate have a statistically significant effect on government bond interest rates along the yield curve, for maturities from 1 month to 10 years (Banco de México (2022)). As expected, the impact is more pronounced for shorter maturities.[2] These results document the strong influence that domestic monetary policy displays on the short end of the yield curve.

As for **the bank credit and deposit channels**, although they may be perceived as less powerful due to the country's low level of financial inclusion and credit penetration, changes in the policy rate, to a large extent, drive adjustments in the interest rates for bank loans and deposits. On the one hand, the pass-through of policy rate adjustments to interest rates of banking business loans is nearly one-to-one. For consumer credit and mortgages the pass-through is lower, but still positive. On the other hand, bank deposit rates also mimic, to different degrees, changes in the policy rate, with the pass-through being substantially larger for term deposits of both firms and households than for check deposits (see Banco de México (2024)).

Other channels, such as those related to asset and debt holdings (which include cash-flow and balance-sheet effects), are less relevant in Mexico. The main reason behind this is, again, the country's low level of financial inclusion. Nevertheless, for those households and firms holding debt and financial assets, changes in the monetary policy rate influences their debt service, as well as the interest income of deposits and other financial investments. In particular, the service of firms' bank debt responds to changes in the monetary policy rate, since most of these loans are granted at variable interest rates. In contrast, households' debt service is relatively less affected, as around 70% of household debt consists of mortgage loans, which have a fixed interest rate.

Through the above channels, monetary policy effectively influences domestic financial conditions, affecting the private sector's spending and saving decisions and the production costs of sectors sensitive to exchange rates. Overall, these actions have contributed to the anchoring of inflation expectations. The most recent inflationary episode is a clear example of how monetary policy has been transmitted through the economy, moderating the inflation surge and contributing later to the disinflationary process. From June 2021 to March 2023, Banco de México raised the policy rate by 725 basis points (bp) to face an increase in inflation not seen in two decades. Along the way, government bond and bank interest rates rose, shifting some aggregate spending to savings and increasing the lending costs of firms. The exchange rate appreciated, especially when volatility was low, and this contributed to reducing production costs, notably for merchandise sectors, lowering the inflation of these goods. And finally, inflation expectations remained well-behaved, with those for the short-term reflecting the effects of the shocks but also the anticipation that they were not permanent, while those for the long-term remained anchored.

[2] The pass-through effect on medium- and long-term rates is lower, as these rates respond to additional factors such as future short-term rate expectations, inflation forecasts and risk premiums.

Measuring the transmission mechanism with structural vector autoregression models

A formal way to measure the monetary policy transmission mechanism in Mexico is through the estimation of structural vector autoregression (SVAR) models. In these exercises, the interest is on the responses of key macroeconomic variables, such as output and inflation, to an unanticipated change in the monetary policy rate.[3] In this context, evidence gathered by Banco de México's staff points to three main findings (Carrillo et al (2025)):

- First, output and inflation in Mexico respond to monetary policy in a similar way in terms of timing and magnitude, as observed in international evidence. These results are robust to a variety of models and identification strategies.
- Second, economic sectors that are more sensitive to exchange rate variations, such as merchandise, display larger responses of prices and real activity to monetary policy adjustments than more domestically driven sectors, such as services. This result suggests that pricing decisions, as those influenced by the exchange rate, might be more relevant than saving/spending decisions, which directly affect aggregate demand. The relatively lesser importance of saving/spending channels is consistent with the low level of financial inclusion in Mexico, as firms and households have limited resources to smooth spending.
- Third, there is not enough evidence suggesting that the monetary policy transmission mechanism has suffered significant changes in late years, especially when considering the period before and after the pandemic.

Regarding the first point, the findings indicate that after an increase in the short-run nominal interest rate, output decelerates and inflation decreases after several months of the policy adjustment. In particular, following a monetary policy shock of 100 bp in the policy rate:

- the output gap decreases (within a plausible range) between 30 and 65 bp after 1 to 1.5 years
- inflation falls (within a plausible range) between 15 and 22 bp after 1 to 2 years[4]

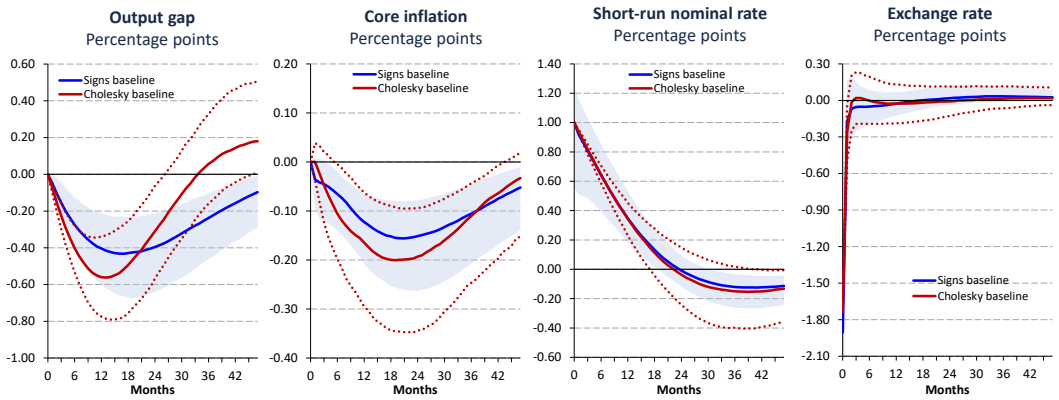
[3] In the literature, it is standard to measure the transmission of monetary policy through its unexpected component, that is, through the so called "monetary policy shock". This shock is defined as a change in monetary policy that is not expected by markets. This approach to isolate monetary policy adjustments is standard and necessary to properly identify its transmission mechanism. This is the case because monetary policy usually reacts to several shocks affecting the economy. Thus, the transmission of policy rate adjustments could be confounded with that of the shock monetary policy is responding to. A common approach to estimate the effects of monetary policy on output, inflation and the exchange rate involves using VAR models and an identification strategy based on exclusion restrictions (eg Cholesky decomposition), sign restrictions, or narrative restrictions. Recently, other strategies have emerged based on high-frequency data collected around monetary policy announcements.

[4] It is standard in the literature to normalise the size of the policy rate adjustment to either 25 bp or 100 bp. This normalisation allows for straightforward international comparisons. The plausible ranges are computed using the results of 11 different SVAR models, in which the minimum and maximum value of the response of the variable of interest for each time horizon is removed. See the Annex for further details regarding the 11 models.

These numbers are obtained after analysing the results of several SVAR models, of which two are considered as the baseline estimations. Graph 1 displays the responses of the output gap, core inflation, the short-run nominal interest rate and the nominal exchange, according to the two baseline models (see the Annex for the results derived from the rest of models).

Responses of selected Mexican variables to a monetary policy shock, according to baseline models

Graph 1



The dotted red lines and the blue shaded area represent the uncertainty bands that cover 68% of the estimated distribution in each model. The estimations are performed on a monthly frequency for a pre-Covid-19 pandemic sample from January 2002 to December 2019.

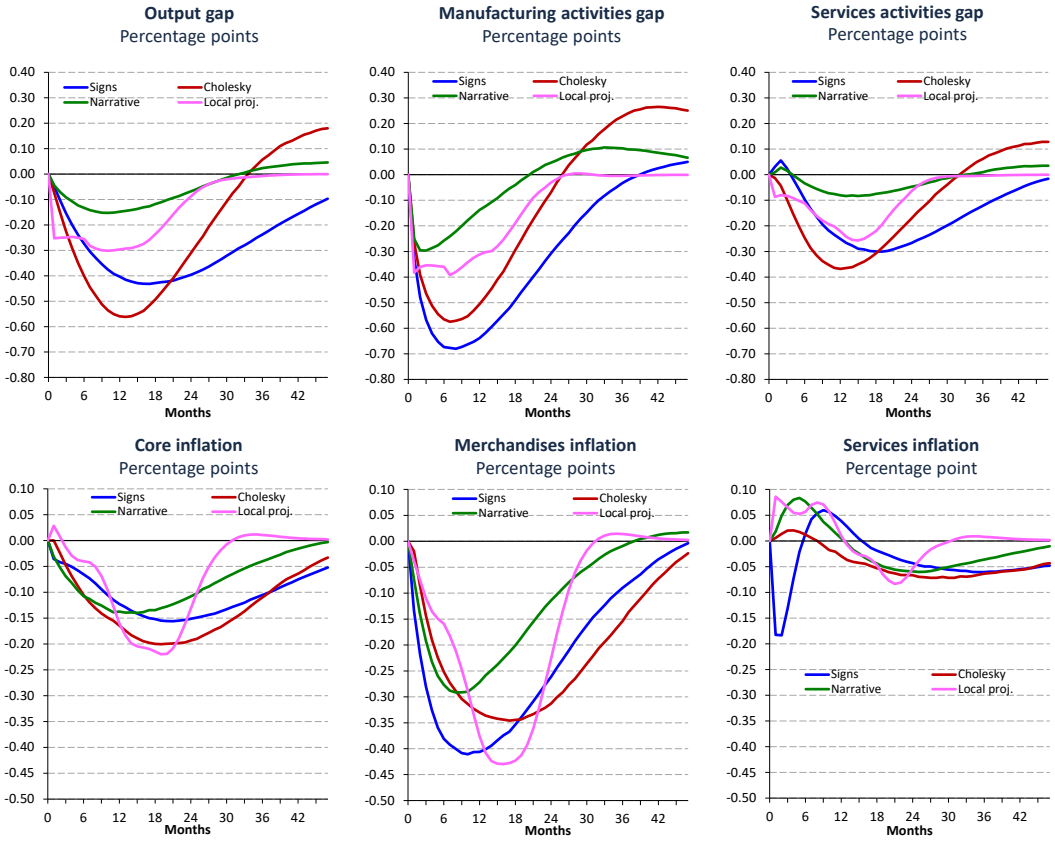
Source: Carrillo et al (2025), with data from National Institution of Statistics and Geography, Banco de México, Bloomberg, Proveedor Integral de Precios (PiP), Valmer.

These findings for Mexico align with the international evidence. Recent estimates by Deb et al (2023) for advanced and emerging markets show that the effects of monetary policy transmission are consistent across different income levels, with the responses of output and inflation peaking within two years in both advanced and emerging market economies. Specifically, their estimates indicate that following a monetary policy shock of 100 bp in the policy rate, inflation falls on average by 40 bp in advanced economies and by 20 bp in emerging market economies. The impact on output is similar, with a decline ranging from 20 bp to 40 bp following a 100 bp increase.

As for the second point, the estimation results point to a larger response of real activity and prices to a policy rate adjustment in the manufacturing sector than in the services sector (see Graph 2). Also, merchandise inflation reacts faster than services inflation to the monetary policy adjustment. The results are robust to different specifications of the SVAR models. Overall, these findings suggest that the exchange rate channel appears as relatively stronger than savings/spending channels that directly affect aggregate demand.

Responses of real activity and prices in the manufacturing and services sector to a monetary policy shock

Graph 2



The dotted red lines and the blue shaded area represent the uncertainty bands that cover 68% of the estimated distribution in each model. The estimations are performed on a monthly frequency for a pre-Covid-19 pandemic sample from January 2002 to December 2019.

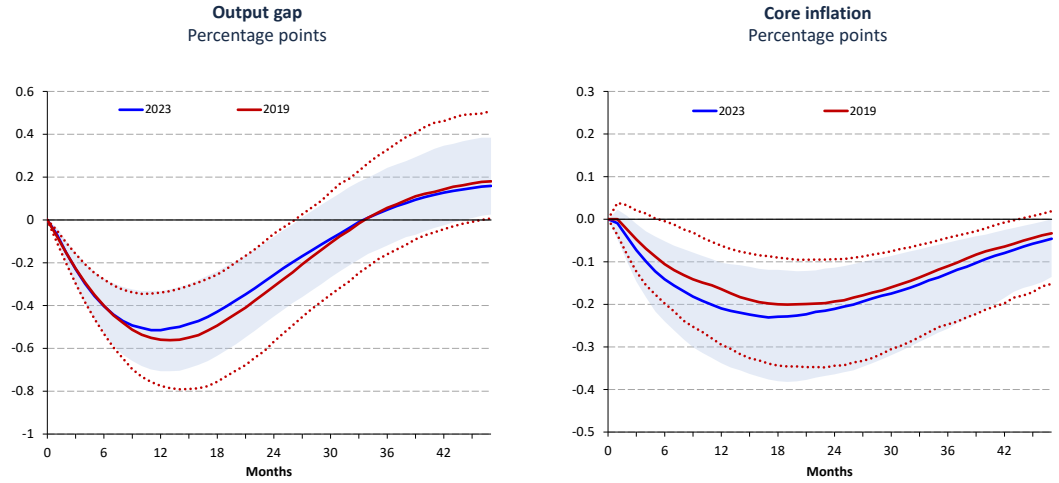
Source: Carrillo et al (2025), with data from National Institution of Statistics and Geography, Banco de México, Bloomberg, Proveedor Integral de Precios (PiP), Valmer.

Finally, concerning the third point, the estimation results are not statistically different regarding the monetary policy transmission mechanism before and after the pandemic (Graph 3). Indeed, according to the baseline models, the responses of macro variables do not display statistically significant changes between the two periods. It is worth noting that including the pandemic in the analysis is not trivial, as the broad, deep and unprecedented shocks affecting real variables need to be controlled for using specific techniques to maintain unbiased estimates (see the Annex).

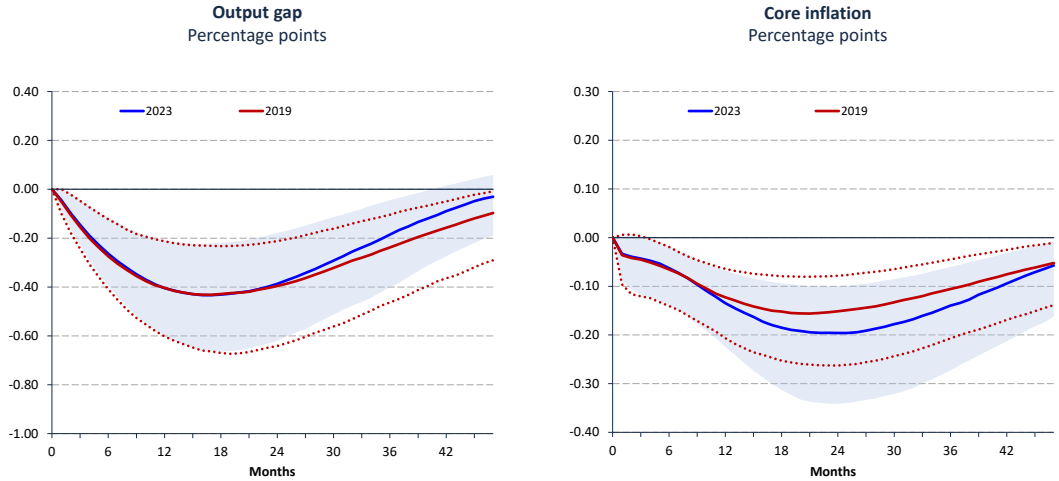
Responses of real activity and prices to a monetary policy shock, before and after the Covid-19 pandemic, according to baseline estimations

Graph 3

A. Results from Cholesky restrictions: 2019 versus 2023, after controlling for pandemic shocks



B. Results from sign restrictions: 2019 vs 2023, after controlling for pandemic shocks



The estimations are performed on a monthly frequency for two time periods: a pre-pandemic sample, from January 2002 to December 2019; and a sample including the pandemic, extending the above to December 2023. Details about the implementation of these estimations are provided in the Annex.

Source: Carrillo et al (2025), with data from National Institution of Statistics and Geography, Banco de México, Bloomberg, Proveedor Integral de Precios (PiP), Valmer.

Banking channels using surveys and granular data

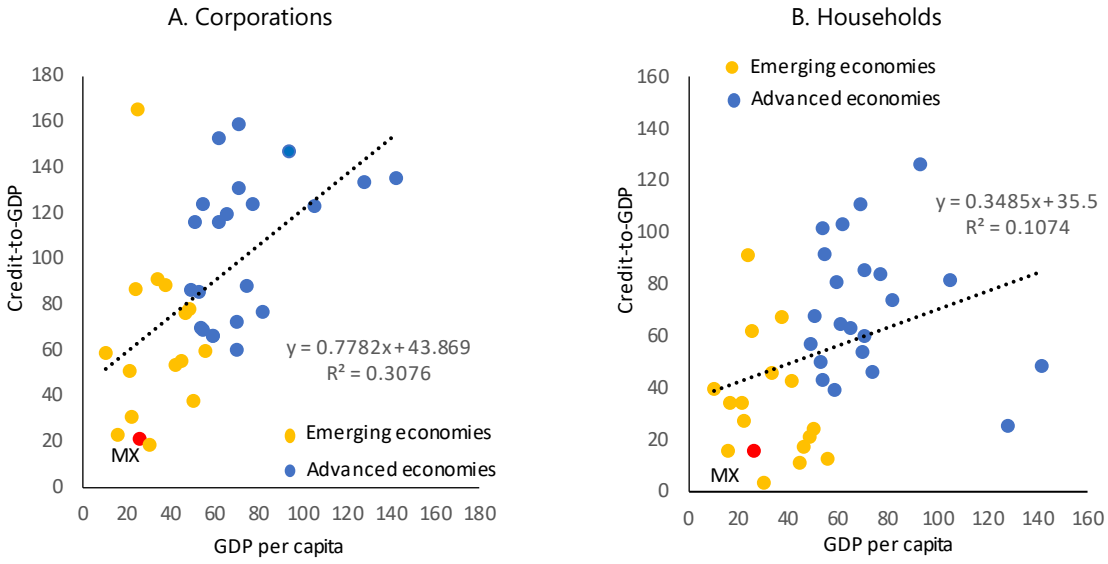
Monetary policy is transmitted to bank interest rates in Mexico both in lending rates to the private sector and in deposit and savings instruments, although with different degrees of pass-through. On the bank's credit side, lending rates to non-financial private firms have a larger and faster reaction after a change in the policy rate than lending rates to households. On the bank's deposit side, the pass-through of changes in the monetary policy rate is stronger for term deposits than for transferable deposits.

To have a better understanding of the performance of monetary policy channels in Mexico, we must consider the level of financial penetration and the heterogeneity in the access to credit and holdings of financial assets among private firms and households. Financial inclusion and credit penetration in Mexico is low compared with other emerging economies. The ratio of credit to the non-financial sector to GDP, both to firms and households, is lower than most economies, even among those with similar levels of per capita income (Graph 4). In addition, the distribution of credit and financial assets across the private sector is highly concentrated among larger and formal firms and among the richest households.

This section explores the banking channels of monetary policy transmission, first for non-financial corporations and later for households, distinguishing on the credit side between consumer credit and mortgages.

Credit to the non-financial sector and GDP per capita

Percentage of GDP and thousands of dollars — Graph 4



Credit-to-GDP figures as of June of 2023, figures for Mexico as of September 2024. GDP per capita PPP (current international $) figures as of 2023. Includes Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, China, Colombia, Denmark, Finland, France, Germany, Greece, Hungary, India, Indonesia, Ireland, Israel, Italy, Japan, Korea Rep, Malaysia, Mexico, New Zealand, Norway, Poland, Portugal, Russia, Saudi Arabia, Singapore, South Africa, Spain, Sweden, Switzerland, Thailand, Turkey, United Kingdom and United States.

Sources: Banco de México; World Bank; BIS.

a. Non-financial corporations

The key takeaways of this subsection are as follows:

- Credit penetration for non-financial firms is low and highly concentrated in a small number of firms.
- For this reason, the bank lending channel is likely to be weak for private non-financial corporations in Mexico, even when there is evidence of a strong and fast pass-through from the policy rate to lending rates.
- For those firms with access to bank financing and with holdings of financial assets, the credit and cash flow channels are relevant.

Credit to non-financial corporations in Mexico is relatively low and is highly concentrated among the largest and formal firms. Low credit penetration for private firms is explained in part by the large proportion of firms that belong to the informal sector (Graph 5.A). But also, within firms in the formal sector, only 11% of them have a credit line with a commercial bank (Graph 5.B). All in all, only 4% of the universe of firms, formal and informal, had a commercial bank credit line in 2023.[5, 6] In this vein, according to a survey conducted by Banco de México to non-financial formal corporations with at least 10 employees, only 27% of firms with up to 100 employees and 35% of larger firms had at least one outstanding bank loan as of the third quarter of 2024.[7]

Within this small number of firms with access to bank credit, the total amount of financing is highly concentrated in the largest firms. Graph 6 shows that, using data from the credit registry where commercial bank credit is classified according to the firm size, this financing is concentrated in larger firms, with 83.1% of the outstanding credit being held by 3.6% of the borrowers.

[5] This number is the ratio of total firms with a commercial bank loan (source: Credit Registry, Formulario R04C Cartera de créditos comerciales), National Banking and Securities Commission to the number of business establishments in Mexico in 2023 according to the National Institution of Statistics and Geography (INEGI).

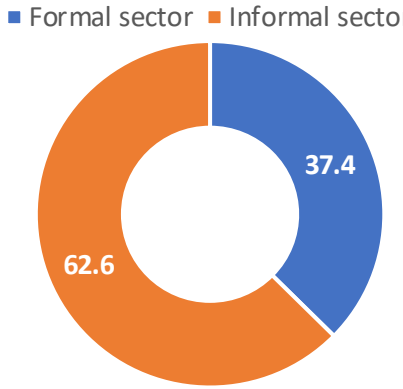
[6] Data are from Censos Económico 2019, Características de los negocios (INEGI). Informal businesses have the following characteristics, among others: five or fewer employed people; do not pay social security or social benefits; and do not have an accounting system. Firms of the informal sector of the economy do not have access to bank credit since commercial banks require firms to present their federal tax returns, the company charter, and financial information, among other requirements.

[7] Data are from the *Credit Market Survey*, July–September 2024, Banco de México. According to Censos Económicos 2019, 95% of firms had less than 10 employees.

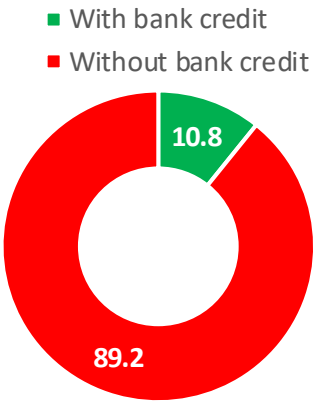
Firms and access to bank credit, 2023

Graph 5

A. Total firms in the economy by status
Percent of all firms



B. Formal sector firms: access to bank credit
Percent of all formal firms

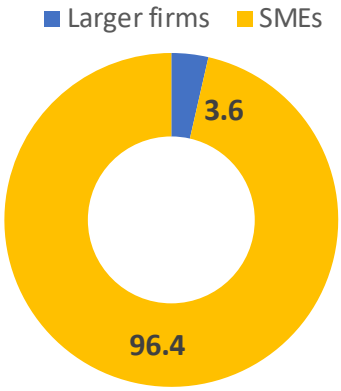


Sources: National Institution of Statistics and Geography and Banco de México, with data from the credit registry (Formulario R04C Cartera de créditos comerciales); National Banking and Securities Commission.

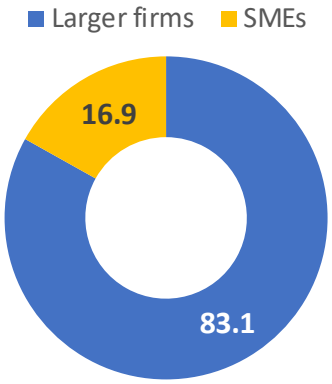
Commercial Bank Credit to Non-financial Firms, September 2024

Graph 6

A. Loans
Percent of all loans



B. Balance of outstanding credit
Percent of overall balance



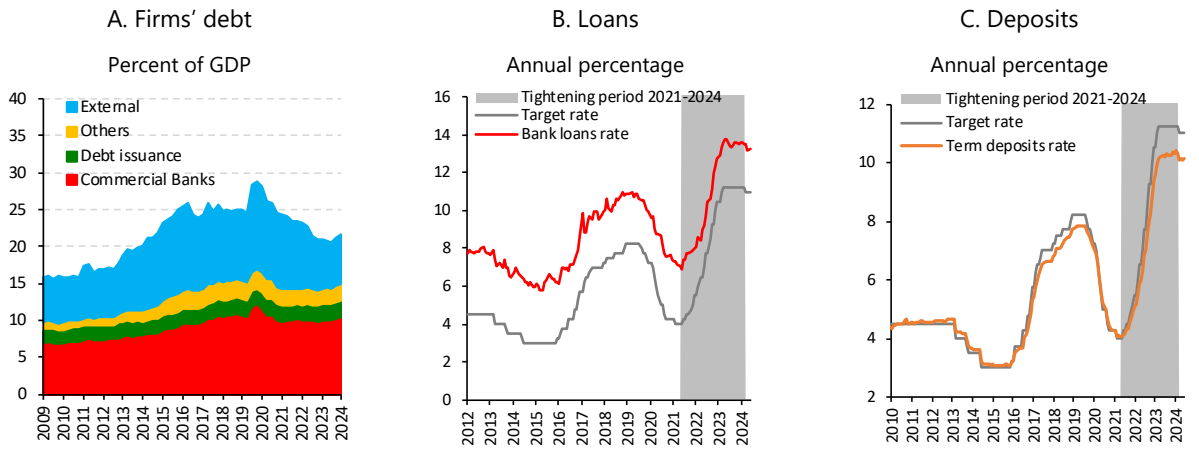
"SMEs" -Small and medium size enterprises- ("Larger firms") are defined as companies that have had credit balances up to (greater than) 100 million Mexican pesos at least in some month from December 2003 to date.

Sources: Banco de México, with data from the credit registry (Formulario R04C Cartera de créditos comerciales); National Banking and Securities Commission.

The low level of credit penetration, coupled with the high concentration of credit in a small number of firms, explains the relatively low importance of the lending channel in comparison with the FX or the expectations channels, even when there is an important pass-through from the policy rate to lending rates for firms. Indeed, recent studies by Banco de México suggest that the pass-through of policy rate adjustments to bank interest rates of new business loans is almost complete over

a period of 12 months: a 94 bp increase in firms' credit interest rates for a 1 percentage point (pp) increase in the policy rate (Graph 7 and Graph A.4).[8, 9] Lastly, for firms with access to bank credit, the cash flow channel might be relevant. Around 80% of bank credit is granted at variable interest rates, and for credit at fixed rates the vast majority of loans falls within a maturity of three months. In addition, there is a significant pass-through of the monetary policy rate to firms' bank deposit rates: over a period of 12 months, we see a 90 bp increase in firms' term deposits interest rates for a 1 pp increase in the policy rate (Graph 7 and Graph A.5).[10]

Firms' debt and Banco de México's target interest rate and bank' interest rates — Graph 7



"Others" includes development banks and other financial intermediaries.

"Banks loans rate" refers to the weighted average interest rate of new loans to non-financial corporations.

"Term deposits rate" also includes bank bonds and securities with a residual term less than or equal to 5 years at domestic banks in national currency and corresponds to the effective interest rate.

The tightening period considers June 2021 to February 2024.

Source: Banco de México.

[8] An econometric model was estimated to quantify the pass-through of the reference rate to bank interest rates. In this model, the dependent variable is the monthly change in the interest rate of the credit or deposit segment and the independent variables are *n*-lags of the monthly change of the monetary policy interest rate and a vector of variables to control effects associated with the economic activity and inflation, among others. This specification allows calculating the pass-through for different time horizons by adding the beta values associated with the monthly change in the monetary policy rate (Banco de México (2024)).

[9] The behaviour of commercial bank credit to firms responds to different determinants, in addition to the interest rate. In Mexico, the evidence indicates that the growth of economic activity is the most important factor to explain firms credit dynamics (Banco de México (2021)).

[10] In September 2024, term deposits at the banking system represented 24.5% of total M2 instruments held by non-financial firms.

b. Households

The key takeaways of this subsection are as follows:

- Financial inclusion and credit penetration for households is low in Mexico.
- Savings accounts are relatively prevalent across households' income distribution. By contrast, bank term deposits are highly concentrated in the richest households.
- The pass-through of the monetary policy rate to consumer loans is positive but smaller than that to firms. The pass-through to mortgages is even smaller and only affects new loans granted by banks and not those of other mortgage institutions (eg Infonavit Fovissste).[11]
- Accordingly, from the perspective of the intensive and the extensive margins, the banking channels operating through households are likely weak.

The National Household Finance Survey (ENFIH) is a representative survey whose primary objective is to collect information on the balance sheet of households in Mexico, that is, on their assets and liabilities, both financial and non-financial.[12] According to this survey, **financial inclusion in Mexico is low and financial savings are highly concentrated**. Whereas the percentage of households that have an M1-M0 financial instrument (savings, deposit or checking account) is 66.6%, financial assets of the monetary aggregate M2-M1 (bank term deposits, shares of money-market funds, etc.) are held by 1.5% of total households and are concentrated in those at the highest income percentiles.[13] The main financial asset for households is the pension savings account, which is the result of mandatory contributions and does not respond directly to changes in the monetary policy interest rate (Graph 8).

Data from the ENFIH about the distribution of financial assets held by households is shown in Graph 8.C. Financial assets, except for government transfers accounts, are concentrated in the top quantile of the income distribution. In contrast, the lowest income quantile has scarce participation on financial assets holdings.

[11] The Institute of the National Housing Fund for Workers (Infonavit) is an institution specialised in mortgage credit with the resources of workers housing savings accounts. The Federal Government, workers' organisations and employers' organisations participate in its decision-making bodies. The Housing Fund for Public Sector Workers (Fovissste) is a public sector institution that provides mortgage loans to public sector employees.

[12] The ENFIH also contains information on the socio-demographic characteristics of households. The first survey was conducted in 2019 by the INEGI in collaboration with Banco de México.

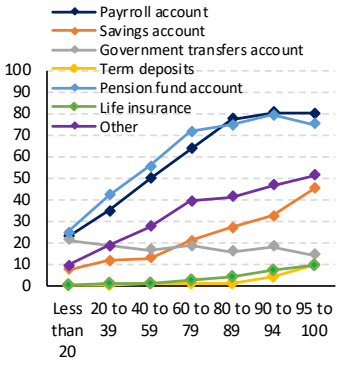
[13] Instruments of M1 includes having at least one payroll account, a savings account and/or a government transfer account, and instruments of M2-M2 includes term deposits.

Households' financial savings

Graph 8

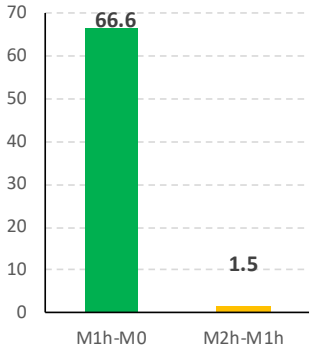
A. Frequency of financial assets holdings

Percent by household per income percentile



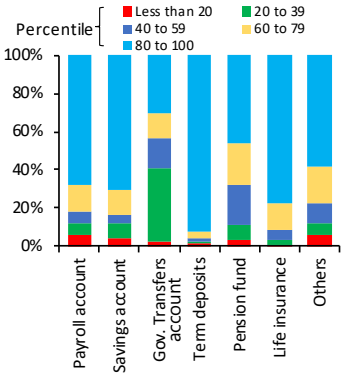
B. Holdings of M2-M0

Percent of all households



C. Amount of financial assets holdings

Percent by household per income percentile



"Term deposits" and "M2h-M1h" include shares in money and non-money markets funds.

"Life insurance" includes instruments that allows money withdrawals.

"Other" includes savings outside the financial sector.

"M1h-M0" includes having at least one payroll account, a savings account and/or a government transfer account.

Source: National Household Finance Survey, 2019, Banco de México and National Institution of Statistics and Geography.

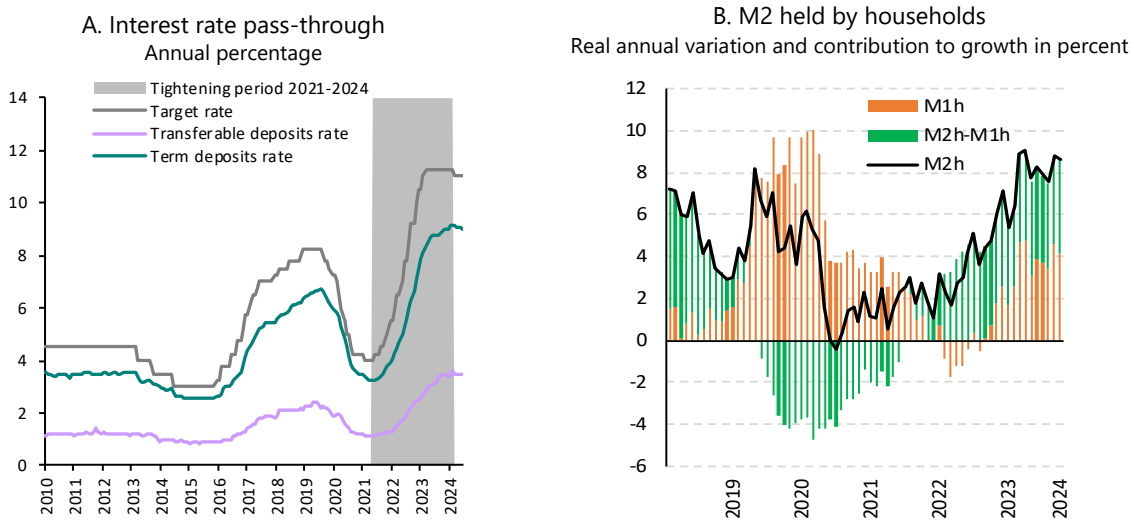
The composition of households' financial savings in Mexico is sensitive to the behaviour of interest rates. The pass-through of the monetary policy rate to households' bank deposit rates over a period of 12 months is 0.73 for term deposits rates, and 0.22 for transferable deposits (Graph A.5). In addition, recent evidence indicates that increases in the interest rate of households' term deposits have a negative impact on their demand for currency and transferable deposits (highly liquid assets, M1h) and, at the same time, a positive effect on the demand for other monetary instruments (term deposits, repurchase agreements, shares of money market funds, M2h-M1h (Banco de México (2023a). Therefore, the change in the composition of households' M2 portfolio observed since 2021 has responded in part to the cycle of increases in the monetary policy rate, which induced an increase in banking deposit rates that led to a substitution of household financial assets against M1h and in favour of other monetary instruments (M2h–M1h) (Graph 9).[14] Thus, incentives to modify households' financial asset portfolio work intuitively,

[14] An exercise was carried out to illustrate the impact of the cycle of increases in the reference rate on households' holdings of monetary instruments. To do this, the trajectories of household financial savings in Mexico were estimated under two scenarios: (i) one in which term deposits interest rates remain constant from the second quarter of 2021 to the fourth quarter of 2022 (counterfactual scenario); and (ii) the model estimates using the observed evolution of term deposits interest rates (base scenario). Under the counterfactual scenario, the M1h would have registered a real annual variation of 9.4% in December 2022, a figure 8.4 pps higher than that obtained in the base scenario. In contrast, the growth of (M2h–M1h) would have been 7.0 pps lower in the counterfactual scenario compared with the base scenario. This suggests that by inducing an increase in banking deposit rates, the cycle of increases in the monetary policy rate has encouraged households to increase their financial savings.

incentivising savings and postponing current consumption for the future (but for a limited number of households).

M2h held by households

Graph 9



"Transferable deposit rate" corresponds to the weighted average of interest rates of checking accounts and current account deposits.

"Term deposits rate" also includes bank bonds and securities with a residual term less than or equal to 5 years at domestic banks in national currency and corresponds to the effective interest rate.

The tightening period considers June 2021 to February 2024.

Source: Banco de México.

Regarding household debt, **in the mortgage market, commercial banks target the highest income quintile and its credit is granted at market rates**, and practically all are issued at fixed rates. The median "loan-to-value" is 72% and an average term of 19 years. However, mortgages provided by commercial banks represent only 39.6% of the total outstanding loans (Graph 10.A). The Institute of the National Housing Fund for Workers (Infonavit) is the most relevant financial intermediary in this market (49.7% of the total outstanding loans) and mainly serves lower to middle income households. It provides loans at previously determined interest rates (Graph 10.B) that carry a subsidy for poorer households.[15]

In this vein, **Infonavit grants credit at fixed rates that do not respond to market conditions**, that range from 3.76% to 10.45%, and are determined based on the worker's salary, with a maximum "loan-to-value" of 90% and a maximum term of 30 years.[16] Likewise, according to the ENFIH, the distribution of mortgage loans by income range presents heterogeneity, such that in the lowest income quantile only 3.9% of households have a mortgage loan, while in the highest income quantile the percentage is 20.8% (Graph 10.C). Mortgage financing to households represents 10.8% of GPD (4.3% of GDP for bank credit).

[15] Fovissste provides loans at previously determined interest rates, with a market share of 10.0%.

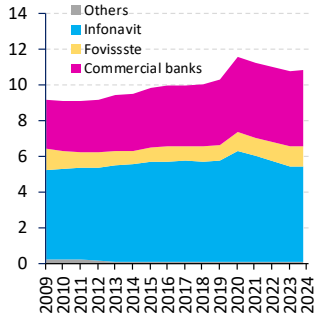
[16] This new interest rate structure was established in May 2021 with a range of 1.91% to 10.45%.

Households: Mortgage debt

Graph 10

A. Outstanding loans by intermediary

Percent of GDP

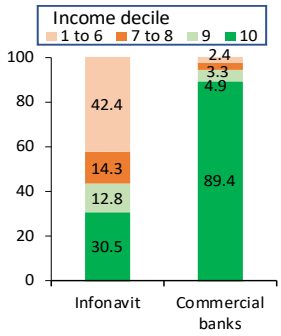


"Others" includes development banks and other financial intermediaries.

Source: Banco de México.

B. Amount of new loans by income decile

Percent of 2023 total amount

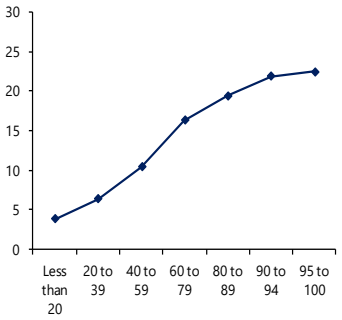


Loans in co-participation with commercial banks are excluded from National Housing Fund for Workers.

Source: Banco de México with information from National Housing Fund for Workers and National Banking and Securities Commission.

C. Frequency of mortgage debt holdings

Percent by household income percentile



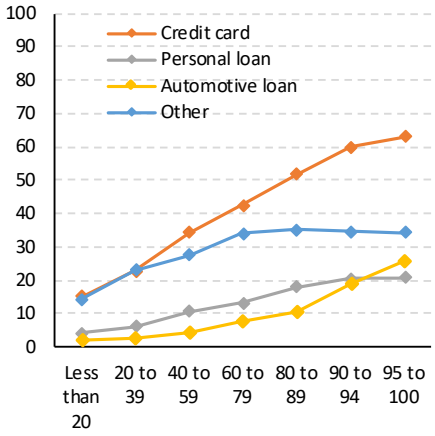
Source: National Housing Fund for Workers and National Household Finance Survey (2019), Banco de México and National Institution of Statistics and Geography.

For consumption credit, the results of the ENFIH show the **presence of a low level of financial inclusion and unequal access to this financing**. The percentage of households with a credit card debt was 34.3%, a personal loan 10.7%, and an automotive loan 6.6%. Nevertheless, its distribution by income range presents heterogeneity, such that in the lowest income quantile only 15.1% of households have a credit card and in highest income quantile the percentage is 56.7% (Graph 11.A). The percentage of the balance of consumer loans is concentrated in the highest income quantiles, particularly for automotive loans (Graph 11.B). Meanwhile, lower-income segments concentrate their debt in informal sources of financing. Finally, households' consumer credit represents 5.7% of GDP, and the most relevant segment is credit cards (31.1% of the total balance).

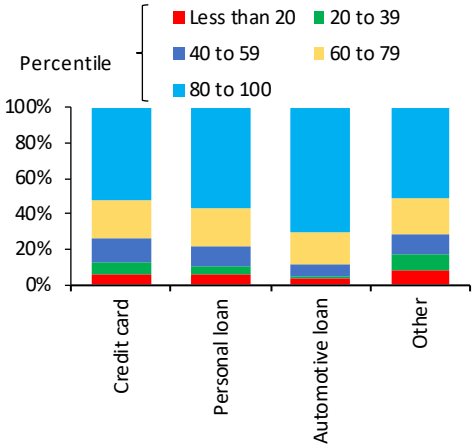
Households: Consumer debt

Graph 11

A. Frequency of consumer debt holdings
Percent by household income percentile



B. Amount of consumer debt holdings
Percent by household income percentile



"Other" includes educational and employee loans, loans from family or friends, pawn shop loans and others.

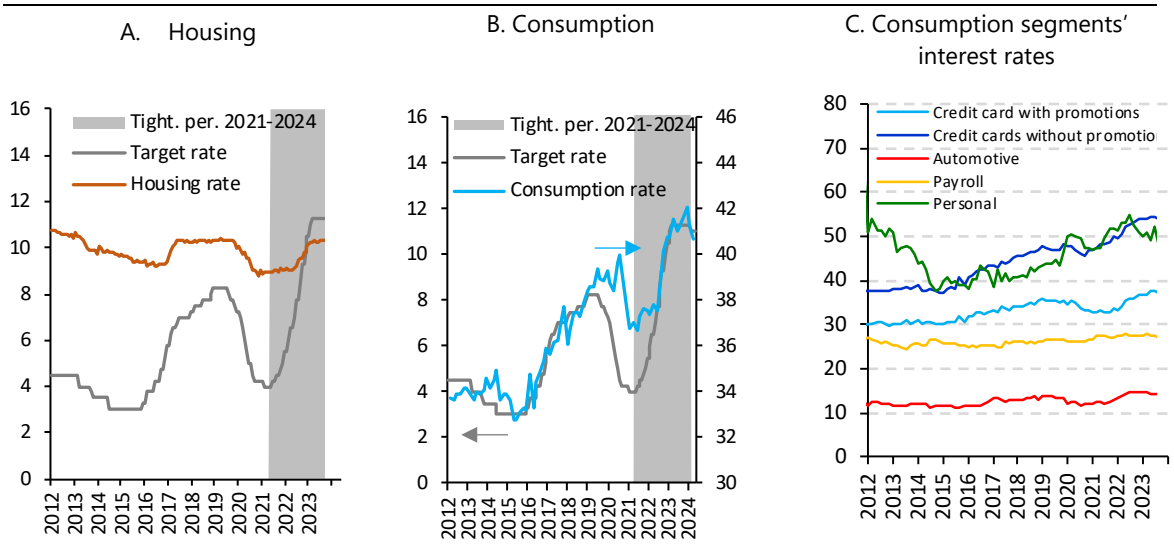
Source: National Household Finance Survey, 2019, Banco de México and National Institution of Statistics and Geography.

In the household sector, the bank credit and the cash flow channels are weaker than for the corporate sector (Graph 12). For consumer bank credit and mortgages loans, the pass-through over 12 months is positive: a 67 bp increase in consumer credit for a 1 pp increase in the policy rate. For mortgages, it is only 21 bp (Graph A.4). Regarding the cash flow channel, for those households holding financial assets, the impact on changes in the monetary policy rates on their debt service is limited, since around 65.5% of household debt consists of mortgage loans, which have a fixed interest rate. Likewise, 43.3% of credit card debt does not pay interests, since the debtor pays in full the amount of their monthly debt ("*totaleros*") or has made purchases using a deferred interest plan. Altogether, total mortgage and credit card debt service not affected by changes in the monetary policy rate represents 70.2% of household debt. As we mentioned before, the low level of financial inclusion, in terms of both users and holdings of financial assets and debt liabilities, limits the effect of these channels on aggregate demand.

Banco de México's target interest rate and bank households' loans' interest rates

Annual percentage

Graph 12



"Bank households' loans' interest rates" refer to the weighted average interest rates of new loans.

"Credit cards interest rates" refer to the weighted average rate of active, widely used credit cards of debtors that do not pay in full the amount of their monthly debt ("no-totaleros" clients). Data from the consumer credit registry (Formulario de créditos al consumo revolventes, Banco de México).

"Automotive, payroll and personal loans interest rates" refer to the weighted average rate of new credits, excluding overdue, or restructured credits, credits granted to related parties of the institution, credits granted under preferential conditions to employees, as well as credits that are not in national currency. Data from the consumer credit registry (Formulario de créditos al consumo no revolventes, Banco de México).

The tightening period considers June 2021 to February 2024.

Source: Banco de México.

Concluding remarks

This note provides a general overview of the monetary policy transmission mechanisms in Mexico, highlighting key facts about its most effective channels, which correspond to those influencing the exchange rate, inflation expectations and the yield curve. Furthermore, quantitative analysis suggests that the responses of output and inflation to monetary policy adjustments are consistent with international evidence. In addition, given Mexico's characteristics as a small open economy with a high degree of trade openness and low financial inclusion, sectors sensitive to the exchange rate, such as merchandise, exhibit larger responses than domestically driven sectors, such as services. This suggests that the exchange rate channel is relatively stronger than savings/spending channels that directly affect aggregate demand.

The note also delves into the importance of heterogeneity in access to banking credit and deposits for both firms and households, and its implications for monetary policy transmission. It argues that for non-financial firms, since credit penetration is low and highly concentrated in a small number of firms, the bank lending channel is

likely to be weak even when there is evidence of a strong and fast pass-through from the policy rate to lending rates. In the household sector, financial inclusion and credit penetration is also low and tilted toward the more affluent. Particularly, financial assets are highly concentrated in the richest households. The pass-through from the policy rate to consumer lending rates is smaller than the one to firms, and even smaller for mortgages, and the effect of the cash-flow channel is limited since a high proportion of households' debt is granted at fixed interest rates. Hence, the banking channels of monetary policy transmission are probably weaker than for firms.

Overall, this note reviews and provides evidence on the relative importance of different transmission channels for monetary policy in Mexico. As some channels seem weaker than others, due to low financial inclusion and credit penetration, the implementation of monetary policy would benefit from an enhancement of the banking channels in general. Indeed, increasing access to financial services and products, reaching a larger share of firms and households, would improve the transmission of monetary policy, specially through the savings/spending channels.

However, this is not an easy task. Moreover, the expansion of financial penetration should proceed at a sound and sustainable pace and with an understanding of the causes of its current low level. The roots of low financial access and credit penetration in Mexico are diverse and complex. Changes in the structure of the economy that promote an increase in formal firms and workers would ease the access restriction for financial services. At the same time, a more transparent, robust and competitive financial system would make the use of credit for production and consumption and for long-term savings more attractive to all economic agents, promoting formality and boosting productivity.

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Annex

A. Structural vector autoregression models included in the analysis

Consider the following general representation for a structural vector autoregression model (SVAR) (see full details in Carrillo et al (2025)):

$$X_{t+h} = \begin{bmatrix} Z_{t+h} \\ Y_{t+h} \end{bmatrix} = C_h + \sum_{\ell=1}^{p} B_{\ell,h} X_{t-\ell} + A u_{t+h}, \qquad (1)$$

where h is the time horizon; Y_t and Z_t are vectors containing endogenous and exogenous variables, respectively; u_t is a vector of structural shocks, which includes the monetary policy shock; A is a structural matrix denoting the impact effect of shocks u_t on variables Y_t and Z_t; and, finally, C_h and $B_{\ell,h}$ are matrices of parameters, in which the latter are consistent with the assumption of block exogeneity, so that:

$$B_{\ell,h} = \begin{bmatrix} B_{zz}^{\ell,h} & 0 \\ B_{yz}^{\ell,h} & B_{yy}^{\ell,h} \end{bmatrix}.$$

To identify matrix A, different strategies with diverse type of restrictions are considered, including Cholesky (recursive) restrictions, sign and zero restrictions, narrative sign restrictions and external instruments using high frequency data. In turn, matrices $B_{\ell,h}$ are estimated using Bayesian techniques on either the canonical SVAR model (so that $B_{\ell,h} = (B_\ell)^h$) or local projections (so that each $B_{\ell,h}$ is estimated independently and does not depend on $B_{\ell,h-1}$). Overall, the results from five methodologies are analysed, from which two are considered as baseline. For robustness purposes, variations to the baseline specification are also included. In sum, the analysis includes the estimation results from a total of 11 SVAR models, as depicted in table A.1.

Table A.1. Total number of estimated models

Approach (type of structural vector autoregression model)	Variation number	Estimation number
i. Cholesky restrictions	1, baseline model	1
	2, with more lags	2
	3, with alternative hyperparameters	3
	4, with alternative output gap	4
ii. Sign and zero restrictions	1, baseline model	5
	2, with more lags	6
	3, with alternative hyperparameters	7
	4, with alternative output gap	8
iii. Local projections with Cholesky restrictions	1	9
iv. Narrative sign restrictions	1	10
v. External instruments using high-frequency data	1	11

Unless specified otherwise, all models include up to one lag.

The estimations are performed on a monthly frequency for two time periods:

- A sample from before the Covid-19 pandemic, from January 2002 to December 2019.
- A sample including the pandemic, extending the above to December 2023. Details about the implementation of this estimations are provided below.

  The variables used in the estimation are summarised in Table A.2.

Table A.2: Variables included in the estimation

	Approach (type of structural vector autoregression model)				
	(i) Cholesky	(ii) Signs and zeros	(iii) Local projections	(iv) Narrative signs	(v) External instruments
Exogenous variables					
For the US economy:					
Price of oil (WTI), output gap, CPI core inflation, Wu-Xia shadow federal funds rate, yield curve slope (10y-2y), VIX index	✓	✓	✓ (except VIX)	✓	✓
For the Mexican economy:					
Monetary policy surprise (narrative information)				✓	
Monetary policy surprise (high frequency data)					✓
Endogenous variables for the Mexican economy					
12-month-ahead headline inflation expectations	✓		✓		
Output gap	✓	✓	✓	✓	✓
Producer price inflation	✓		✓		✓
Core inflation	✓	✓	✓	✓	✓
Short-run nominal interest rate	✓	✓	✓	✓	✓
Nominal exchange rate	✓	✓	✓	✓	✓
EMBI+ index	✓	✓	✓	✓	
Yield curve slope (10 years–2 years)		✓		✓	
Total number of variables included	13	12	12	13	12

Inflation indicators refer to the annualised quarterly variation at a monthly frequency. The exchange rate is included as a monthly variation. For Mexico, the short-run nominal interest rate refers to the overnight banking funding rate before August 2008 and to the monetary policy reference rate after this date. For the external instrument approach, output, price indexes and exchange rate are included in log-levels. Also, only for this approach, the short-run nominal interest rate corresponds to the 1-year rate.

The results from all models are depicted in Graph A.1. Details on each of the five identification approaches are as follows:

1. **Cholesky restrictions.** To identify the monetary policy shock, it is assumed that variables placed before the short-run nominal interest rate do not respond in the impact period to an unexpected change in this variable. The order of variables used in this strategy is depicted in column (i) of Table A.2.

2. **Sign and zero restrictions.** Four structural shocks for the Mexican economy are identified to reduce the uncertainty bands around the responses of endogenous variables to a monetary policy shock. The other three structural disturbances are a central bank information shock, an aggregate supply shock and an aggregate demand shock. Table A.3 summarises the sign and zero restrictions used to identify these shocks. Within this approach, distinguishing between a monetary policy shock and a central bank information shock is necessary to disentangle the effects of new information provided by the central bank about the state of the economy and changes in the reference rate at the time of a monetary policy decision. In this case, it is assumed that after a restrictive monetary policy shock, the slope of the yield curve decreases, while after a pessimistic central bank information shock, this slope rises. For the former, the restriction implies that the 10-year yield remains steady as the 2-year yield increases. Conversely, after a pessimistic central bank information shock, the 10-year yield rises more than the 2-year yield, driven by a surge in the term premium (ie the risk compensation demanded by investors) (see Jarociński and Karadi (2020); Carrillo et al (2020)).

3. **Local projections with Cholesky restrictions**. The impact response ($h = 0$) of endogenous variables to a monetary policy shock is given by the corresponding column of matrix A. This matrix is obtained by applying Cholesky restrictions on a canonical SVAR model, following the order of variables presented in column (iii) of Table A.2. To compute the response of each variable for time periods after the shock ($h > 0$), equation (1) is estimated as a linear regression using Bayesian techniques for each horizon of interest (for instance, $h = 1, 2, \dots, 48$). To estimate matrices $B_{\ell,h}$, Minnesota-type priors are employed to ensure that the responses of more distant periods gradually converge to zero (see Jordá (2005); Ferreira et al (2023)).

Table A.3: Sign and zero restrictions imposed on the responses of endogenous variables to structural shocks

	Structural shocks			
	Monetary policy	Central bank information	Aggregate supply	Aggregate demand
Response on impact ($h = 0$)				
Output gap	**0**	**0**		**+**
Core inflation	**0**	**0**	**+**	
Short-run nominal interest rate	**+**	**+**		
Yield curve slope	**-**	**+**		
Nominal exchange rate	**-**			
Response six months after the shock ($h = 6$)				
Output gap	**-**	**-**	**-**	**+**
Core inflation	**-**	**-**	**+**	**+**
Short-run nominal interest rate				
Yield curve slope				
Nominal exchange rate				

Restrictions are based on Carrillo et al (2020). In the present analysis, since the interest is on measuring the monetary policy transmission mechanism in Mexico, the restrictions are imposed on Mexican variables, instead of US variables.

4. **Narrative sign restrictions**. This approach uses the same variables and sign and zero restrictions as in in column (ii) of tables A.2 and A.3. The difference is that the identification includes narrative information, external to the VAR model, regarding the presence of monetary policy shocks. As a result, the narrative approach requires some key events with conclusive information about the sign of the monetary policy shock. Adding this information into the model may significantly reduce uncertainty in the impulse-response functions (Antolín-Díaz and Rubio-Ramírez (2018)). The narrative information for Mexico exploits the difference between the observed monetary policy rate and a forecast of this rate from a Bloomberg survey. For the narrative information, the signs of the largest surprises are considered. As a result, the sign of the March 2009 surprise is used, as well as those of the surprises from March and April 2020 for the sample including the pandemic.

5. **External instruments using high frequency data**. In this approach, monetary policy surprises around Banco de México announcements are incorporated as an external instrument within the SVAR model. In particular, the monetary policy shock is identified using changes in the 3-month swap interest rate within a half-hour window around Banco de México's monetary policy decisions (Solís (2023)). Large changes in the 3-month swaps are interpreted as reflecting surprises in market expectations regarding the monetary policy rate. The advantage of using

these surprises is that the likelihood of other structural shocks influencing the swap rate within the specific time window is minimal (Jarociński and Karadi (2020)). To estimate the impulse responses of endogenous variables to the monetary policy shock, a two-stage linear regression is performed. In the first stage, a regression of the residuals corresponding to the monetary policy indicator equation is estimated on the external instrument, and adjusted residuals are obtained. In the second stage, these adjusted residuals are used to estimate the effects of the monetary policy shock on the variables analysed.

Estimation with the sample including the pandemic. Applying conventional methodologies to estimate the transmission mechanism of monetary policy during the pandemic has been complicated given the presence of extreme shocks affecting real activity. If not handled, these shocks may bias the estimation results, as their presence violates the assumptions underneath these models (eg well-behaved error terms). As a result, the biased estimations may suggest false or erratic changes in the transmission mechanism (graphs A.2 and A.3).

Dealing with the pandemic shocks has required exploring alternatives to adapt the methodologies. These efforts can be classified into three categories:

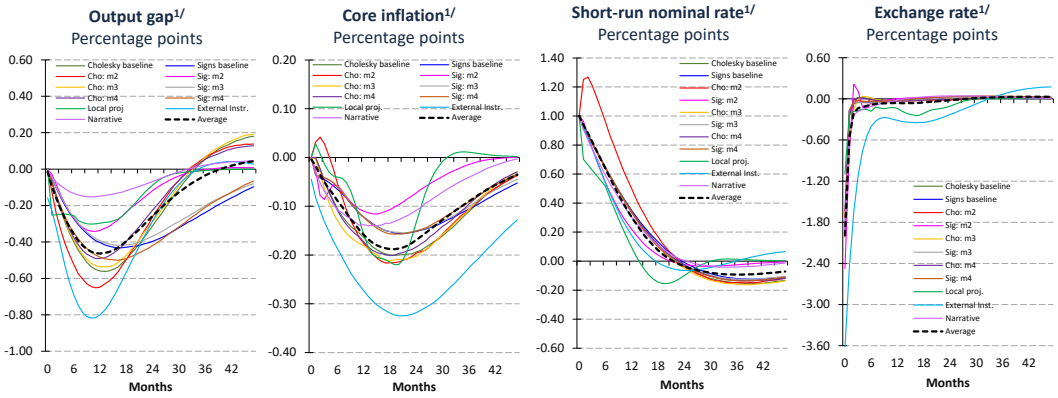
- Adapted models: More flexible structures are considered to model the error variance, so that pandemic shocks are captured and isolated. Among these structures, pandemic priors are a popular choice (Primiceri and Tambalotti (2020); Bobeica and Hartwig (2023); Lenza and Primiceri (2022); Carriero et al (2022); and Holston et al (2023)).
- Pandemic dummies: Dichotomous variables are incorporated for various periods to isolate pandemic shocks (Maroz et al (2021); Ng (2021); Cascaldi-Garcia (2022); and Holston et al (2023)).
- Cleaning of outliers: First, periods of atypical movements in real variables are identified. Subsequently, the following options are considered: (i) exclude these values for the estimation of the error variance; (ii) use these values to estimate extraordinary volatility and uncertainty; or (iii) clean real variables of atypical movements using confinement indicators (eg Google Mobility Index) (Marcellino et al (2021); Arriola et al (2022); and Pattanaik et al (2022)).

For the Cholesky approach, pandemic dummies were used. For sign and zero restrictions, as well as for local projections, the cleaning of outliers was used. In turn, for the narrative sign restrictions, the pandemic prior's strategy, as in Cascaldi-Garcia (2022), was used. Finally, the external instrument approach has not been yet applied in the sample including the pandemic, as high-frequency data after 2019 has not yet been included.

Disentangling the monetary policy transmission mechanism on output and inflation. To explore the strength of the monetary policy transmission on different sectors of the economy, additional variables are included in the SVAR models, with minimal or no restrictions. The variables relate to economic activity in the manufacturing and services sector, as well as the merchandise and services prices. Each variable is added to the SVAR model on isolation (ie one at a time).

Responses of selected Mexican variables to a monetary policy shock, according to baseline and alternative models

Graph A.1



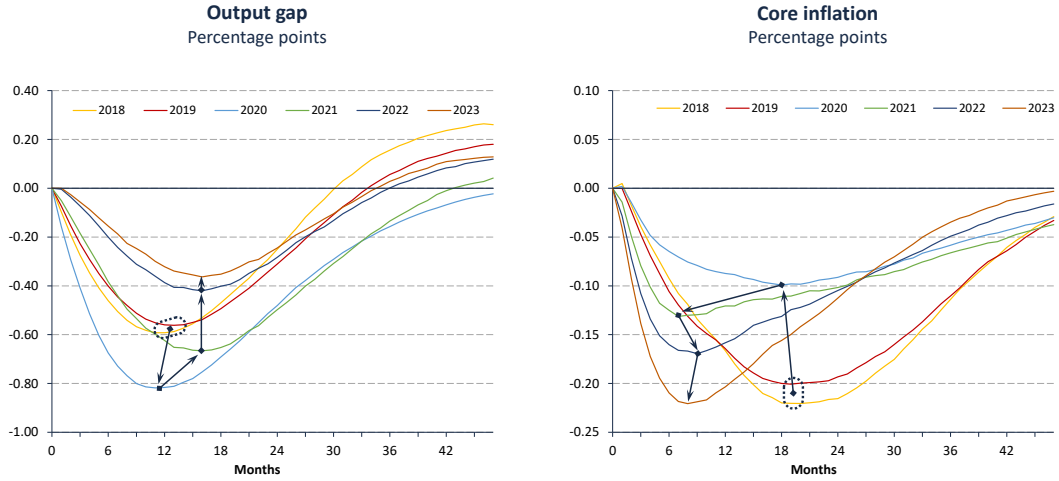
Model 2 includes two lags; model 3 uses different hyperparameters in the estimation process; and model 4 considers an alternative output gap.

Sources: Banco de México; National Institution of Statistics and Geography; Bloomberg; Proveedor Integral de Precios (PiP); Valmer.

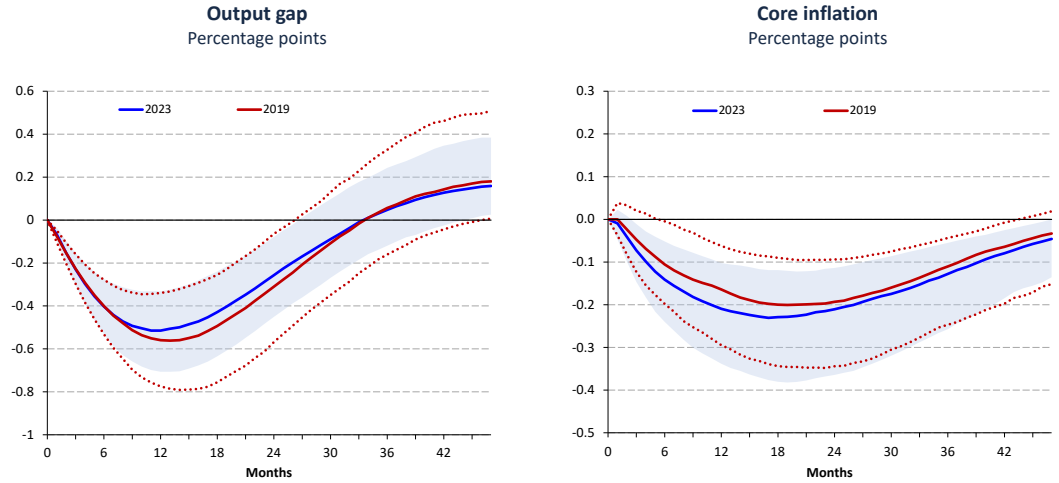
Responses of real activity and prices to a monetary policy shock, before and after the Covid-19 pandemic, according to Cholesky restrictions

Graph A.2

A. Results from Cholesky restrictions: 2018–23, without controlling for pandemic shocks



B. Results from Cholesky restrictions: 2019 versus 2023, after controlling for pandemic shocks



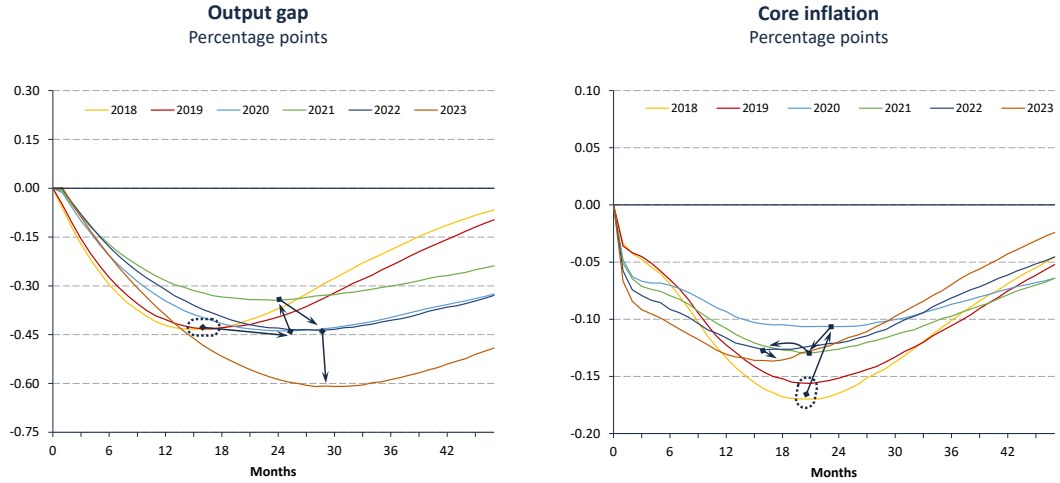
The dotted red lines and the blue shaded area represent the uncertainty bands that cover 68% of the distribution in each model.

Sources: Banco de México; National Institution of Statistics and Geography; Bloomberg; Proveedor Integral de Precios (PiP); Valmer.

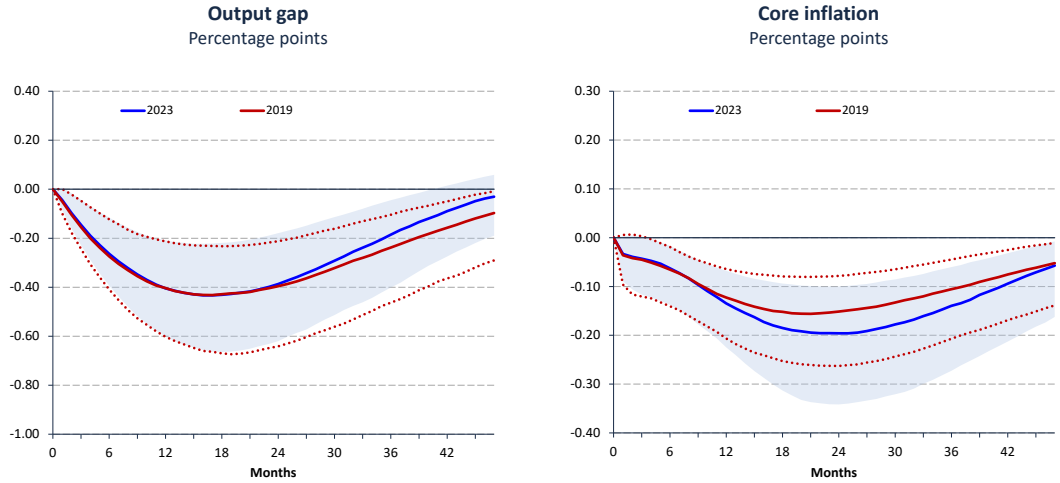
Responses of real activity and prices to a monetary policy shock, before and after the Covid-19 pandemic, according to sign and zero restrictions

Graph A.3

A: Results from sign and zero restrictions: 2018–23, without controlling for pandemic shocks



B: Results from sign and zero restrictions: 2019 versus 2023, after controlling for pandemic shocks



The dotted red lines and the blue shaded area represent the uncertainty bands that cover 68% of the distribution in each model.

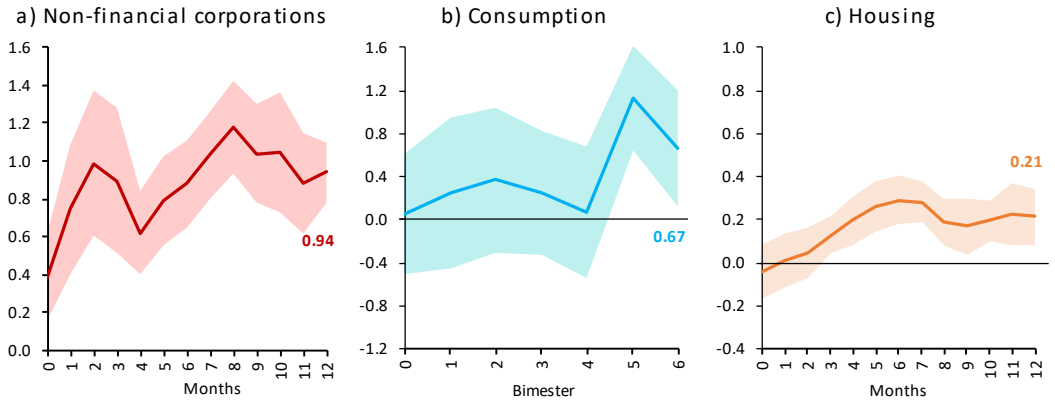
Sources: Banco de México; National Institution of Statistics and Geography; Bloomberg; Proveedor Integral de Precios (PiP); Valmer.

B. Estimates of the pass-through of Banco de México's target interest rate to commercial bank loans and deposit interest rates

Estimated pass-through of Banco de México's target interest rate to bank loans' interest rates

Cumulative effect

Graph A.4



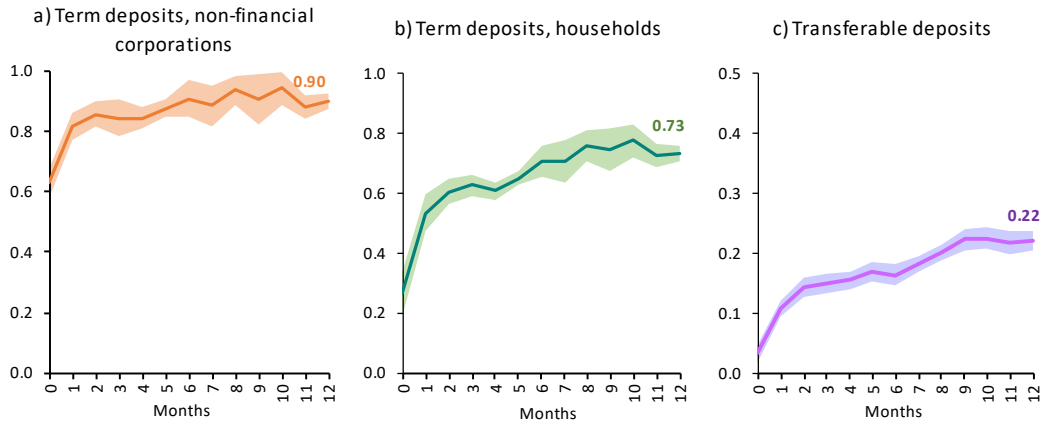
Pass-through is measured as the beta coefficient obtained from the following regression:

$\Delta r\_t^d = \alpha + \sum_{k=0}^{K} [\![\beta\_k^M \Delta r\_(t-k)^{target}]\!] + \theta X\_t^d + \epsilon\_t$. For loan rates, it is the weighted average interest rate of new loans to non-financial corporations, consumption and housing, correspondingly. $\Delta r\_(t-k)^{target}$ is the monthly change in Banco de México's target interest rate, and X_t^d is a vector of variables that control for economic activity, inflation and other effects. Confidence intervals at 95%, Newey-West standard errors. The adjusted R2 for each regression is: non-financial firms 0.516, consumption 0.554, and housing 0.456. Consumption includes credit cards, auto and payroll loans.

Source: Banco de México

Estimated pass-through of Banco de México's target interest rate to bank deposits' interest rates

Cumulative effect — Graph A.5



Pass-through is measured as the beta coefficient obtained from the following regression:

$\Delta r\_t^d = \alpha + \sum\_(k=0)^K \beta\_k^M \Delta r\_(t-k)^{target} + \theta X\_t^d + \epsilon\_t$. For deposit rates, Δr_t^d is the monthly change of the effective interest rate of term deposits to non-financial corporations, households and transferable deposits, accordingly. $\Delta r\_(t-k)^{target}$ is the monthly change of Banco de México's target interest rate, and X_t^d is a vector of variables that control for economic activity, inflation and other effects. Confidence intervals at 95%, Newey-West standard errors. Adjusted R2 for each regression is: non-financial firms 0.906, households 0.797, and transferable deposits 0.350. "Term deposits, households" shows effective weighted interest rate of term deposits and debt securities issued by banks with a residual maturity lower or equal to 5 years. For "overnight deposits", weighted average interest rate is calculated over the total of checking accounts and current account deposits at commercial banks.

Source: Banco de México