Red Nacional de Investigadores en Economía

Monetary Policy Transmission in an Emerging Market: The Financial-Friction Channel VS The Interest-Rate Channel

Lorenzo Menna (Banco de México)

Martín Tobal (Banco de México)

Alejandro Werner (Georgetown Americas Institute)

DOCUMENTO DE TRABAJO N° 394

Abril de 2026

Citar como:
Menna, Lorenzo, Martín Tobal y Alejandro Werner (2026). Monetary Policy Transmission in an Emerging Market: The Financial-Friction Channel VS The Interest-Rate Channel. Documento de trabajo RedNIE N°394.

Monetary Policy Transmission in an Emerging Market: The Financial-Friction Channel *VS* The Interest-Rate Channel[1]

Lorenzo Menna (Banco de Mexico), Martín Tobal (Banco de México) and

Alejandro Werner (Georgetown Americas Institute)

We provide the first micro-level evidence on the mechanisms through which monetary policy transmits in an emerging market. Using high-frequency identification and a dataset covering over 10 million firm-month bank-loan observations, we move beyond only documenting policy effects to identify the transmission itself in Mexico. Credit falls earlier, more sharply, and persistently for young firms, SMEs, and firms with recent delinquencies, consistent with a financial-frictions channel. Credit to durable-goods producers also declines more, consistent with an interest-rate channel. However, unlike the pattern documented for advanced economies, the financial-frictions channel dominates. Further evidence suggests that this dominance extends to employment growth.

Keywords: monetary policy, financial frictions, emerging markets; credit growth; bank capitalization

JEL Classification: E52, E51, E44, O54.

[1] The views in this paper represent just those of the auhors; they do not represent the views of Banco de Mexico, Georgetown America's Instiute ir the corresponding Board or Governors.

1. Introduction

Macroeconomic theory assigns a central role to financial frictions in the transmission of monetary policy. These frictions arise from banks' difficulty in assessing borrowers' repayment capacity, due to limited information, and from the collateral requirements imposed in response (Bernanke and Gertler, 1989; Kiyotaki and Moore, 1997). In emerging market and developing economies (EMDEs), where disclosure standards are weaker, informality more pervasive, and insolvency regimes less transparent, both information acquisition and collateral enforcement are further hindered (La Porta et al., 1998), possibly altering the nature of monetary policy transmission (De Leo et al., 2024).[2] Yet the scarcity of micro-level firm data in EMDEs means that remarkably little is known empirically about how financial frictions shape the process of monetary policy transmission in these economies.

This paper fills this gap by identifying mechanisms through which monetary policy transmits to credit in Mexico and by assessing their relative strength. We use high-frequency identification to isolate monetary policy shocks, following Gertler and Karadi (2015), Jarociński and Karadi (2020), Bahaj et al. (2022), Cloyne et al. (2023), and Gnewuch and Zhang (2025), and we employ Jordá's (2005) local projection method on a unique dataset covering the universe of bank loans to private firms. This dataset identifies the lending bank, borrowing firm, firm age, sector, recent credit delinquencies, municipality, firm-size status, and loan amounts. While prior work has examined monetary policy effects in EMDEs, including the impact of US and European monetary policy in Mexico (Morais et al., 2019), we are the first to study the effects of an EMDE's own monetary policy on credit and employment, to identify those effects using high-frequency shocks, and to examine transmission channels at such a granular level. Rather than only documenting monetary policy impacts, we also uncover the transmission mechanism itself using micro-level data.

Aggregating our database to the firm-month level, we obtain over 10 million observations from more than 225,000 firms. This granular information provides the statistical power and the firm- and sector-level heterogeneity needed to examine the financial-frictions channel, which operates through borrowers' informational and collateral constraints, and the interest-rate channel, which operates through the sensitivity of demand to changes in the cost of capital. Because our dataset lacks employment data, we complement it with an external employment database to conduct regional-level analysis and gain preliminary insights into the response of employment growth.

The results indicate that both transmission mechanisms are active. However, our findings run counter to the pattern documented for advanced economies (Durante et al., 2022): in our setting, the financial-frictions channel dominates the interest-rate channel. This result is robust across all dimensions of firms' financial constraints that we consider. We also find that the financial-frictions channel is particularly strong among less-capitalized banks. These banks are less able to absorb losses associated with higher delinquency or lower asset prices, and thus, more likely to reduce risk-taking after tightening. Accordingly, their stronger response through the financial-frictions channel, relative to the interest-rate channel, provides additional support for the former as the dominant mechanism in an EMDE like Mexico.

Mexico is a particularly representative, and therefore informative, case. In terms of central bank structure and the organization of the monetary policy framework, it is similar to the average EMDE: on Romelli's index of the legal and institutional design of central banks, Mexico scores 0.6485, less than one-tenth of a standard deviation from the mean (0.6598) among the 117 IMF-defined EMDEs in the sample. At the same time, its credit market is shallower and its financial depth lower than in most advanced economies, as is typical of EMDEs,[3] making it a relevant setting for understanding how monetary policy

---

[2] De Leo et al. (2024) document a "short-rate disconnect" in EMDEs, where market rates fail to track policy rates and often rise during recessions. They attribute this impaired transmission to the banking sector's reliance on external dollar funding, which links local market rates to fluctuations in global funding premia.

[3] The figures for the central bank index are calculated for the sample period. According to BIS data and the BIS classification of AEs and EMDEs, the average credit-to-GDP ratio for the former economies is 162% over the sample, more than double of the latter's average (excluding China).

operates in financially constrained environments. Indeed, our main result, that the financial-friction channel is stronger than the interest-rate channel, is consistent with evidence concerning most EMDEs that weaker financial disclosure, pervasive informality, limited collateral availability, fragile legal systems, and poor-quality credit registries exacerbate information asymmetries and, in turn, intensify financial constraints relative to advanced economies.

To construct proxies for financially constrained firms (Cloyne et al., 2023), we obtain from the credit dataset information about firm size, age, and recent credit delinquency to test for the financial friction channel. Younger firms have shorter credit histories, which matter even more in EMDEs where borrower information is limited, and should therefore be more affected by financial frictions. Consistent with this, young firms in our data receive smaller loans (8.96 million pesos vs. 27.84 million for old firms), maintain relationships with fewer banks (1.27 vs. 1.50), and rely more on highly capitalized banks, which are better positioned to take on risk. An advantage of age is its exogeneity to both monetary policy and the business cycle. As alternative measures, we also consider size and credit performance, since SMEs and firms with recent credit defaults should likewise face tighter frictions. In addition, we classify sectors based on product durability to empirically to test for the interest-rate channel.

To construct monetary policy shocks, we exploit high-frequency changes in expectations of policy rates reflected in derivative contracts, within a window spanning 10 minutes before to 20 minutes after Banco de México's communiqué on monetary policy announcement days.

The results indicate that a contractionary monetary policy significantly reduces credit growth 12 months after the shock. The effect emerges earlier, is stronger, and persists longer for young firms than for mature or old firms, providing robust evidence of the financial frictions channel. Specifically, credit growth falls significantly 12, 15, and 16 months after the shock for young, mature, and old firms, respectively. After 16 months—when all responses are significant—young firms exhibit the strongest decline in credit growth.

Regarding firm size, credit growth to SMEs begins declining significantly 12 months post shock and remains so for two years, while large firms show no significant response. Firms with recent delinquency react earlier and more than non-defaulting firms, with statistically significant differences. Since SMEs and defaulting firms may be more affected by financial frictions, these findings provide further support for a financial-frictions mechanism.

We also examine the interest-rate channel by analyzing credit growth across sectors producing goods with different durability (Dedola and Lippi, 2005; Peersman and Smets, 2005). The contraction in credit growth occurs later in non-durable manufacturing, becoming significant 16, 10, 14, and 11 months after the shock in non-durables, durables, construction, and services, respectively. Furthermore, the decline in non-durables is weaker than in the other sectors, providing support for the existence of the interest-rate channel.

Since both the financial-frictions and interest-rate channels are active, we assess their relative strength by combining firm age with sectoral durability. Being both young and operating in the durables sector amplifies the reduction in credit growth. For young firms, credit growth declines earlier and more strongly than for non-young firms, also highlighting the role of age alone, and thus financial frictions. However, while producing non-durables has a slightly larger effect, conditional on age the difference between durables and nondurables is not statistically significant, indicating that sector alone does not alter monetary policy transmission. Overall, we find that the financial-frictions channel outweighs the interest-rate channel.

We also examine how banks' capitalization shapes the transmission of monetary policy by assessing whether the financial-friction channel outweighs the interest-rate channel for less-capitalized banks. Financial frictions operate at both the firm and bank levels (e.g., Gertler and Kiyotaki, 2015; Kashyap and Stein, 2000; Gerali et al., 2010), as both require sufficient net worth to access funding. For banks, lower capitalization reduces their ability to absorb losses, limits funding, and constrains risk-taking. Consequently, less-capitalized banks are more likely to cut credit to riskier borrowers. Evidence from the risk-taking channel supports this view: less-capitalized banks shift credit more toward safer borrowers under contractionary policy (Borio and Zhu, 2012; Jiménez et al., 2014; Ioannidou et al., 2015).

We find that credit growth declines earlier and more sharply for young firms in any sector than for non-young non-durables, indicating that age (alone or combined with durables) affects monetary policy transmission for less-capitalized banks. However, producing durables alone does not alter the response. In contrast, for more capitalized banks, the credit growth responses of young durables, young non-durables, and non-young durables do not differ from non-young non-durables. Overall, our results suggest that the larger strength of the financial frictions channel is stronger for less capitalized banks, that is, those less able to absorb capital losses, consistent with evidence from the risk-taking channel.

Using a public dataset, we gain insights into the effects of monetary policy on employment growth. Municipalities with a stronger presence of young and mature firms in the banking system experience larger employment growth declines, supporting the financial-frictions mechanism. Responses in non-durable manufacturing are weaker than in services, slightly weaker but not significantly different from construction, and not different from durable manufacturing, providing only weak evidence of an interest-rate channel. Overall, the financial-frictions channel dominates the interest-rate channel also for employment growth.

We conduct additional exercises to address two concerns: (i) the surprise series may embed information effects, whereby the central bank conveys private information about economic conditions (Nakamura and Steinsson, 2018); and (ii) markets may revise their perceived Taylor rule in response to new macroeconomic or financial data (Bauer and Swanson, 2023). To address (i), we follow Jarociński and Karadi's (2020) "poor man's" filter, excluding observations where swap rate changes and stock price movements share the same sign around announcements. To address (ii), we regress the surprise series on preannouncement macroeconomic and financial news to remove data-driven responses. Both approaches produce results closely matching the baseline findings.

We further verify robustness by replacing the taxonomy used in Federal Reserve and Statistics Canada reports with the European Classification of Economic Activities when testing for the interest-rate channel. The results are qualitatively the same.

This paper contributes to an emerging literature on advanced economies showing that firm characteristics shape monetary policy transmission. Cloyne et al. (2023) find that young, non-dividend-paying US firms experience the largest borrowing declines following tightening, highlighting financial-friction channels. Durante et al. (2022) show that investment falls one to two years after tightening and that, while both the interest-rate and credit channels operate, the interest-rate channel dominates in Europe. Kalemli-Özcan et al (2022) use a firm-bank matched dataset for Europe to quantify the real effects of these micro-frictions, finding that corporate debt overhang and rollover risk accounted for roughly 20% of the cumulative decline in aggregate private sector investment in the European crisis. Jeenas (2019) finds that low-cash firms reduce capital accumulation more sharply, and Gnewuch and Zhang (2025) show that expansionary shocks induce "lumpy" investments, especially in young US firms.

The paper also relates to a smaller strand of research that uses high frequency methods in EMDEs. Pirozhkova et al. (2024) find that communication shapes monetary policy transmission in South Africa. De Leo et al. (2022) show that EMDEs lower policy rates when activity slows but short-term market rates often rise. Vicondoa (2019) shows that anticipated US interest rate shocks can reduce output in EMDEs even before rate changes. Like this literature, we use high frequency methods to identify monetary policy shocks. However, we focus on the monetary policy of an EMDE, like Pirozhkova et al. (2024), and are the first to combine high-frequency causal identification with an administrative micro firm-level dataset to uncover transmission channels dominate in an EMDE and show which dominate.

The paper shares similarities with Li et al. (2024), who identify a "risk-weighting channel" in China driven by the specific implementation of Basel III, our contribution is distinct: we show that bank-level capitalization is a primary determinant of which macroeconomic transmission channel dominates (frictions vs. interest rates) across the broader private sector in an EMDE, regardless of specific regulatory reforms

Finally, the paper connects to work on the link between monetary policy and credit. For Mexico, Morais et al. (2019) show that US and European monetary policy affect credit in Mexico. Mejía-Castelazo et al. (2025) find that the effect of monetary policy on credit intensifies during periods of economic weakness. Chiguil-Rojas et al. (2024) show that banks facing stronger frictions adjust their behavior more in response to monetary policy.

The rest of the paper is organized as follows. Section 2 reviews the literature documenting that financial frictions are more severe in EMDEs. Section 3 details the high-frequency monetary policy identification method and the datasets. Section 4 outlines the econometric framework and examines the average credit response to monetary policy shocks. Section 5 analyzes heterogeneous responses across firm groups. Section 6 examines responses across banks with different capitalization levels. Section 7 presents employment growth results, and Section 8 provides robustness checks. Section 9 concludes.

2. Institutional background

Information asymmetries complicate the assessment of credit risk, generating financial frictions that are often more severe in EMDEs, where legal and institutional frameworks tend to be weaker (for evidence, see the empirical literature below). Conceptually, the literature models these frictions in two main ways: (1) the costly-state-verification framework, introduced by Bernanke and Gertler (1989) and later developed by Carlstrom and Fuerst (1997) and Bernanke et al. (1999); and (2) the collateral-constraint approach, proposed by Kiyotaki and Moore (1997) and further extended by Jermann and Quadrini (2012) and Iacoviello (2005), among others.

In the costly-state-verification framework, financial frictions stem from the fact that lenders cannot freely observe a borrower's project returns or remaining assets and must incur in costly actions to do it. Under the optimal contract, lenders incur these costs only when the borrower defaults, because they then need to verify the borrower's net worth to seize it and recover part of their loss (Bernanke and Gertler, 1989; Carlstrom and Fuerst, 1997). In the collateral constraint framework, frictions arise from collateral requirements: borrowers must pledge assets that lenders can seize in the event of default to recover part of their loss. The credit borrowers can obtain therefore depends on the value and enforceability of the collateral they can provide (Kiyotaki and Moore, 1997; Iacoviello, 2005).

Thus, the conceptual literature indicates that financial frictions are lower in countries where the costs of verifying borrowers' income and assets are smaller. The frictions are also lower where borrowers hold more assets or banks accept a broader range of collateral, possibly, because they are easier to enforce. In extensions of these frameworks involving repeated interactions, financial frictions are further reduced when borrowers can build reputational capital and demonstrate creditworthiness. Hence, lower monitoring costs, greater collateral availability, and stronger reputation mechanisms all help mitigate asymmetries and improve lenders' ability to assess credit risk (Monnet and Quintin, 2005).

On the empirical front, studies show that EMDEs underperform along these four dimensions and therefore face more severe frictions. First, in these economies income and asset verification is more costly than in advanced economies. Weak disclosure and accounting standards limit interpretability, clarity, and comparability across projects, exacerbating information asymmetries (La Porta et al., 1998; Levine, 1999). Second, high levels of informality further raise monitoring costs. Informal firms often lack financial records, avoid traceable transactions, and mix personal with business finances, complicating assessments of income, repayment capacity, and credit risk (Auriol and Warlters, 2005; La Porta and Shleifer, 2008, 2014; Farazi, 2014).

Third, collateral availability is more limited in EMDEs. Firms are smaller and hold fewer liquidable assets, restricting their ability to obtain credit on favorable terms (Menkhoff et al., 2012; Nguyen and Qian, 2012). Moreover, even when collateral is pledged, enforcement is often problematic due to weaker insolvency regimes. Bankruptcy laws frequently impose automatic stays and fail to prioritize secured creditors, while judicial inefficiencies further hinder legal enforcement (La Porta et al., 1998; Levine, 1998, 1999; Demirgüç-Kunt and Maksimovic, 1998, 1999). Therefore, the use of collateral —which limits lenders' losses and thus financial frictions — is more restricted in EMDEs.

Finally, borrowers in these economies find it more difficult to build reputational capital. Credit registries—which share information on borrowers' repayment histories and delinquency rates—are less common than in advanced economies (Djankov et al., 2007). Their limited availability reduces borrowers' ability to signal reliability and constrains lenders' capacity to infer repayment ability from past behavior when information about a project's profitability is unavailable.

In sum, weaknesses in EMDEs' legal and institutional environments amplify information asymmetries and the incidence of financial frictions, making credit provision more difficult in these economies.

3. Data

3.1. Monetary Policy Shocks

Endogeneity poses significant challenges for identifying the effect of monetary policy on credit. This policy may respond to unobservable factors that also influence credit and, in certain circumstances, also to credit itself. To estimate its causal effect, it is therefore necessary to isolate the exogenous component of monetary policy—that is, the component not influenced by credit or other factors affecting it. This challenge is common in the macroeconomic literature (e.g., Nakamura and Steinsson, 2018); thus, we adopt techniques used in this literature to isolate exogenous variation (Gertler and Karadi, 2015).

Specifically, we use a high-frequency identification approach (e.g., Gertler and Karadi, 2015; Jarociński and Karadi, 2020). This method exploits changes in expectations of policy rates—reflected in derivative contracts—within narrow windows around monetary policy announcements. If these windows are sufficiently short and no other systematic events affect derivative prices within these windows, the observed changes in expectations capture only the surprises generated by the announcements (Stock and Watson, 2018). Thus, calculated in this way, the monetary policy surprises are not influenced by credit or unobservable factors influencing it, meaning that they address endogeneity and reverse causality concerns.

To calculate shocks, ideally, an overnight indexed swap (OIS) directly tied to the policy rate would be used. However, in Mexico, the swap market primarily references the 28-day interbank equilibrium rate (TIIE28D), which closely tracks—but does not exactly match— the policy rate. Among the instruments linked to the TIIE28D, the 3-month interest rate swap is the most liquid and widely traded. Unlike the TIIE28D itself, calculated once daily by the central bank, the 3-month swap is traded continuously, allowing intraday measurement of rate fluctuations. We obtain 3-month interest rate swap data from Bloomberg.

We measure the change in this rate within a window spanning 10 minutes before to 20 minutes after Banco de México's monetary policy communiqué on announcement days, including extraordinary meetings. Figure 1 shows the surprises and movements in the policy rate from January 2011 (when swap rate data first became available) through December 2019, a period chosen to avoid potential distortions from the COVID-19 pandemic. 4 As is common with cleanly identified surprises (Nakamura and Steinsson, 2018), these shocks exhibit a less predictable pattern than the raw rate. Like other central banks, Banco de México communicates with markets ahead of announcements. Nevertheless, some events—such as the 50-basis-point rate cut in June 2014—generated surprises. As noted by the central bank, this decision responded in part to a downward revision in growth forecasts following unexpectedly weak activity data released just two weeks prior to the announcement. [5]

We address concerns that high-frequency surprises may misrepresent monetary policy shocks when the private sector is uncertain about the central bank's reaction function (i.e., the Taylor rule). In such cases, news releases—for example, a strong jobs report—may lead markets to expect a different central bank response than what actually occurs. This gap can affect the surprise series, and the news itself may influence the outcome variable, creating a correlation unrelated to a true shift in policy stance. Thus, we follow the methodology proposed by Bauer and Swanson (2023) by conducting a robustness check where we recalculate our surprises-orthogonalizing them against news released prior to announcements. While Bauer and Swanson (2023) focused on U.S. indicators like nonfarm payrolls and the S&P 500, we expand this adjustment to include Bloomberg survey data on surprises in Mexican and U.S. GDP growth, inflation, unemployment, stock indices, yield curves, exchange rates, the Fed funds rate, and commodity prices.

Recent literature also highlights that high-frequency surprises may misrepresent monetary policy shocks when the private sector interprets central bank decisions as conveying private information—the "information effect" (Nakamura and Steinsson, 2018). For example, a rate hike could signal that the central bank expects stronger growth, which may in turn raise growth expectations and affect the outcome variable

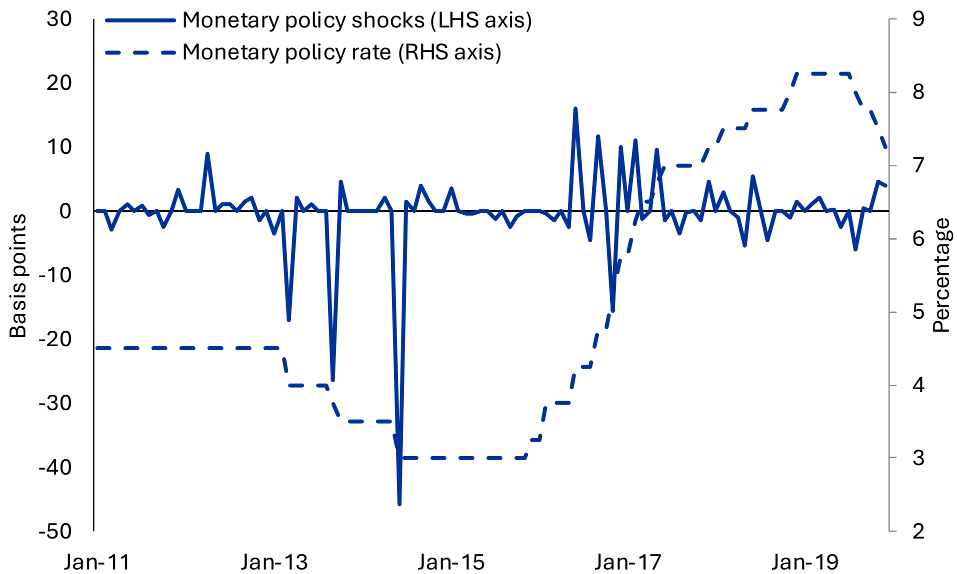
---

[4] Months without monetary policy decisions, and therefore without surprises, are assigned a value of zero.

[5] The monetary policy statement of June 6th, 2014 states that "for 2014 economic growth will be lower than expected just a couple of weeks ago," highlighting that the downward revision to growth forecasts was based on data released very shortly before the policy decision, to which markets may not have given proper weight.

for reasons unrelated to an actual policy shift. To mitigate this, we apply the "poor man's" adjustment of Jarociński and Karadi (2020) and exclude cases where swap rates and stock prices move in the same direction, as these may reflect information effects. For this adjustment, we use stock price data from Bloomberg.

Figure 1. Monetary Policy Shocks in Mexico



Source: Banco de México.

3.2. Firm-level data

We use a proprietary dataset from the central bank of Mexico (Banco de México) containing confidential and comprehensive information on all credit lines issued by private commercial banks to private firms in the country. Commercial banks are required to submit monthly reports to the regulatory authority, the Comisión Nacional Bancaria y de Valores (CNBV), detailing all loans granted to non-financial private firms, regardless of loan or firm size.

For each loan, we identify the issuing bank (lender), the borrowing firm (borrower), the loan amount, whether the loan is performing or in default, the firm's foundation date, its economic sector, and its municipality. Regulatory guidelines stipulate banks must consider a loan as non-performing when the borrower fails to meet payment obligations within a specified period—between 1 and 90 days, depending on loan terms. [6]

To conduct the baseline analysis in Section 4, we aggregate the loan-level data into a firm-level dataset by summing all loans granted to each firm by all commercial banks. Following Durante et al. (2022), we exclude sectors unlikely to respond to monetary policy, such as agriculture, mining, and those with significant government ownership. The dataset spans from January 2011—when monetary policy shock became available—through December 2019, thus avoiding the COVID-19 pandemic. This process yields a monthly firmlevel panel dataset comprising 225,098 firms and 10,548,362 firm-month observations.

To assess heterogeneous monetary policy responses in Section 5, we calculate firms' age. Age may determine the intensity with which monetary policy transmits through the financial frictions channel. Specifically, we define a firm's age as the number of years between the date of observation and its foundation date. In forming groups, we follow the approach of Cloyne et al. (2023) and classify a firm as

[6] A loan must be classified as non-performing when: (1) interest or principal payments are overdue by 90 days or more; (2) payments have been refinanced, capitalized, or rolled over for 90 days or more; or (3) there is substantial evidence indicating the loan should be considered non-performing even if it has not reached the 90-day threshold.

young if it is between 0 and 10 years old, as mature if it is older than 10 but no older than 20 years old, and old if it is over 20 years.

In Section 5, we also examine heterogeneous responses by firm size, as small firms may face tighter financial constraints. To classify firms, we follow the methodology used by the central bank in its flagship reports, which is based on credit history. Specifically, a firm is considered small if, up to that month, it has not obtained a loan exceeding 100 million pesos (in 2018 constant prices), and large if it has received at least one loan above this threshold. We also analyze potentially heterogeneous responses among firms that, based on recent credit performance, may be perceived as riskier, subject to greater information asymmetry, and more likely to face tighter financial constraints. To classify firms under this criterion, we use data on loan performance and identify those that defaulted in previous years.

We also group firms into sectors based on the durability of the goods and services they produce. This durability may determine the intensity with which monetary policy transmits through the interest rate channel. Specifically, we define four groups using the North American Industry Classification System (NAICS) under which the dataset is classified: (i) we include all 3-digit subsectors under the 2-digit NAICS code 23 (labeled as Construction) in a group called "Construction"; (ii) and (iii) we split 3-digit subsectors under NAICS codes 31–33 (Manufacturing Industries) into "Durable Manufacturing" and "Non-Durable Manufacturing," based on a NAICS classification used by the Federal Reserve and Statistics Canada, and include them in groups called "Durable Manufacturing" and "Non-Durable Manufacturing," respectively; and (iv) all remaining 3-digit subsectors are services; thus, we include them in an additional group called "Services." [7]

Finally, in Section 6, we analyze whether financial frictions operate differently across banks with varying levels of capitalization. Lower capitalization reduces a bank's ability to absorb losses, thereby constraining its lending and risk-taking capacity. It also makes it more difficult for banks to obtain funding, which may in turn further limit their lending capacity (Gertler and Kiyotaki, 2015). Hence, these banks and their borrowers may be more strongly affected by a contraction in monetary policy that amplifies financial frictions. To assess whether banks with different capitalization levels respond differently, we use the proprietary dataset to link firms with their lending banks and classify them according to their levels of capitalization.

3.3. Bank level-data and employment information

To classify banks as more or less capitalized, we use publicly available information from the CNBV website. The dataset includes balance sheets and income statements for all regulated commercial banks, providing information on banks' characteristics. We retrieve information on two measures reported by the CNVB, banks' capital adequacy ratio (ICAP) —a measure of widely used under international frameworks such as Basel — and their core capital. Both measures provide an assessment of a bank's ability to absorb losses and lend.

In Section 8, we also use a publicly available dataset to assess the effects of monetary policy on employment. This dataset, published by the Mexican Social Security Institute (IMSS, by its Spanish acronym), covers formal private-sector workers. Since all private firms in Mexico are required to contribute a fraction of each employee's salary to the IMSS, this institution maintains detailed records of all formal private-sector workers.

3.4. Summary Statistics

Services account for by far the largest share of firms with credit (72%), a pattern that is even stronger among SMEs (Table 1). Yet service firms receive smaller loans—9.07 million pesos—so their share of total amount of outstanding credit is much lower (47%). Although services dominate in the number of firms, particularly SMEs, this dominance does not extend to the number of young firms (46% vs. 47% in

[7] For a complete list of 3-digit NAICS sectors included in each broad category, see Table A1 in the Appendix, and for the classification used by the FED and Canada: https://www.federalreserve.gov/releases/g17/.

construction, 40% in durable manufacturing, and 36% in non-durable manufacturing). The number of bank relationships—another measure of credit access—is lowest in both construction and services (1.34).

Table 2 presents summary statistics by age groups. Young firms account for the largest share of firms (45%), followed by mature firms (35%) and old firms (20%). However, consistent with the notion that young firms are perceived as riskier and face tighter frictions, they receive smaller loans (8.96 million pesos). Thus, young firms account for a smaller share of total outstanding credit (29%) than mature and old firms (31% and 40%, respectively).

However, unlike service firms, young firms do not show a stronger dominance in the number of SMEs: their share in the SME population is similar to their share in the overall firm population. However, young firms maintain relationships with fewer banks than mature and old firms (1.27, 1.42, and 1.50 banks, respectively), indicating that, regardless of firm size, they find it more difficult to relate with multiple banks and obtain credit. Hence, young firms receive smaller loans, account for a smaller share of total credit, and maintain fewer banking relationships, suggesting that they are perceived as riskier and face tighter frictions.

Consistent with this view, more capitalized banks—which are better equipped to take on risk than less capitalized banks—grant a higher share of their credit to young firms. In particular, young firms represent 38% of total credit for highly capitalized banks (versus 27% and 35% for mature and old firms) and only 27% for lowly capitalized banks (versus 31% and 41% for mature and old firms, respectively).

These findings further support the view that financial frictions at the bank level amplify those at the firm level: banks with lower capitalization, facing tighter funding constraints, are less able to lend to riskier firms—such as young firms—and are presumably also more likely to reduce lending to them when their own credit constraints tighten, for instance following a contractionary monetary policy.

Table 1. Summary Statistics by sector group

	(1) Durable manufacturing	(2) Construction	(3) Services	(4) Non-durable manufacturing	T-test Difference (3)-(4)	(2)-(4)	(1)-(4)
Share in the total number of firms (proportion)/1	0.09	0.10	0.72	0.09	-0.62***	-0.63***	-0.64***
	(0.00)	(0.00)	(0.01)	(0.00)			
Average loan amount (million pesos in 2018 constant prices)/2	24.71	31.15	9.07	22.50	22.08***	13.43***	15.64***
	(335.14)	(233.95)	(151.99)	(197.56)			
Share in outstanding credit (proportion)/1	0.15	0.23	0.47	0.15	-0.24***	-0.31***	-0.31
	(0.01)	(0.04)	(0.04)	(0.01)			
Share in the total number of small firms (proportion)/1	0.08	0.10	0.73	0.09	-0.63***	-0.63***	-0.64***
	(0.00)	(0.00)	(0.01)	(0.00)			
Share of young firms (proportion)/1	0.40	0.47	0.46	0.36	0.02	-0.09***	-0.06***
	(0.03)	(0.05)	(0.03)	(0.03)			
Average number of banks with which firms have a credit relationship (number of banks)/2	1.49	1.34	1.34	1.53	0.00*	0.19***	0.15***
	(0.91)	(0.76)	(0.73)	(0.95)			
Share in credit granted by lowly capitalized banks (proportion)/1	0.16	0.21	0.47	0.16	-0.26***	-0.31***	-0.31***
	(0.01)	(0.03)	(0.04)	(0.01)			
Share in credit granted by highly capitalized banks (proportion)/1	0.13	0.35	0.41	0.12	-0.06***	-0.29***	-0.28***
	(0.06)	(0.08)	(0.05)	(0.02)			

Source: Authors' calculations based on data from Banco de Mexico.

Notes: We first calculate the average net capital to total assets ratio for each bank over the available pre-sample period and, then, classify them as more or less capitalized based on whether their average capital is above or below the median of all banks. Descriptive statistics based on administrative data at firm-level from January 2011 to December 2019. Size is defined based on firms' credit history as the central bank does in its flagship reports: for each month, a firm is considered a small firm if it has not obtained a loan exceeding 100 million pesos at 2018 constant prices up to that month. Average loan amount measured in Mexican pesos at constant prices of the second half of July 2018. /1 For each group of firms, we calculate their share for each month and then take the average across months. 2/ For each group of firms, we take the average across firms and months. ***, **, * denote significance at the 1%, 5% and 10% significance levels.

Table 2. Summary Statistics by age group

	(1) Young	(2) Mature	(3) Old	T-test Difference (2)-(3)	T-test Difference (1)-(3)
Share in the total number of firms (proportion)/1	0.45	0.35	0.20	0.15***	0.24***
	(0.03)	(0.01)	(0.02)		
Average loan amount (million pesos in 2018 constant prices)/2	8.96	11.80	27.84	-16.04***	-18.88***
	(122.48)	(179.19)	(290.86)		
Share in outstanding credit (proportion)/1	0.29	0.31	0.40	-0.10***	-0.12***
	(0.01)	(0.03)	(0.04)		
Share in the total number of small firms (proportion)/1	0.45	0.35	0.20	0.16***	0.25***
	(0.03)	(0.01)	(0.02)		
Average number of banks with which firrms have a credit relationshisp (number of banks)/2	1.27	1.42	1.50	-0.08***	-0.24***
	(0.63)	(0.82)	(0.93)		
Share in credit granted by lowly capitalized banks (proportion)/1	0.27	0.31	0.41	-0.10***	-0.14***
	(0.01)	(0.03)	(0.04)		
Share in credit granted by highly capitalized banks (proportion)/1	0.38	0.27	0.35	0.07***	0.03**
	(0.06)	(0.05)	(0.09)		

Source: Authors' calculations based on data from Banco de Mexico.
Notes: Firms are classified as young if they are between 0 and 10 years old, mature if they are between 11 and 20 years old, and old if they are older than 20 years. To classify banks, we calculate the average net capital to total assets ratio for each bank over the available pre-sample period and, then, classify them as more or less capitalized based on whether their average capital is above or below the median of all banks. Descriptive statistics based on administrative data at firm-level from January 2011 to December 2019. Size is defined based on firms' credit history as the central bank does in its flagship reports: for each month, a firm is considered small if it has not obtained a loan exceeding 100 million pesos at 2018 constant prices up to that month. Average loan amount measured in Mexican pesos at constant prices of the 2nd half of July 2018. /1 For each group of firms, we calculate their share for each month and take the average across months. 2/ For each group of firms, we take the average across firms and months. ***, **, * denote significance at the 1%, 5% and 10% significance levels.

4. Empirical Framework

4.1. Baseline specification

To estimate the effect of a monetary policy shock on firm credit at different horizons, we use a panel local projection model *á la Jordá* (2005). Specifically, in our empirical approach we follow closely the strategy of Cloyne et al. (2023) and Gnewuch and Zhang (2025) and consider the following specification:

$$\Delta^{*} C_{i,0} = \alpha_i^0 + \sum_{g=1}^{G} \gamma_g^0 * D_i^g + \sum_{g=1}^{G} \beta_g^0 * D_i^g * \varepsilon_t + u_{i,t} \quad (1)$$

.

.

$$\Delta_h^{*} C_{i,t} = \alpha_i^h + \sum_{g=1}^{G} \gamma_g^h * D_i^g + \sum_{g=1}^{G} \beta_g^h * D_i^g * \varepsilon_t + u_{i,t+h}$$

where α_i^0 is the fixed effect for firm i ; $\Delta^* C_{i,0}$ is the growth rate of firm i's credit at month t, calculated as the log difference in its credit between the year preceding t and the previous year; D_i^g is a variable equal to 1 if the firm belongs to group g (for example, young firms) and 0 otherwise; γ_g^0 is the group-level fixed effect, which controls for unobservable characteristics at the group level, such as intrinsically different growth rates across groups; we interact D_i^g with the monetary policy shock ε_t;[8] β_g^0 measures the contemporaneous credit growth response to a monetary policy shock in t for firms of group g and is our coefficient
of interest; and $u_{i,t}$ is the error term for firm i at month t; α_i^h; $\Delta_h^* C_{i,t}$; γ_g^h; β_g^h and $u_{i,t+h}$ are the corresponding firm fixed effect, h-forward growth rate of credit, group fixed effect; coefficient of interest, and error term for horizon $h \in (0,1, ..24)$.

4.2. Average effect of monetary policy shocks on credit growth

We present estimates of the effects of monetary policy on credit growth for the full sample of firms. These results serve as a benchmark for the heterogeneous firm analysis of section 5, where we show responses for firms of different age, size, credit performance and sectors.

To this end, we use the specification from equation (1) and, accordingly, omit the group variables D_i^g and replace the group-specific coefficient β_g^h with a single parameter β^h for each horizon h. The average response of credit growth to monetary policy shocks over h = 0,
1, 2, …, 24 months is then given by the sequence of estimates β^0, β^1, … , β^{24}.[9]

Figure 2 shows the results. It depicts the estimated effect in percentage points (pp) on credit growth (Y-axis) of a 1 basis point (bp) upward monetary surprise at different horizons h (X-axis). Consistent with the fact that obtaining credit typically takes time, the effect is not statistically significant either contemporaneously or during the first 11 months. Instead, the monetary policy shock exerts a negative and statistically significant effect on credit growth beginning in month *t+12*: it peaks at *t+23*, where a 1 bp upward surprise diminishes credit growth by 0.20 pp, and persists for at least one year (from *t+12* to *t+24*). Both the timing and the duration are broadly consistent with findings in the literature on the impact of monetary policy on other variables, such as investment, for other economies.

When assessing magnitudes, comparisons with traditional approaches—such as standard VARs—are not straightforward. High-frequency methods like ours typically yield larger shocks and effects, partly due to the information they capture. Consistent with this, Gertler and Karadi (2015) show that even small high-frequency shocks to short-term rates can generate large increases in credit costs within a VAR, because they also reflect movements in spreads and term premia. These dynamics may, in turn, affect bank-lending spreads and amplify the estimated impact. Relative to studies using similar high-frequency identification, our results fall within a comparable range. For instance, Durante et al. (2022) find that a 1bp upward shock reduces the investment rate by 0.34 pp one year later in European countries, exceeding the 0.08-point decline we observe for credit growth. The timing and duration of our effects are also broadly consistent with theirs, as they similarly report that the statistical significance of monetary policy shocks dissipates after the second year.

5. Heterogenous Responses

5.1. Financial frictions channel: credit responses across age, size and non-performing loans

We analyze heterogeneous credit growth responses. A large body of research shows that (i) financially constrained firms react more strongly to monetary policy (Bernanke and Gertler, 1995), and (ii) such frictions are more severe in EMDEs (see Section 2). Yet empirical evidence on how monetary policy affects

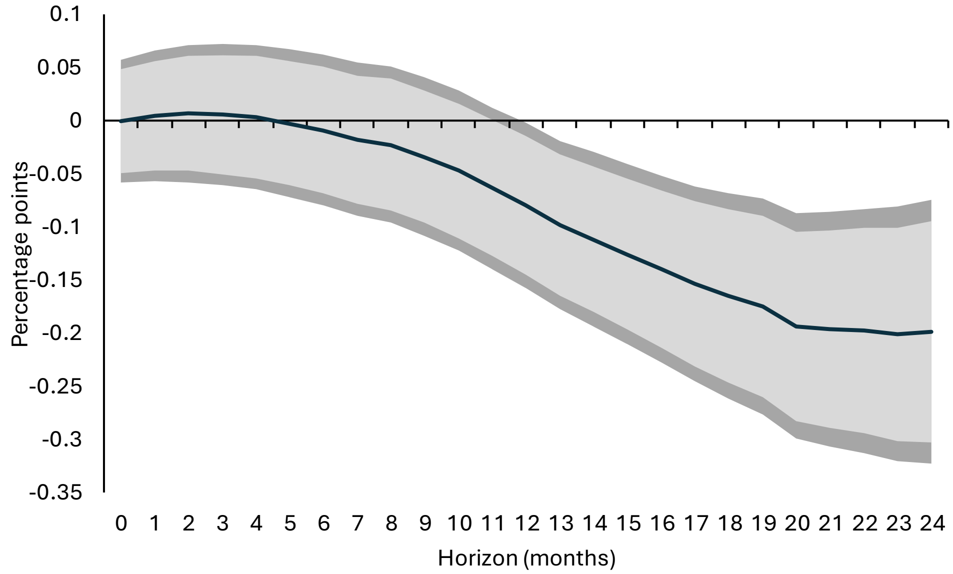
---

[8] Including lagged variables increases the parameter space without necessarily improving identification, as commonly argued in local projection models.

[9] Following Durante (2022), we maximize observations for each horizon and use all available months for all firms for the local projections. Hence, firms that enter the sample at the end of the dataset will not be in the regression at further horizons implying that the number of observations declines as the horizon increases.

firms with different characteristics remains limited—especially credit markets featuring strong financial frictions—and there is no consensus on how to measure financial frictions (Ferrando and Mulier, 2015).

Figure 2. Average firm level credit growth response to monetary policy shocks



Source: Authors' calculations based on data from Banco de México.
Notes: Effect of a 1-basis-point monetary shock on credit growth. Shaded areas represent 90 and 95 percent confidence intervals. Errors clustered at firm and month level.

The literature often relies on proxy variables, particularly those capturing information asymmetry. We use firm age, as younger firms typically lack sufficient fixed assets to pledge as collateral and have shorter credit histories, making them less able to overcome informational asymmetries. We also consider firm size and recent credit default. Smaller firms generally face greater financing constraints due to higher idiosyncratic risk and weaker collateral, while firms with recent delinquency are more likely to be perceived as risky.

The literature emphasizes that one of the advantages of age is its exogeneity to both monetary policy and the business cycle. Studies like Gertler (1988) and Hadlock and Pierce (2010) highlight the relevance of firm age, and more recent work—including Cloyne et al. (2023), Bahaj et al. (2022), and Durante et al. (2022)—uses this proxy when analyzing monetary policy transmission. Moreover, age may be more relevant in EMDEs, where mechanisms traditionally used to mitigate information asymmetries—such as credit bureaus—are less effective. Hence, overall, we view age as the preferred measure.

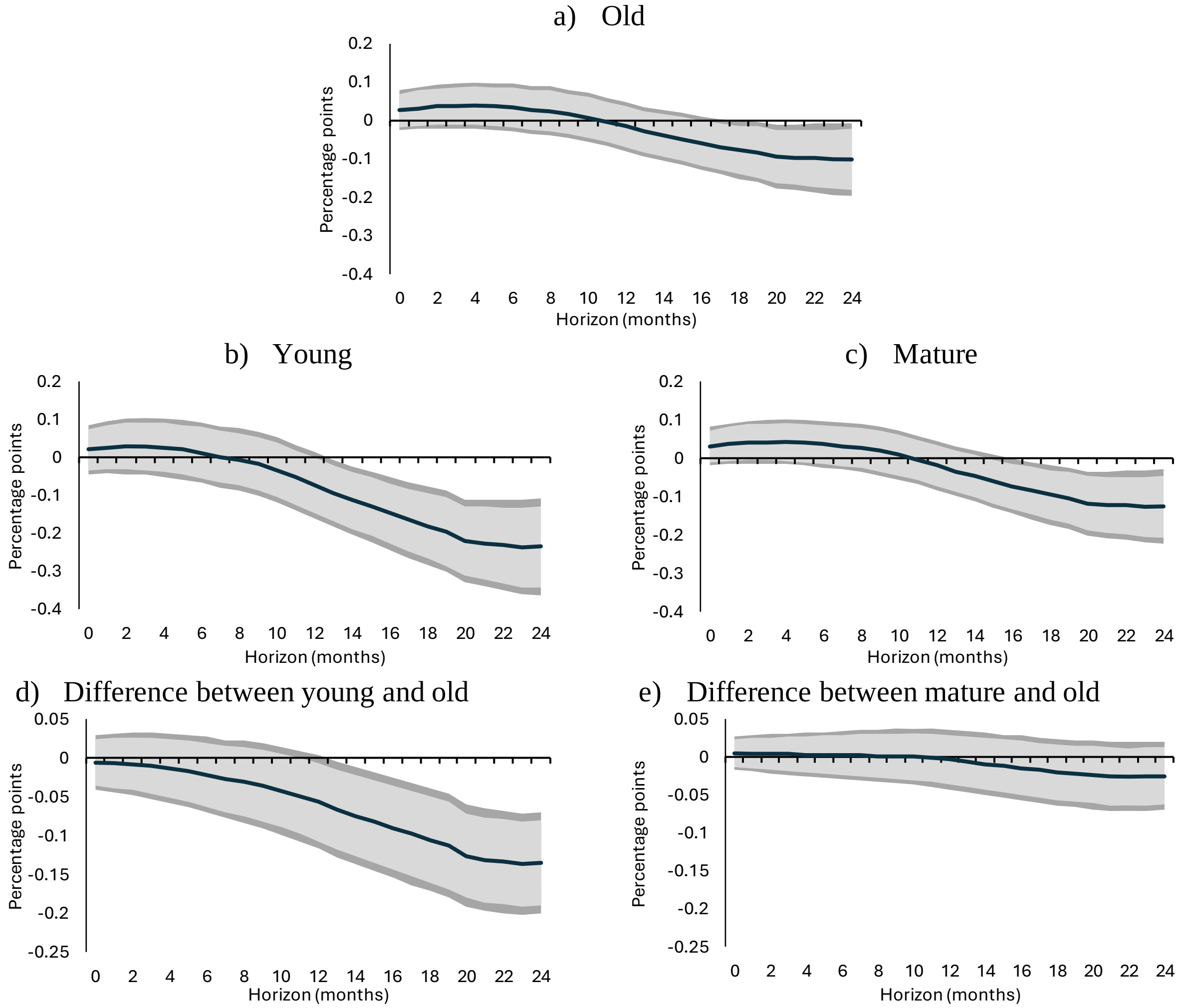
When using age, we assign each firm to one of the groups described in Section 3.2, depending on the number of years that have elapsed since its creation up to a given moment. Thus, we add the subscript t to the variable D_i^g in equation (1) to indicate that a firm may transition from one group to another over time. Specifically, we define $D_{i,t}^y$, $D_{i,t}^m$, and $D_{i,t}^o$ that take the value of 1 if firm i is young (up to 10 years), mature (between 10 and 20 years), and old (over 20 years) and 0 otherwise. We also interact them with the monetary policy shock.

Figure 3 shows the impulse response functions of credit growth to a monetary policy shock for old, young, and mature firms (panels a, b, and c, respectively). The figure also reports the differences between these responses, along with their confidence bands: between young and old firms (panel d), and between mature and old firms (panel e). We obtain estimates of these differences and their confidence bands by running equivalent regressions reformulated such that old firms are the reference group.

The responses diverge across groups. A contraction in monetary policy has a negative and statistically significant effect on credit growth 12 months (and up to at least 24 months) after the shock for young firms, 15 months (and up to at least 24 months) after the shock for mature firms, and 16 months (and up to at least 24 months) after the shock for old firms.

At the 16-month horizon—when the response is statistically significant across all groups—credit growth reacts most strongly among young firms, with a point estimate of 0.15, compared to -0.07 for mature firms and -0.06 for old firms. Thus, the effect of monetary policy on credit is around 6 percent larger for young firms than for the average firm, while the effect for mature and old firms is about 48 percent and 58 percent smaller, respectively.

Figure 3. Firm level credit response to monetary policy shocks by age



Source: Authors' calculations based on data from Banco de México.

Notes: Shaded areas represent 90 and 95 percent confidence intervals. Errors clustered at firm and month level.

Similarly, the difference in credit growth responses between young and old firms (panel d) is statistically significant from t+12 onward, whereas the difference between mature and old firms (panel e) is not statistically significant at any horizon. Overall, these results suggest that the effects of monetary policy shocks begin earlier, are stronger, and are considerably more persistent for younger firms than for mature and old firms, providing strong support for the financial-frictions transmission mechanism of monetary policy in Mexico. This finding is consistent with Cloyne et al. (2023) and Durante et al. (2022).

For heterogeneity based on firm size, we define a variable ($D_{i,t}^{s}$) for small firms that equals one at month *t* if firm *i* has never obtained a loan exceeding 100 million pesos (at 2018 prices) up to the previous month (i.e., up to *t-1*), and a variable for large firms ($D_{i,t}^{l}$) that equals one if firm i has obtained a loan exceeding that amount.

The results show that credit growth to small firms begins to decline significantly 12 months after the shock and remains statistically significant two years later (Figure A1, panel a, in the Appendix). In contrast, credit growth to large firms does not respond significantly at any horizon (Figure A1, panel b, in the Appendix). Consistently, the difference between the two responses is statistically significant from *t+13* onward (Figure A1, panel c, in the Appendix). Hence, the results suggest that small firms react strongly to monetary policy shocks—similar to young firms according to our results, and in contrast to Crouzet and Mehrotra (2020) and Durante et al. (2022) for advanced economies.

For recent defaults, we define a dummy ($D_i{}^{d}{}_{,t}$) that equals one if firm *i* had a nonperforming loan during the second year prior to *t*, and a variable ($D_i{}^{nd}{}_{,t}$) that equals one if it did not have non-performing loans over that period. The two-year lag ensures that the variable is independent of the other variables considered in the regression, while also giving banks enough time to observe the final outcome of the non-repayment situation.

Credit growth to defaulting firms declines significantly on impact (Figure A2 in the Appendix), whereas credit growth to non-defaulting firms decreases significantly only in the 13th month. In that month, the response of defaulting firms is stronger, with a point estimate of –0.41 compared to –0.08 for non-defaulting firms. More generally, the difference between the responses of defaulting and non-defaulting firms is negative and statistically significant from *t+0* onward; that is, defaulting firms react earlier and more strongly to monetary policy. Since defaulting firms are arguably perceived as riskier by banks, this result provides additional support for the financial-frictions transmission mechanism of monetary policy.

5.2. Interest-Rate channel

We assess the interest-rate channel by analyzing credit growth responses across sectors (see Dedola and Lippi, 2005; Peersman and Smets, 2005). To this end, we include four variables in equation (1) —one for each sectoral group: $D_i{}^{md}{}_{,t}$; $D_i{}^{mnd}{}_{,t}$; $D_i{}^{cons}{}_{,t}$; and $D_i{}^{serv}{}_{,t}$ —which equal 1 for firms in durable manufacturing, non-durable manufacturing, construction, and services, respectively, and 0 otherwise.

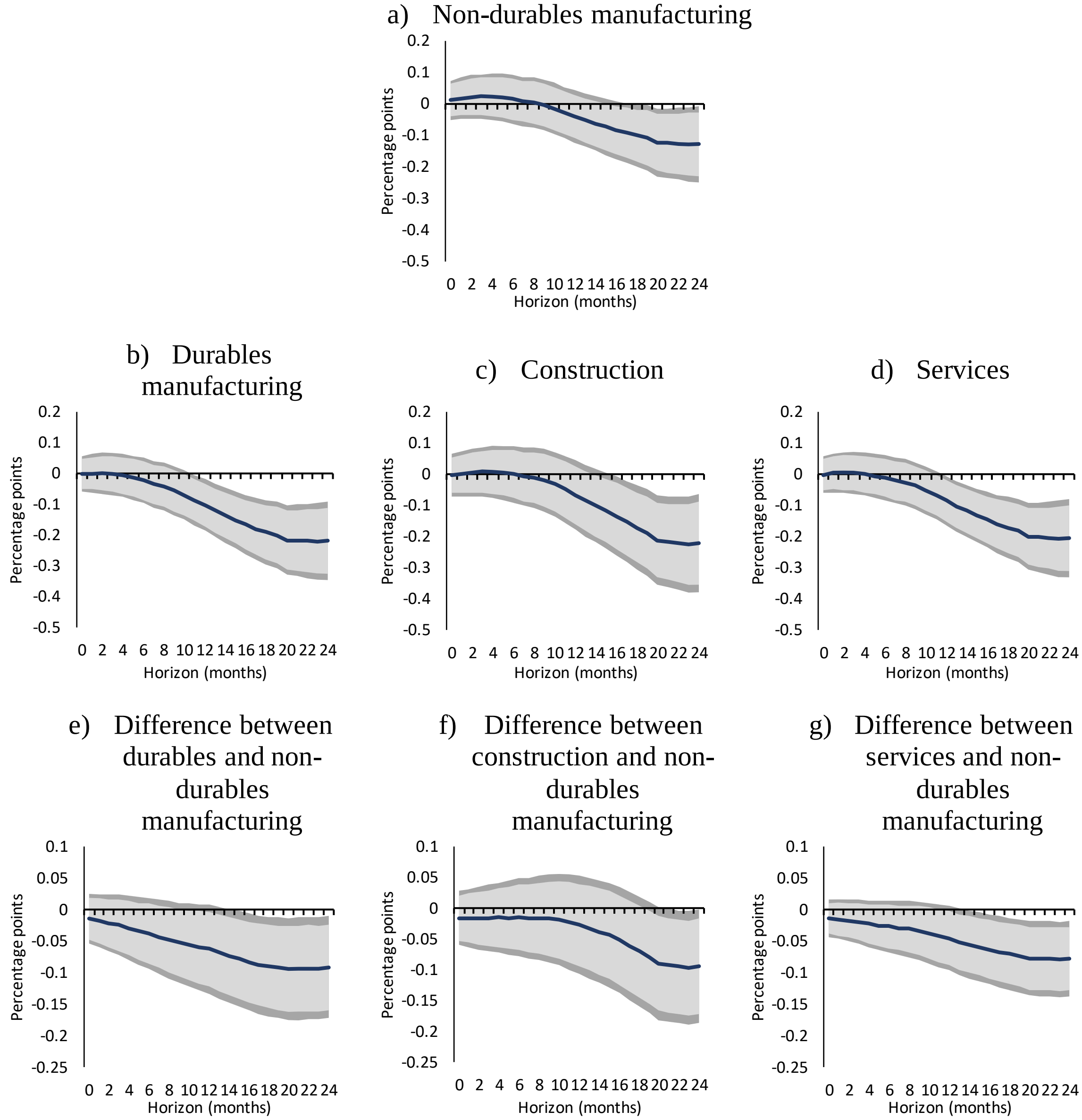
In the non-durable manufacturing sector, credit growth begins to decline later than in the other sectors: the effect becomes significant 16, 10, 14, and 11 months after the shock in nondurables, durables manufacturing, construction, and services, respectively (Figure 4, panels b, c, and d). At month t+16, when responses are significant in all sectors, a 1-bp contraction in monetary policy reduces credit growth by 0.17, 0.08, 0.13, and 0.15 pp in durable manufacturing, non-durable manufacturing, construction, and services, respectively.

The results further show that the response in non-durable manufacturing is indeed significantly weaker than in the remaining sectors (panels e, f, and g). For instance, compared to durables, credit growth in non-durables declines by 0.09 pp less at a 20-month horizon.

The earlier and stronger response of construction and services relative to non-durables warrants discussion. Construction, despite its separate classification, produces inherently durable assets—buildings and infrastructure—whose demand is highly sensitive to interest rates, consistent with the interest-rate channel. The services response is better understood through the financial-frictions lens: as Table 1 shows, services firms in Mexico are disproportionately small and young, and therefore more exposed to financial constraints. A monetary tightening thus amplifies the credit contraction for service-sector firms through borrower-level frictions, not through interest-rate sensitivity of demand. These patterns are, in fact, consistent with our broader finding in Section 5.3 that the financial-frictions channel is the dominant mechanism: the key prediction of the interest-rate channel—that non-durable manufacturing responds least—is confirmed, while the responses of construction and services are better accounted for by durability and financial frictions, respectively.

Hence, the interest-rate channel is an active mechanism through which monetary policy is transmitted to credit growth in Mexico. This suggests that a contraction in monetary policy raises interest rates, making financial assets more attractive than durable goods and thus reducing the expected sales of these goods. Lower expected sales make it less favorable for banks to extend credit to firms producing such goods and for these firms to demand financing.

Figure 4. Firm level credit response to monetary policy shocks by sector



Source: Authors' calculations based on data from Banco de México.
Notes: Shaded areas represent 90 and 95 percent confidence intervals. Errors clustered at firm and month level.

5.3. Financial Frictions Channel vs Interest-Rate Channel

We compare the strength of the financial-frictions and interest-rate channels by combining the age-based grouping with sector durability. We extend the analysis by also combining firm size and default status—the alternative measures of financial constraints—with the sector durability classification.

To combine age and durability, we form four groups following Durante et al. (2022). We simplify age categories by merging mature and old firms into a single non-young group, leaving two age groups: young and non-young. We also merge non-durable manufacturing, construction, and services into a single non-durables group, resulting in two sector categories: durables and non-durables. Thus, we define a variable $D_{i}^{g}{}_{,t}$ that that equals 1 if firm i belongs to one of the four resulting groups g in month t, and 0 otherwise where g ∈ $(y_d, y_{nd}, ny_d, ny_{nd})$ corresponds to young durables, young non-durables, non-young durables, and nonyoung non-durables, respectively. Each firm is assigned to one of these groups.

Credit growth declines significantly 14 months after the shock for firms that are not young and do not operate in the durables sector (the reference category), with the effect remaining significant until *t+24* and, at a 20-month horizon, it reaches 0.13 pp (Figure 5). The response occurs earlier and is stronger for young firms in the durables sector, as expected because both the financial-frictions and interest-rate channels are active. Specifically, the credit reduction becomes significant at *t+11* and, at a 20-month horizon, is 0.20 pp larger than in the reference group. This stronger response is statistically significant from *t+13* until at least t+24 (Figure 5, panel e). Hence, being both young and operating in the durables sector significantly amplifies the reduction in credit growth triggered by a contraction in monetary policy.

The effect of being young alone is notable. For young non-durables, credit growth also diminishes earlier and more—it is significant at *t+13* and remains so until *t+24*. At a 20month horizon, it falls by 0.08 pp more than in the reference group, with the difference being significant from *t+17* to *t+24*. Hence, regardless of sector durability, firm age is a key determinant of the credit growth response to monetary policy. In turn, they underscore the importance of the financial frictions channel in a shallow market like those of other EMDEs.

However, the conclusion is different for durability, as shown by the comparison between non-young durables and the reference group. For non-young, firms credit growth responds slightly more in the durable sector, but the difference with non-durables is not statistically significant. That is, the effect of producing non-durables alone is not significant.

Overall, the results indicate that, although both the financial frictions and interest-rate channels are active, the former mechanism is stronger. This result follows naturally from the institutional environment documented in Section 2: in credit markets of EMDEs like Mexico's, information asymmetries are more severe—due to weaker disclosure standards, pervasive informality, limited collateral, and underdeveloped credit registries—and financial frictions are therefore expected to have a stronger influence on monetary policy transmission. While Morais et al. (2019) document that foreign banks in Mexico engage in risk-taking following external shocks, our results demonstrate that domestic monetary policy itself transmits primarily through a financial-frictions channel that affects young and small firms across the entire banking system. The finding is also broadly consistent with Durante et al. (2022), who document that the interest-rate channel dominates in Europe, where financial frictions are comparatively mild. Together, these results suggest that the institutional environment is a key determinant of which channel prevails.

Turning to firm size, credit growth to large firms in the non-durables sector (the reference group) does not decline significantly at any horizon (Figure A3 in the Appendix). In contrast, credit growth to small firms in the same sector diminishes significantly. In the durables sector, credit growth also to small firms responds more than in the reference group (with the difference being only weakly significant from *t+14* to *t+24*), indicating that size alone plays a somewhat significant role in monetary policy transmission. By contrast, the response of large firms is not different in the durables and non-durables sectors, suggesting that producing durables, by itself, does not affect this transmission.

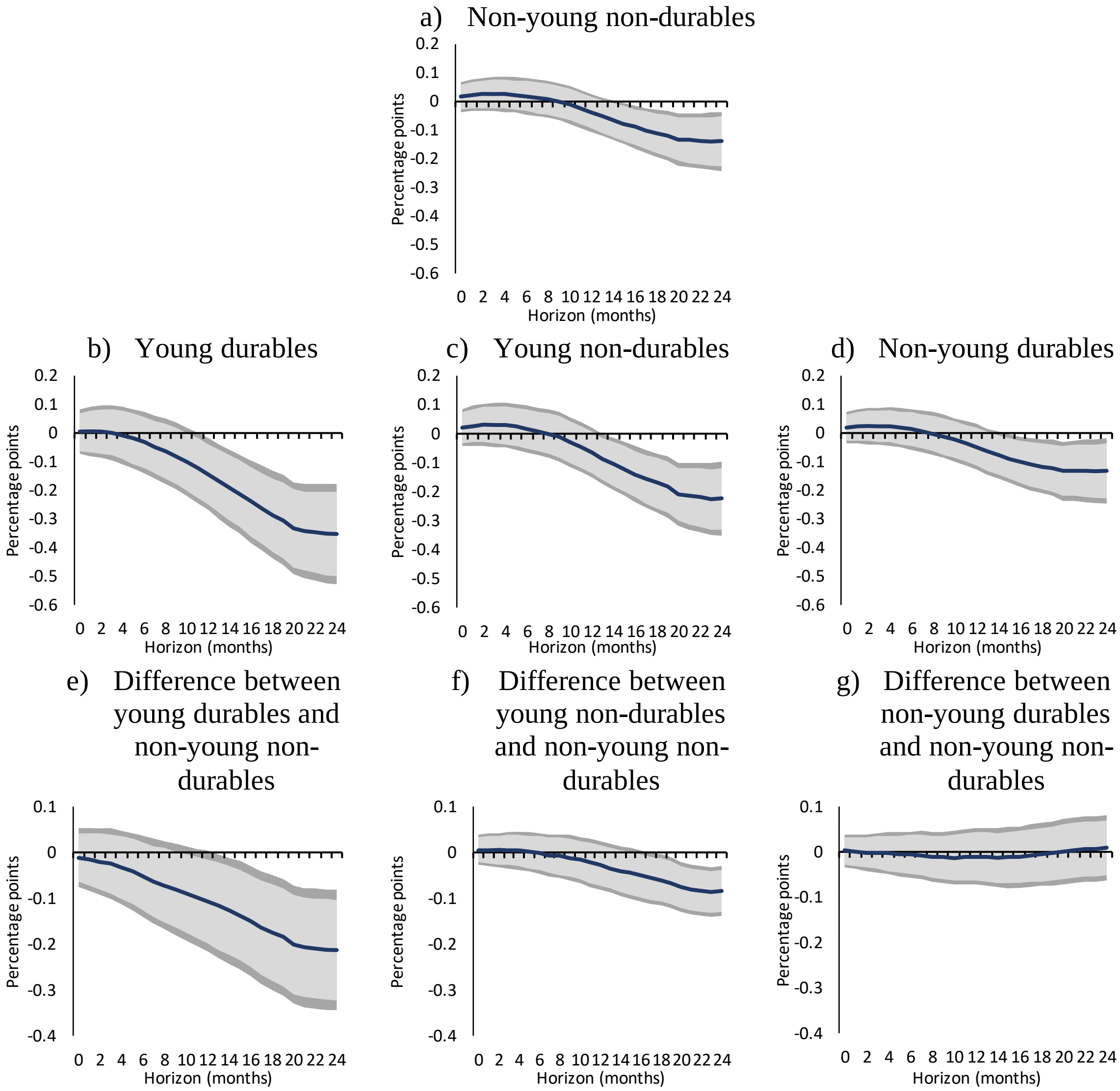
Turning to recent defaults, credit growth to non-defaulting firms in the non-durables sector (the reference group) declines significantly 13 months after the shock (Figure A4 in the Appendix). For defaulting firms in durables, credit growth reacts earlier and more strongly, revealing a strong joint effect of default status and producing durables. For defaulting firms in non-durables, credit growth also reacts earlier and more sharply, indicating that default status alone shapes monetary policy transmission. In contrast, credit growth to non-defaulting firms shows no difference between durable and non-durable sectors, suggesting that producing durables alone does not affect the response to monetary policy.

Consistent with the previous results for age-durability, the findings for firm size and credit performance suggest that the financial frictions channel of monetary policy is stronger than the interest-rate in assessing the effect of monetary policy.

6. Financial Frictions vs Interest-Rate channels: the Role of Capitalization

Financial frictions arise at both the firm and bank levels (e.g., Gertler and Kiyotaki, 2015; Kashyap and Stein, 2000; Gerali et al., 2010), as both often need sufficient net worth to access funding. For banks, capitalization is central: lower capitalization reduces their capacity to absorb losses, makes funding harder to obtain, and limits their ability and willingness to take on risk (Gertler and Kiyotaki, 2015). Consistent with this, Section 3.4 showed that lesscapitalized banks lend less to young firms than better-capitalized ones.

Figure 5. Firm level credit response to monetary policy shocks by age-durability



Source: Authors' calculations based on data from Banco de México.

Notes: Shaded areas represent 90 and 95 percent confidence intervals. Errors clustered at firm and month level.

These financial constraints are shaped by monetary policy (e.g., Gerali et al., 2010; Gertler and Kiyotaki, 2015). A monetary tightening can worsen loan repayment conditions, increase delinquency, or reduce asset prices, generating capital losses that may prompt banks to cut lending to riskier borrowers. Less-capitalized banks—being less able to absorb losses—may therefore be more likely to reduce credit to risky firms; they may be more exposed to the financial-friction mechanism. This behavior mirrors evidence from other large emerging markets; for example, Li et al (2026) find a 'risk-weighting channel' in China where bank branches constrained by capital adequacy regulations significantly shift credit allocation between risky and safe borrowers following policy shocks. Similar to the Chinese experience, our data shows that less-capitalized Mexican banks are the primary drivers of the financial-frictions channel as they are more pressed to curb risk-taking.

This section compares the strength of the channels for firms borrowing from lesscapitalized banks. Evidence from the risk-taking channel supports this view, as it shows that less-capitalized banks shift credit more strongly toward safer borrowers under contractionary policy (e.g., Borio and Zhu, 2012; Jiménez et al., 2014; Ioannidou et al., 2015).

To classify banks, we use their capital adequacy ratio (ICAP), defined as net capital over risk-weighted assets—a standard measure of banks' loss-absorption capacity under international frameworks such as Basel. [10] Using this capitalization metric yields the same results as using the CNBV's alternative measure, core capital; thus, we refer only to the ICAP. For each bank, we compute the average ICAP over all months with data prior to the start of the estimation period and classify banks as more or less capitalized depending on whether their average ratio lies above or below the system median.

After splitting the dataset into these two subsamples, we cross age and durability groupings within each subsample and re-estimate the models from Section 5.3. For less capitalized banks, the reduction in credit growth—the reference group—becomes statistically significant at *t+14* and reaches a peak decline of 0.14 pp for non-young non-durable firms. For young durables, the contraction begins earlier and is stronger (*t+11*; 0.35 pp), indicating that being both young and operating in the durables sector matters for this subsample.

The reduction in credit growth becomes statistically significant earlier and is stronger for young non-durable than for the reference group —*t+13* and reaches 0.23 pp— indicating that being young alone is also statistically and quantitatively relevant for less-capitalized banks. Indeed, the difference in these responses is statistically significant from *t+15* (Figure A5, panel f, in the Appendix). In contrast, for non-young durables the decline in credit growth is slightly larger than for the reference group, but the difference is not statistically significant (Figure A5, panel g, in the Appendix). Hence, producing durables alone does not independently shape the credit response among less-capitalized banks.

In contrast, for more-capitalized banks, the credit growth responses of young durables, young non-durables, and non-young durables do not differ significantly from those of nonyoung non-durables at any horizon (Figure A6, panels a–c, in the Appendix). Thus, consistent with the existing literature on the risk-taking channel (e.g., Borio and Zhu, 2012; Jiménez et al., 2014; Ioannidou et al., 2015), our result indicate that the financial-friction transmission mechanism is more relevant for less-capitalized banks.

7. Extension: Channels of Monetary Policy Transmission to Employment

Studies in the literature examine the effects of monetary policy on real-sector variables in advanced economies, such as sales (e.g., Cloyne et al., 2023; Durante et al., 2022; Crouzet and Mehrotra, 2020; Ottonello and Winberry, 2020). While we lack detailed data on such variables at the firm-level, we use the most disaggregated information available to conduct an initial exploration of the effects of monetary policy on employment.

We use the database provided by the IMSS. This database contains information on the total number of registered workers and has the advantage of offering finer regional disaggregation than other datasets on real variables in Mexico. We aggregate the total number of workers at the municipality level to obtain the outcome variable, defined analogously to the previous credit analysis —i.e., the growth rate of employment for municipality m at month t.[11] We use the same specifications as in that analysis.

To explore the financial-frictions channel, we classify municipalities into the same age groups. We rank municipalities by their share of credit to young firms during the pre-sample period and classify the top

[10] First, we identify the bank or banks from which a firm borrows. If a firm borrows from only one bank, we assign that bank to the firm. If a firm borrows from multiple banks, we calculate each bank's share of the firm's total credit and assign the firm to the bank with the largest share. In rare cases (0.01% of firm-month observations), firms borrow equal shares from two or more banks in a given month, which we exclude from the regressions in this section.

[11] For example, there is an index of economic activity called Index of Global Economic Activity (IGAE) but it is not disaggregated at the regional level; there is also a survey on informal employment called "Encuesta Nacional de Ocupación y Empleo (ENOE), but it is not representative at such a regional disaggregated level.

tercile as “young,” then rank the remaining municipalities by credit to mature firms and classify the top tercile as “mature,” and identify all others as “old.”[12]

For brevity, we report differences in employment growth responses across groups (see Figure A7 in the Appendix). In municipalities with young and mature firms the employment growth response is stronger than in municipalities with old firms across all horizons. Hence, like in the previous credit analysis, we find different responses credit growth responses across age, providing for the financial-friction mechanism of monetary policy.

To assess the interest-rate channel, we classify municipalities into the same four groups as before. We rank municipalities by their share of credit to non-durables firms and classify the top quartile as non-durables, then rank the remaining municipalities by credit to construction firms to select the top quartile as construction, then rank the rest by credit to durables firms to identify the top quartile as durables, and classify all others as services. [13]

In non-durable manufacturing, the response is statistically weaker than in services; weaker than in construction, with the difference being only close to significant; and not statistically different from durable manufacturing. Thus, there are some indications that the interest-rate channel for employment is present, but this evidence is weak (Figure A8 in the Appendix).

This pattern is also evident when comparing the strength of the two channels. In young non-durables municipalities, the employment growth response is stronger than in non-young non-durables municipalities, with the difference significant (Figure A9, panel b, in the Appendix). In contrast, there is no difference between the responses of non-young durables and non-young non-durables municipalities. Hence, the results suggest that the financial friction channel is stronger than the interest-rate channel also for employment growth.

8. Robustness checks

This section presents three robustness checks. The first two address concerns about whether the surprise series accurately captures monetary policy shocks. These concerns arise from two potential issues: (i) the surprise series may embed information effects—i.e., private information about the state of the economy conveyed by the central bank through its decisions (Nakamura and Steinsson, 2018); and (ii) agents may revise their perceived Taylor rule in response to newly released macroeconomic or financial data (Bauer and Swanson, 2023). In both cases, the series would represent a contaminated proxy rather than the true monetary policy shock. The third robustness check uses an alternative classification of sectors to assess the interest-rate channel, replacing the categorization used in Federal Reserve and Statistics Canada flagship reports with one based on the European Classification of Economic Activities (NACE Rev. 2) instead of NAICS.

To address concerns (i) and (ii), we rely on the “poor man’s” method of Jarociński and Karadi (2020) and the regression-based approach of Bauer and Swanson (2023), respectively. The “poor man’s” method removes observations in the shock series where changes in the swap rate and stock prices have the same sign within announcement windows. Such comovement may indicate that the central bank announcement conveyed private information about future growth (Jarociński and Karadi, 2020). Since we lack intraday stock market data, we approximate this filtering by combining intraday swap rate changes with daily stock market data. Specifically, we measure swap rate changes within a 30-minute window around announcements (as in the baseline case) and use the daily change in the stock market index. We then exclude observations where both changes share the same sign.

The Bauer and Swanson approach consists of a first-stage regression of the surprise series on economic and financial news released before the announcement. This step purges the series of information to which the central bank might be responding with an intensity different from what markets anticipated. We include

---

[12] Due to availability of the shock, the analysis begins in January 2011; thus, the first employment data used for the outcome variable is January 2010. We use all available prior information prior to classify municipalities. We exclude small municipalities to avoid noise; those in the sample account for 99.999% of the population.

[13] The balance in the number of municipalities with credit reaches the most even distribution possible.

surprises in key macroeconomic data (Mexican and U.S. GDP growth, inflation, unemployment, and Mexican global economic activity) as well as changes in financial variables (Mexican and U.S. stock indices, yield curves, exchange rate, the federal funds rate, and commodity prices) as regressors.[14]

The results of the "poor man's" approach show that the heterogeneous responses across firm characteristics are preserved: younger firms continue to exhibit significantly stronger credit contractions than older firms, while credit to firms in durable goods sectors responds more than to those in non-durables (Figures A10–A12 in the Appendix).[15] When combining age and durability, the results confirm that age independently determines the credit response regardless of sector, whereas durability only matters when interacting with age, reinforcing our main conclusion that the financial frictions channel dominates the interest rate channel.

The results of Bauer and Swanson's approach are also qualitatively consistent with the baseline finding (Figures A13–A15).[16] Young firms experience significantly larger credit contractions than old firms, and the credit growth reduction is stronger for firms producing durable goods than for those producing non-durables. Moreover, the crossed age-durability results show again that age plays a dominant role in shaping monetary transmission, with young firms showing strong responses in both durable and nondurable sectors, while older firms in durables do not respond significantly differently from the reference group. Hence, the results confirm that our results are not driven by information effects or central bank signaling about economic conditions.

Finally, to implement the alternative sectoral taxonomy, we map our NAICS-based credit data to NACE Rev. 2. Although there is no direct correspondence between NAICS and NACE Rev. 2, the latter is based on the International Standard Industry Classification (ISIC) Rev. 4, and NACE Rev 2 and ISIC Rev. 4 are identical at the 2-digit level–the level used by Durante et el. (2022) in their sectoral taxonomy. We therefore use the ISIC Rev.4-NAICS correspondence table published by Mexico's National Institute of Statistics and Geography (INEGI) to map Durante's et al. (2022) sectoral taxonomy to our 3-digit NAICS categories.

Heterogeneous sectoral responses are preserved: credit growth declines more for firms producing durable goods than for those producing non-durables following a contraction in monetary policy. However, in contrast to the baseline results, the difference between durable and non-durable firms is statistically significant but only weakly. When crossing age with durability, the findings again show that age independently determines the credit response across durable and non-durable sectors, whereas durability matters only through its interaction with age (impulse responses for this sectoral classification are available upon request). This further strengthens our conclusion that the financial-frictions channel dominates the interest-rate channel.

9. Conclusion

This paper presents evidence on the transmission of monetary policy in an EMDE, Mexico. This is particularly important, as the mechanisms through which monetary policy operates in these economies remain insufficiently understood. Using high-frequency identification of monetary policy shocks and firm-level credit microdata, we showed that the financial frictions channel is the dominant transmission mechanism of monetary policy, surpassing the traditional interest rate channel. This finding is consistent with theoretical predictions: the weaker disclosure standards, higher informality, limited collateral availability, and less developed credit registries that characterize EMDEs (see Section 2) all amplify

[14] To calculate surprises, we take the difference between the actual release on the publication day and the median estimate in Bloomberg's survey of economists for each variable. Then, for each announcement, we sum all the differences from one day after the previous announcement up to the day of the current announcement. Changes in financial variables are computed as changes in the corresponding variable between the day of the current announcement and the day after the previous announcement. Table A2 in the Appendix shows the results of this regression. Then, we take the residuals from this regression and re-estimate the credit responses across firm groups using them as our monetary policy shocks.

[15] The average credit response, available upon request, remains negative and statistically significant from month 12 onward, with a similar magnitude and timing as in the baseline results.

[16] The average credit response, also available upon request, exhibits the same delayed but persistent negative effect beginning around month 12.

financial frictions and should therefore strengthen the financial-frictions channel relative to the interest-rate channel. The result is also broadly consistent with Durante et al. (2022), who find that the interest-rate channel dominates in Europe—a context with significantly weaker financial frictions—suggesting that the institutional environment shapes which channel prevails.

Acknowledgements

We thank Renato Yslas for outstanding research assistance.

Funding sources

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Appendix

Table A1. List of Mexican NAICS sectors and industries used in the paper

Construction
236 Construction
237 Civil engineering construction works
238 Specialized construction works
Non-durables manufacturing
311 Food industry
312 Beverage and tobacco industries
313 Textile inputs manufacturing, and textiles finishing
314 Textile products manufacturing, except apparel
315 Apparel manufacturing
316 Leather and hide tanning and finishing, and manufacturing of leather, hide and allied materials products
322 Paper industry
323 Printing and related industries
324 Petroleum and coal products manufacturing
325 Chemical industry
326 Plastic and rubber industry
Durables manufacturing
321 Wood industry
327 Nonmetallic mineral products manufacturing
331 Basic metal industry
332 Metal products manufacturing
333 Machinery and equipment manufacturing
334 Manufacturing of computer, communications, and measuring equipment, and other electronic equipment, components and appliances manufacturing
335 Electric appliances, accessories and electric power generation equipment manufacturing
336 Transportation equipment manufacturing
337 Furniture, mattresses and blinds manufacturing
339 Other manufacturing industries
Services
431 Wholesale trade of groceries, food, beverages, ice and tobacco
432 Wholesale trade of textile products and footwear
433 Wholesale trade of pharmaceutical and perfumery products, recreational goods, and small and major household appliances
434 Wholesale trade of agricultural, forestry and industrial raw materials, and waste materials
435 Wholesale trade of agricultural, industrial, commercial and services machinery, equipment and furniture, and other general purpose machinery and equipment
436 Wholesale trade of trucks and new parts for automobiles, pickup trucks and trucks
437 Wholesale trade intermediation
461 Retail trade of groceries, food, beverages, ice and tobacco

462 Retail trade in self-service shops and department stores

463 Retail trade of textile products, costume jewelry, clothing accessories and footwear

464 Retail trade of health care items

465 Retail trade of stationery supplies, recreational and other personal goods

466 Retail trade of household goods, computers, interior decorative articles and used goods

467 Retail trade of hardware and glass

468 Retail trade of motor vehicles, parts, fuels and lubricants

469 Retail trade exclusively through Internet and printed catalogs, television and similar media

481 Air transportation

482 Rail transportation

483 Water transportation

484 Freight truck transportation

485 Passenger transportation by road, except by rail

486 Pipeline transportation

487 Sightseeing transportation

488 Services related to transportation

491 Postal services

492 Courier and messenger services

493 Warehousing services

511 Newspaper, magazine, book, software and other materials publishing, and integrated publishing and printing of these publications

512 Film and video industry, and sound recording industry

515 Radio and television

517 Telecommunications

518 Electronic data processing, hosting, and other related services

519 Other information services

532 Rental and leasing of tangible goods

533 Rental services of trademarks, patents and franchises

541 Professional, scientific and technical services

551 Head offices

561 Business support services

711 Artistic, cultural and sporting services, and other related services

713 Amusement services in recreational facilities and other recreational services

721 Temporary accommodation services

722 Food and beverage preparation services

811 Repair and maintenance services

812 Personal services

Table A2. Regression of high-frequency monetary policy surprises on economic and financial data that precedes announcements

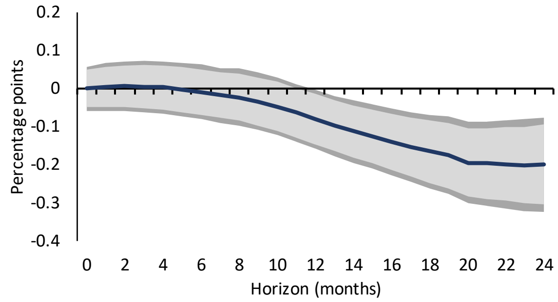
	Monetary policy shocks
Data release surprises for	
Mexican GDP	19.39**
	(8.27)
US GDP	-3.35
	(2.13)
Mexican inflation	-2.08
	(1.41)
US inflation	-3.44
	(2.64)
Mexican unemployment	-1.47
	(2.51)
US unemployment	0.38
	(0.78)
Mexican global economic activity index	-1.35
	(0.83)
Changes in	
Mexican stock market prices	18.20
	(24.87)
US stock market prices	-5.48
	(11.96)
Mexican yield curve	-7.57**
	(3.05)
US yield curve	-4.81
	(4.95)
Mexican exchange rate	23.97
	(20.53)
Fed funds rate	-1.00
	(1.12)
Commodity prices	18.39
	(18.49)
Constant	-0.05
	(0.35)
Observations	145
R^2	0.26

Source: Authors' calculations based on data from Banco de México and Bloomberg.

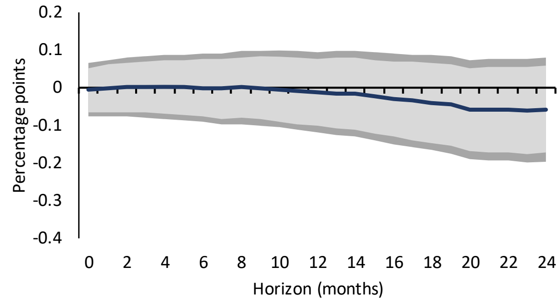
Notes: Data release surprises are calculated as follows. For each variable, we take the difference between the actual release on the publication day and the median estimate in Bloomberg's survey of economists. Then, for each policy announcement, we sum all the differences from one day after the previous announcement up to the day of the current announcement. This sum represents the data release surprise for this last announcement. In turn, changes in financial variables are computed as changes in the corresponding variable between the day of the current announcement and the day after the previous announcement. Robust standard error in parenthesis. ***, ** and * indicate significance at the 1%, 5% and 10% significance level.

Figure A1. Firm level credit response to monetary policy shocks by size

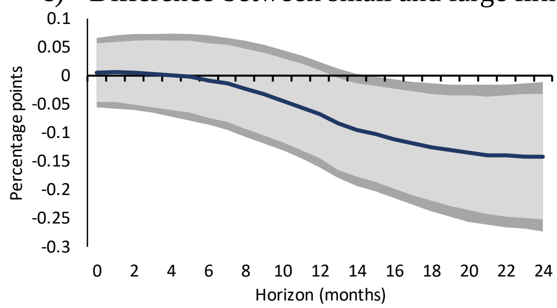
a) Small firms



b) Large firms



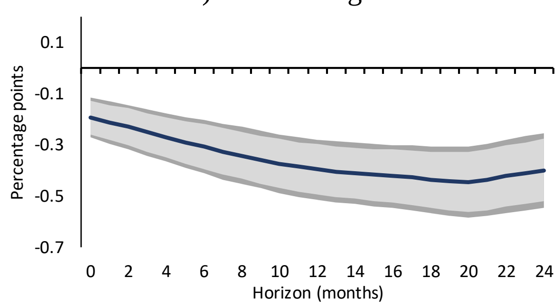
c) Difference between small and large firms



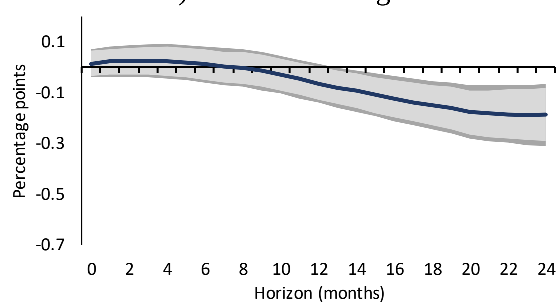
Source: Authors' calculations based on data from Banco de México.
Notes: Shaded areas represent 90 and 95 percent confidence intervals. Errors clustered at firm and month level.

Figure A2. Firm level credit response to monetary policy shocks by default status

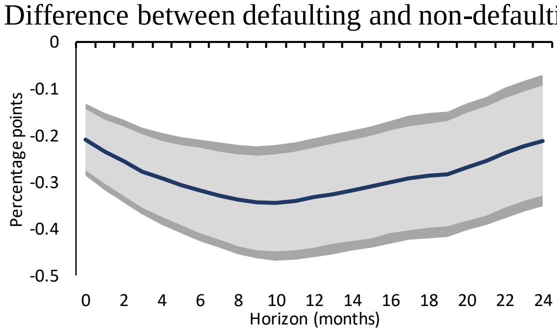
a) Defaulting firms



b) Non-defaulting firms



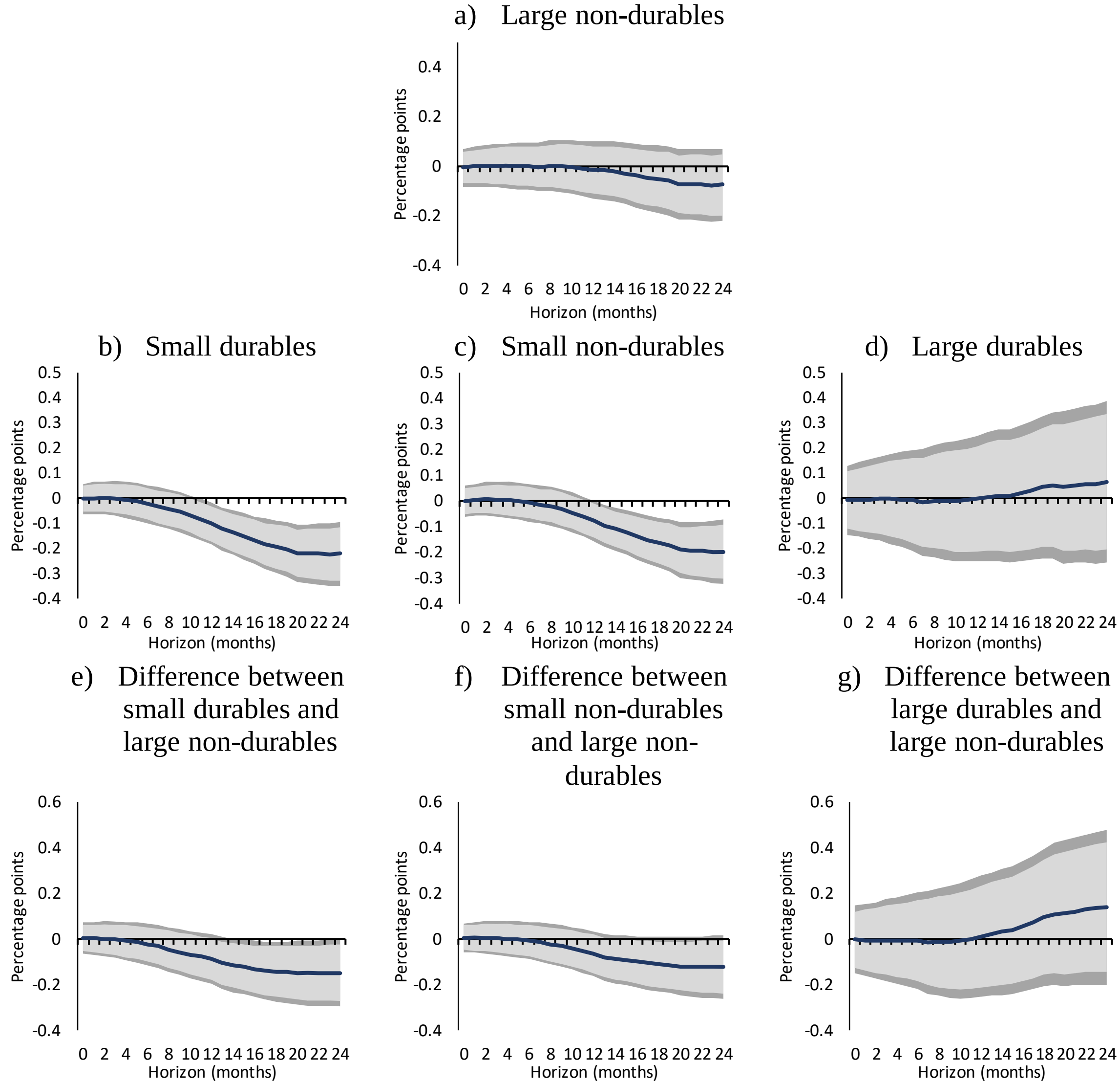
c) Difference between defaulting and non-defaulting firms



Source: Authors' calculations based on data from Banco de México.

Notes: Shaded areas represent 90 and 95 percent confidence intervals. Errors clustered at firm and month level.

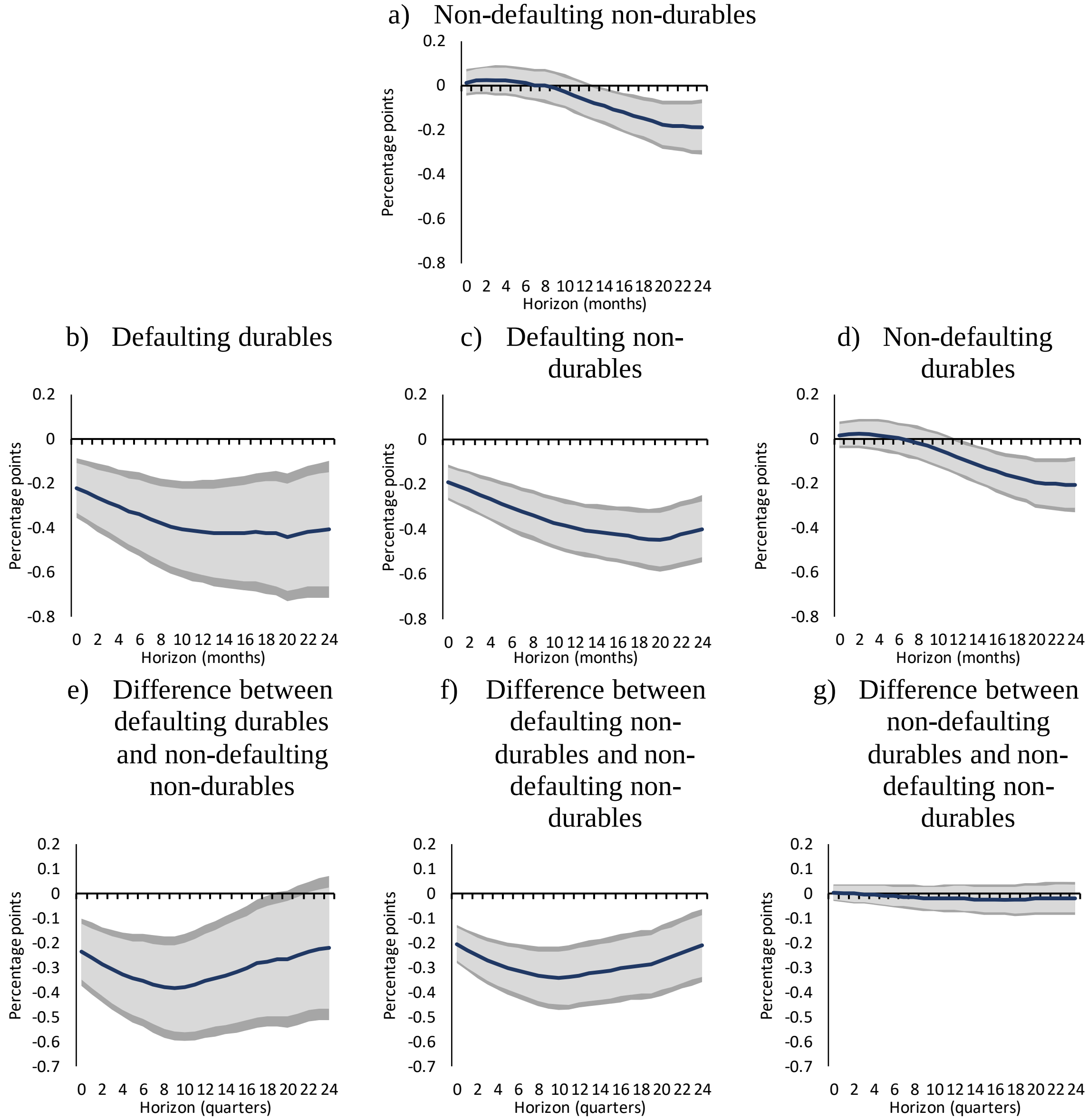
Figure A3. Firm level credit response to monetary policy shocks by size-durability



Source: Authors' calculations based on data from Banco de México.

Notes: Shaded areas represent 90 and 95 percent confidence intervals. Errors clustered at firm and month level.

Figure A4. Firm level credit response to monetary policy shocks by defaulting status-durability

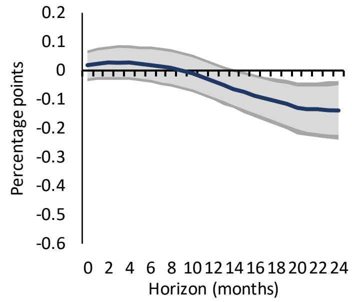


Source: Authors' calculations based on data from Banco de México.

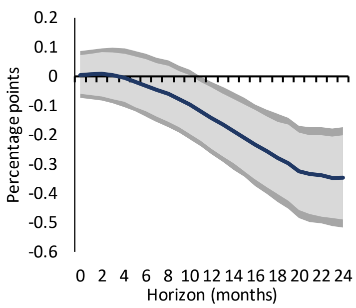
Notes: Shaded areas represent 90 and 95 percent confidence intervals. Errors clustered at firm and month level.

Figure A5. Firm level credit response to monetary policy shocks by age-durability in less capitalized banks

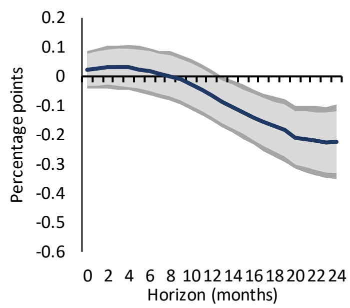
a) Non-young non-durables



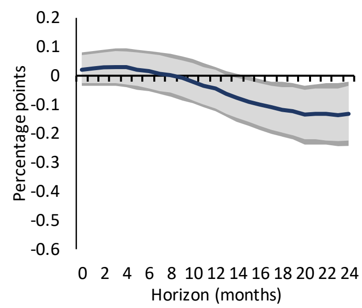
b) Young durables



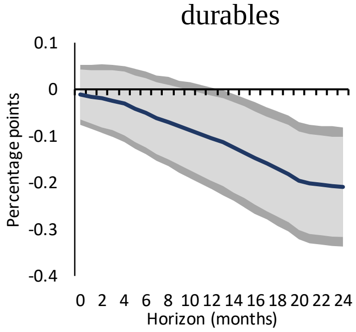
c) Young non-durables



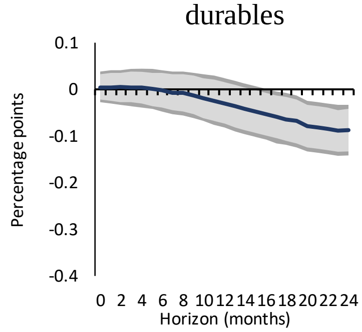
d) Non-young durables



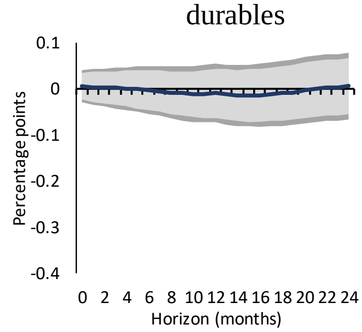
e) Difference between young durables and non-young non-durables



f) Difference between young non-durables and non-young non-durables

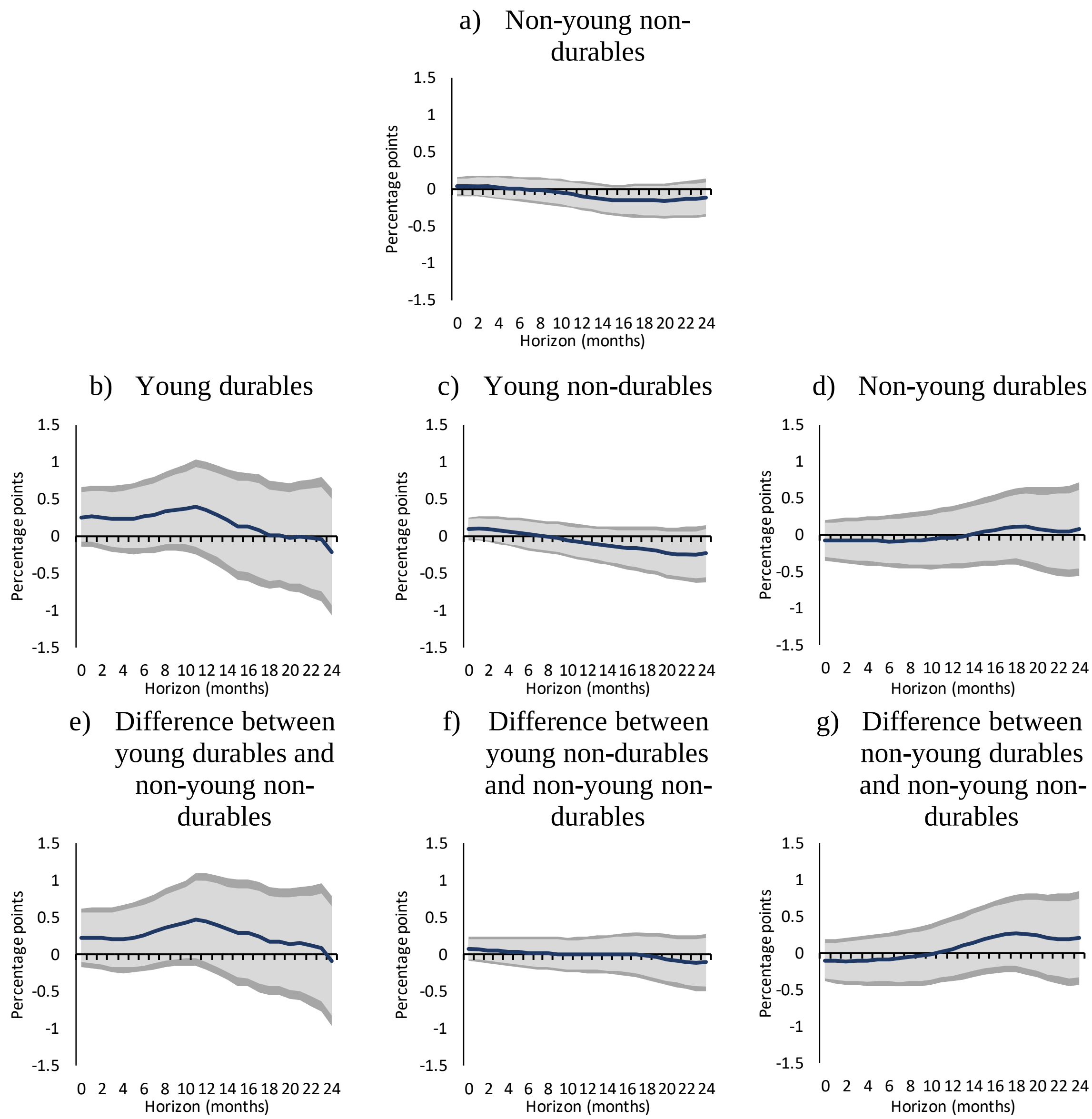


g) Difference between non-young durables and non-young non-durables



Source: Authors' calculations based on data from Banco de México and CNBV.
Notes: Shaded areas represent 90 and 95 percent confidence intervals. Errors clustered at firm and month level.

Figure A6. Firm level credit response to monetary policy shocks by age-durability in more capitalized banks

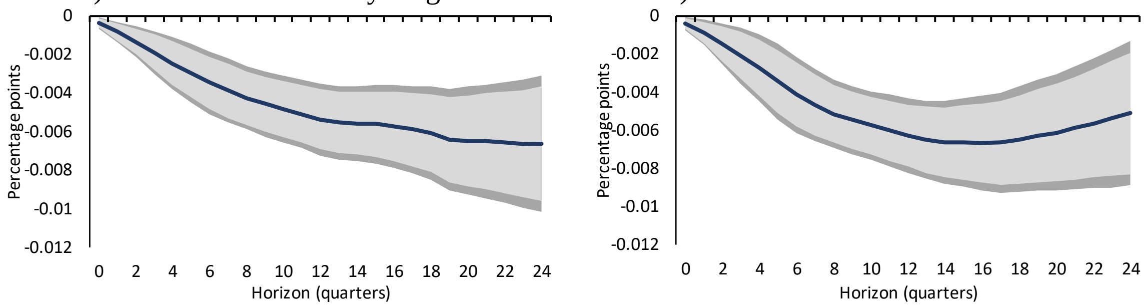


Source: Authors' calculations based on data from Banco de México and CNBV.

Notes: Shaded areas represent 90 and 95 percent confidence intervals. Errors clustered at firm and month level.

Figure A7. Municipality level employment response to monetary policy shocks by age

a) Difference between young and old   b) Difference between mature and old

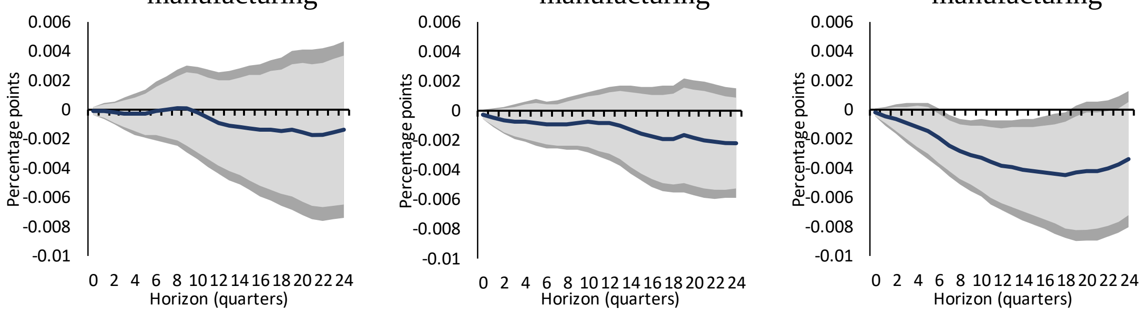


Source: Authors' calculations based on data from Banco de México, Bloomberg and IMSS.

Notes: Shaded areas represent 90 and 95 percent confidence intervals. Errors clustered at firm and month level.

Figure A8. Municipality level employment response to monetary policy shocks by sector

a) Difference between durables and non-durables manufacturing   b) Difference between construction and non-durables manufacturing   c) Difference between services and non-durables manufacturing

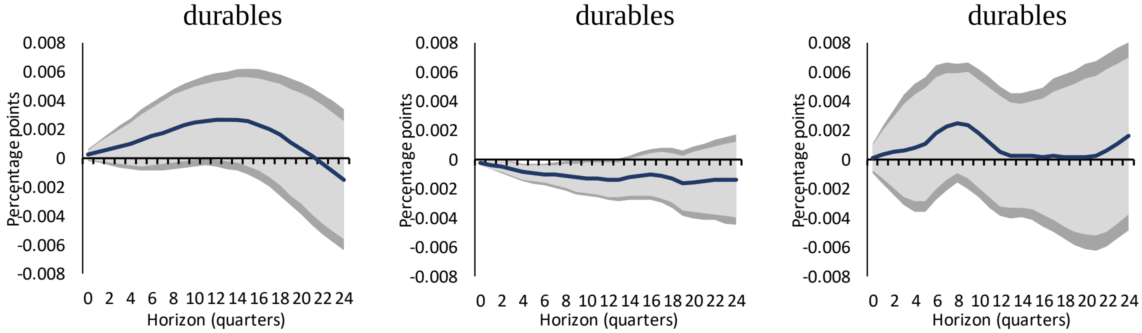


Source: Authors' calculations based on data from Banco de México, Bloomberg and IMSS.

Notes: Shaded areas represent 90 and 95 percent confidence intervals. Errors clustered at firm and month level.

Figure A9. Municipality level employment response to monetary policy shocks by age-durability

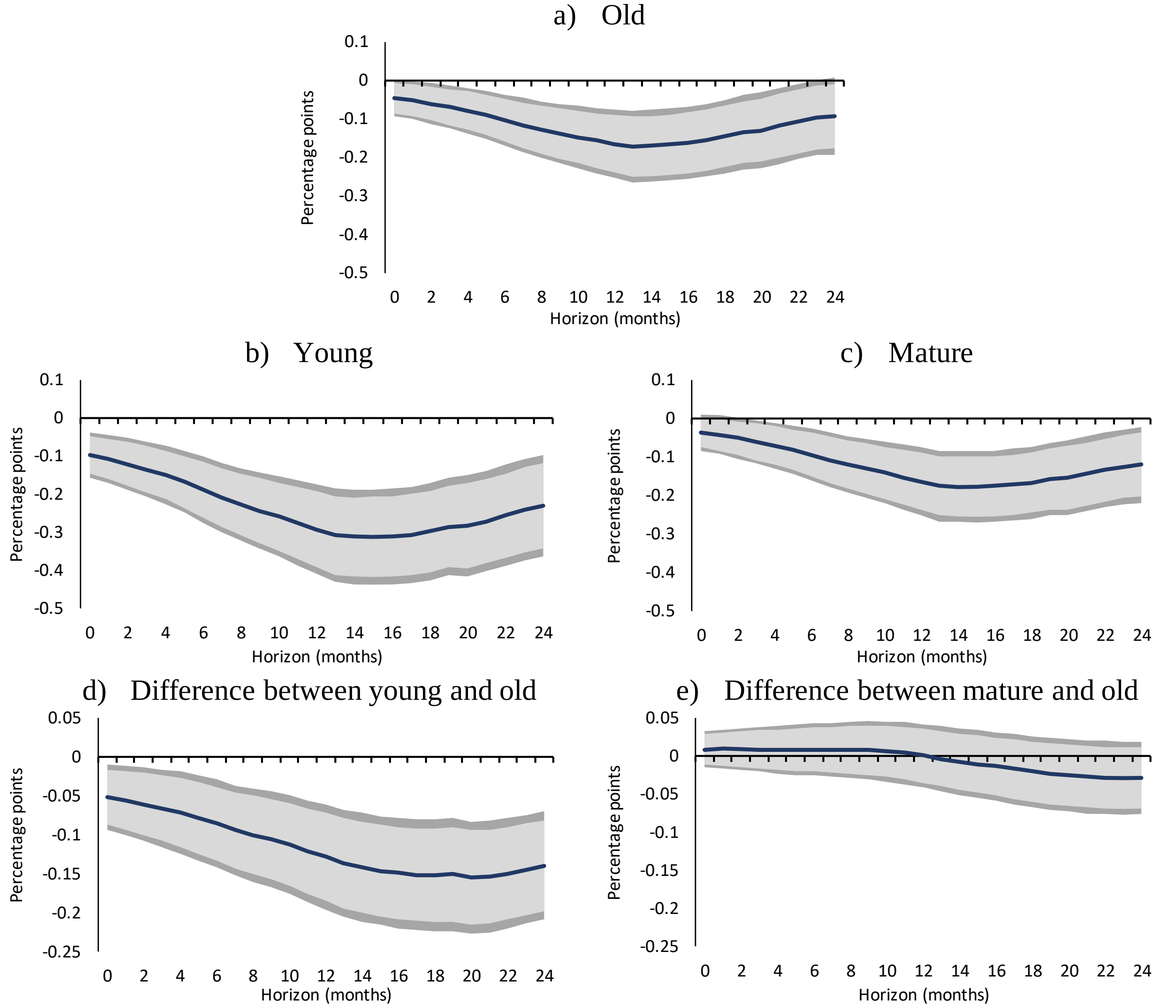
a) Difference between young durables and non-young non-durables   b) Difference between young non-durables and non-young non-durables   c) Difference between non-young durables and non-young non-durables



Source: Authors' calculations based on data from Banco de México, Bloomberg and IMSS.

Notes: Shaded areas represent 90 and 95 percent confidence intervals. Errors clustered at firm and month level.

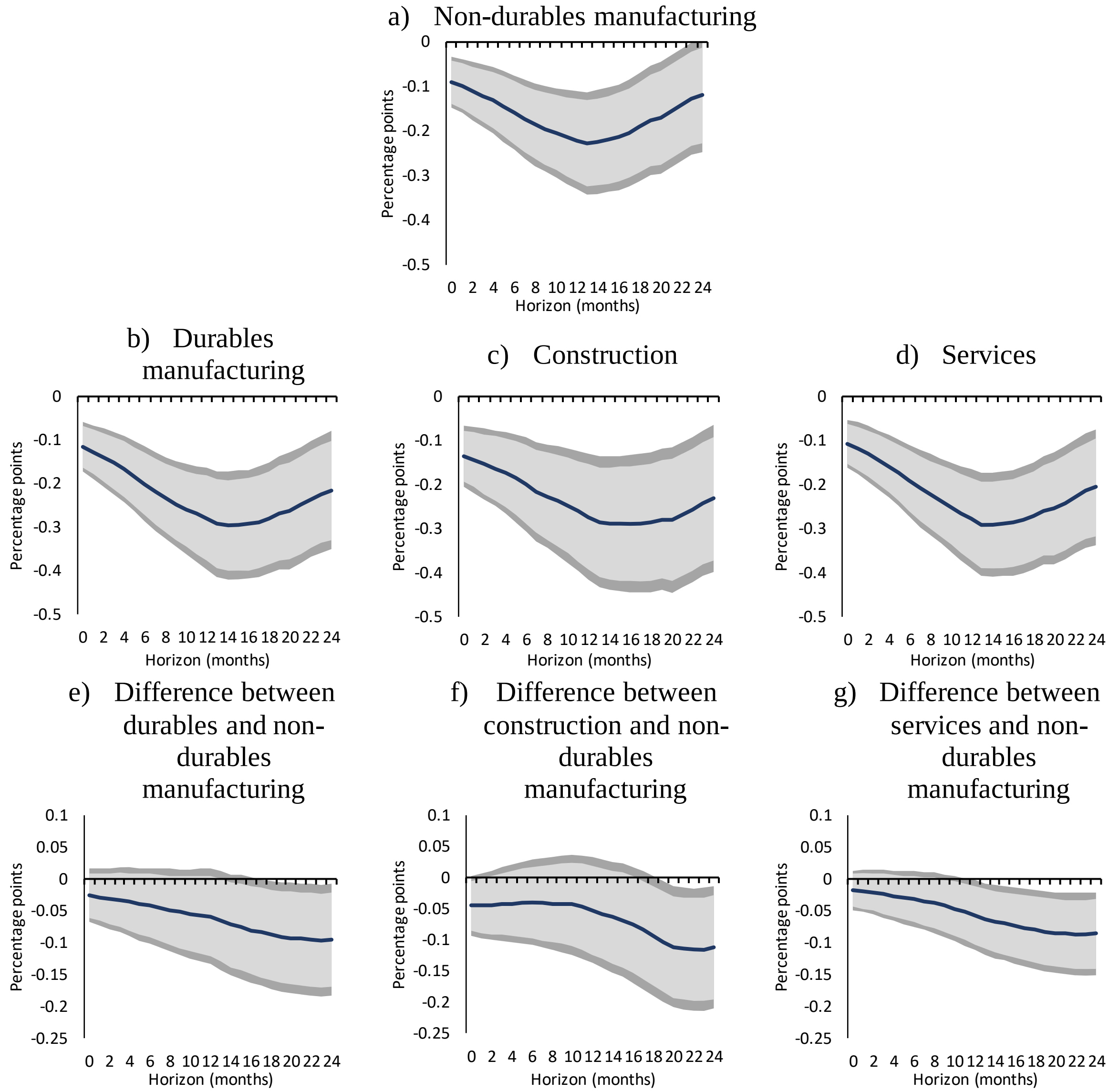
Figure A10. Firm level credit response to monetary policy shocks by age when using the poor man's proxy for these shocks



Source: Authors' calculations based on data from Banco de México.

Notes: Shaded areas represent 90 and 95 percent confidence intervals. Errors clustered at firm and month level.

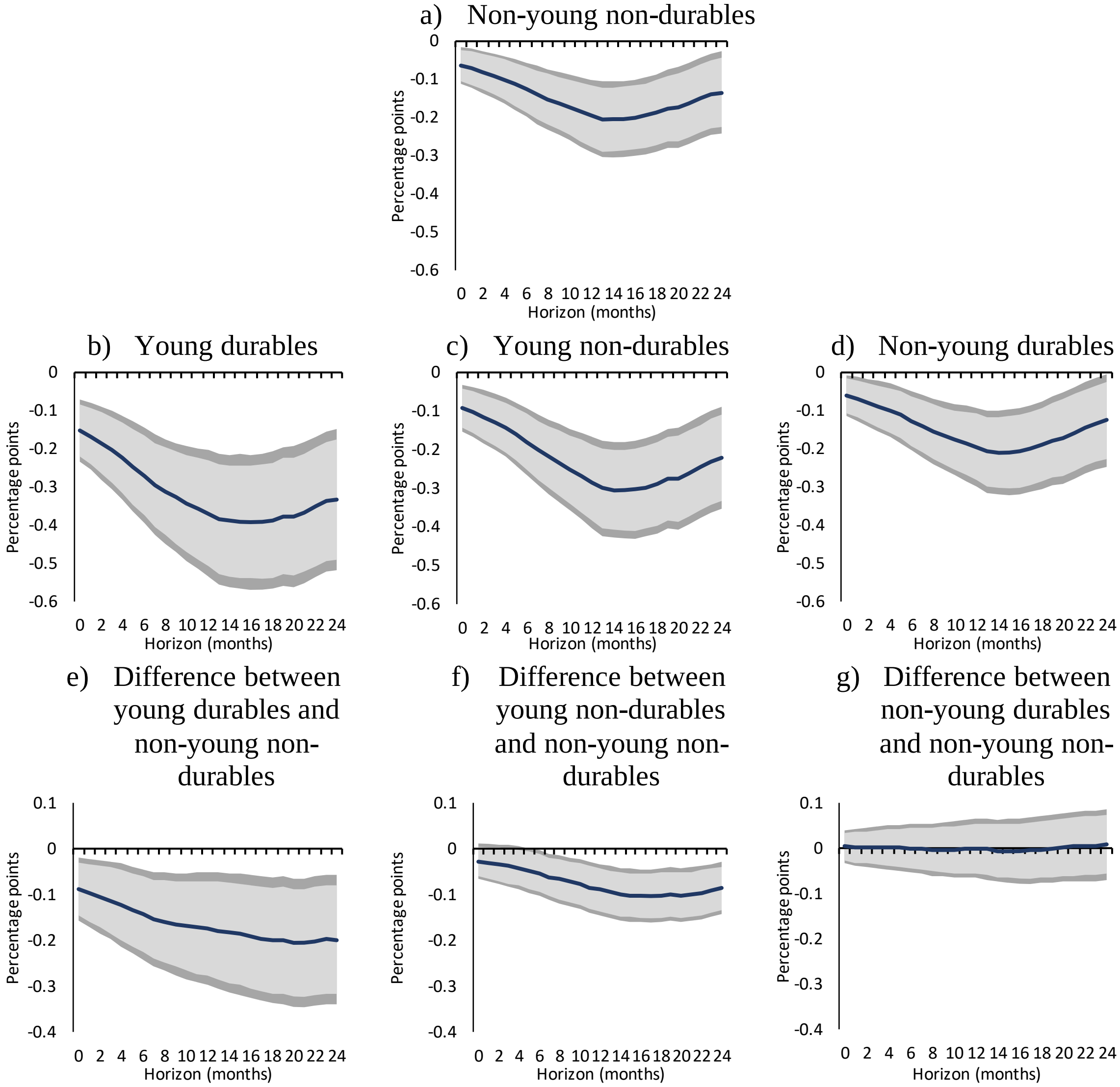
Figure A11. Firm level credit response to monetary policy shocks by sector when using the poor man's proxy for these shocks



Source: Authors' calculations based on data from Banco de México.

Notes: Shaded areas represent 90 and 95 percent confidence intervals. Errors clustered at firm and month level.

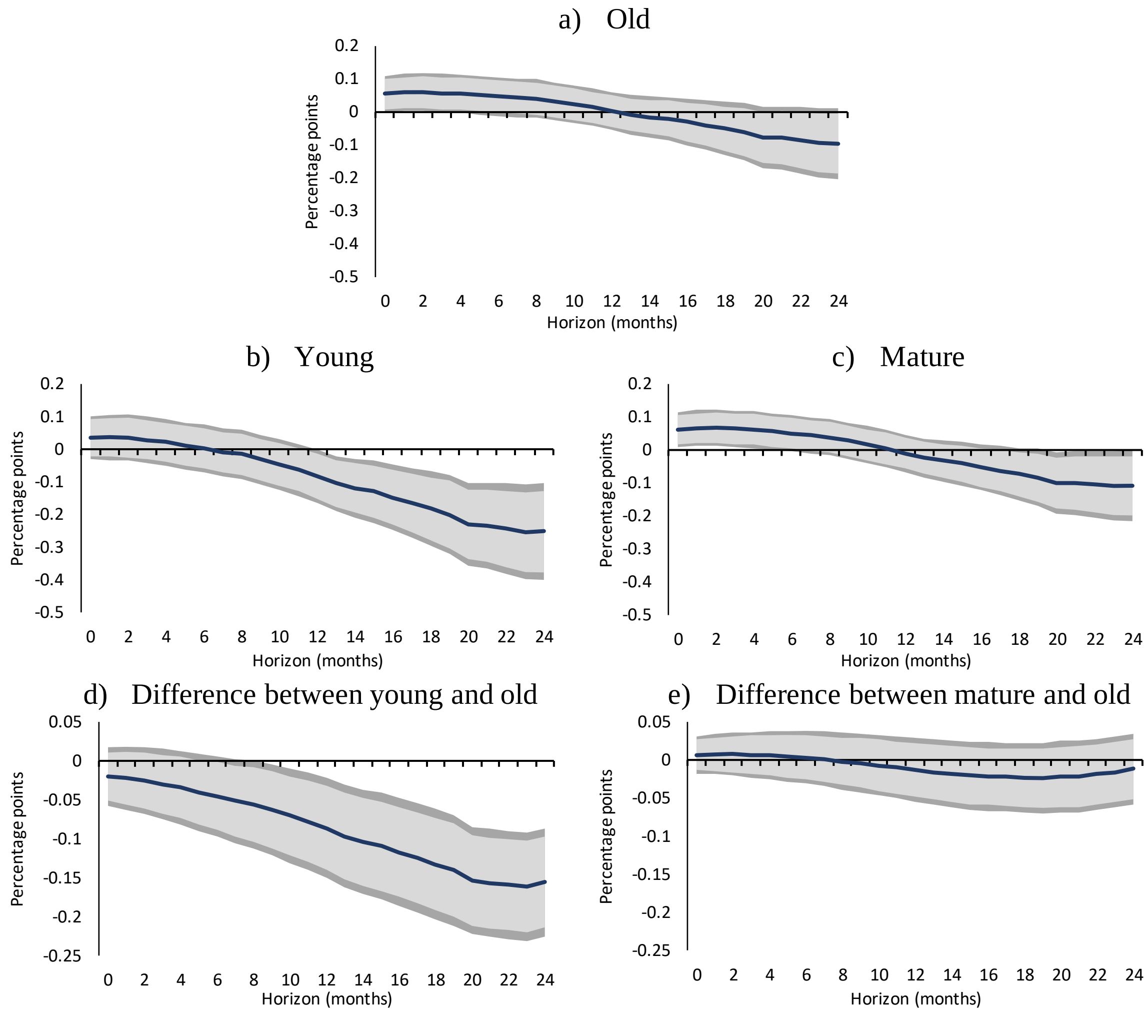
Figure A12. Firm level credit response to monetary policy shocks by age-durability when using the poor man's proxy for these shocks



Source: Authors' calculations based on data from Banco de México.

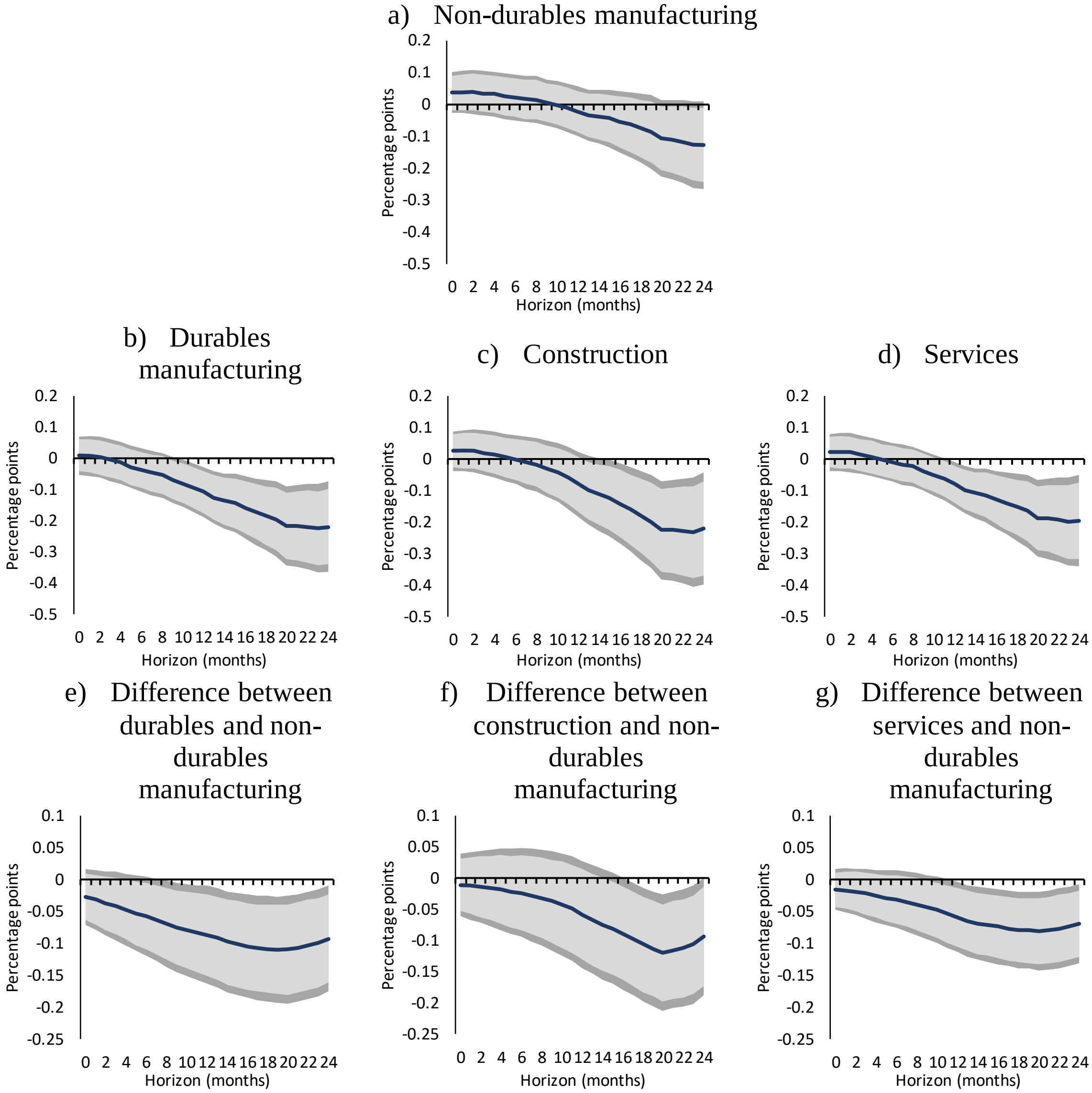
Notes: Shaded areas represent 90 and 95 percent confidence intervals. Errors clustered at firm and month level.

Figure A13. Firm level credit response to monetary policy shocks by age when using Bauer and Swanson's proxy for these shocks



Source: Authors' calculations based on data from Banco de México and Bloomberg.
Notes: Shaded areas represent 90 and 95 percent confidence intervals. Errors clustered at firm and month level.

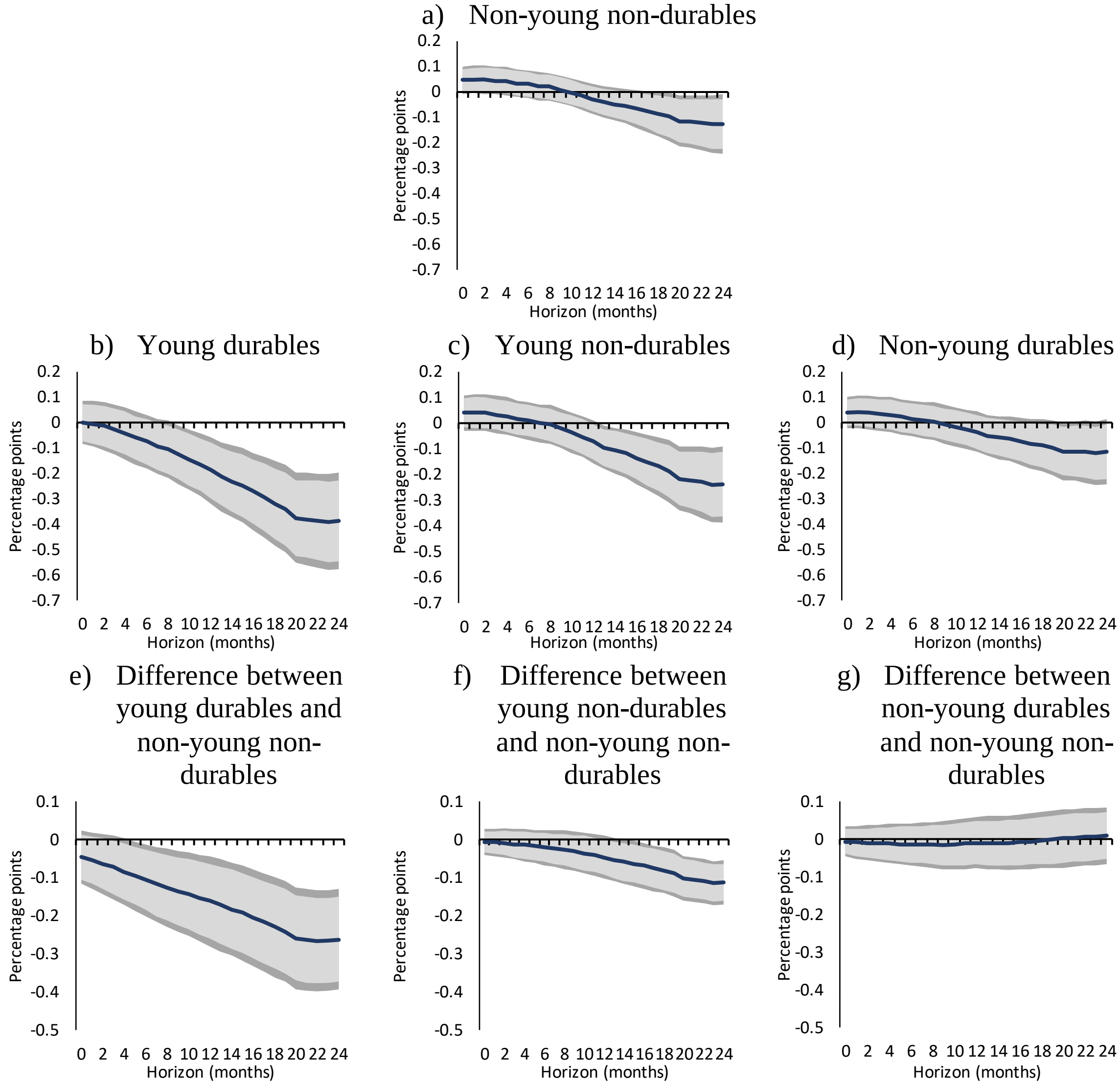
Figure A14. Firm level credit response to monetary policy shocks by sector when using Bauer and Swanson's proxy for these shocks



Source: Authors' calculations based on data from Banco de México and Bloomberg.

Notes: Shaded areas represent 90 and 95 percent confidence intervals. Errors clustered at firm and month level.

Figure A15. Firm level credit response to monetary policy shocks by age-durability when using Bauer and Swanson's proxy for these shocks



Source: Authors' calculations based on data from Banco de México and Bloomberg.
Notes: Shaded areas represent 90 and 95 percent confidence intervals. Errors clustered at firm and month level.

References

Auriol, E., and M. Warlters (2005). "Taxation base in developing countries." Journal of Public Economics, 89(4), 625-646.

Bahaj, S., A. Foulis, G. Pinter, and P. Surico (2022). "Employment and the residential collateral channel of monetary policy." J. Monet. Econ. (827), 2018–2032.

Barth, M. J., and V. A. Ramey (2002). "The cost channel of monetary transmission."

Bauer, M. D. and E. T. Swanson (2023). "A reassessment of monetary policy surprises and high-frequency identification." NBER Macroeconomics Annual, University of Chicago Press, vol. 37(1), pages 87-155.

Bernanke, B., and M. Gertler (1989). "Agency costs, collateral, and business cycle fluctuations." American Economic Review, 79, 14-31.

Bernanke, B., and M. Gertler (1995). "Inside the black box: the credit channel of monetary policy transmission." Journal of Economic Perspectives, 9(4), 27-48.

Bernanke, B., M. Gertler, and S. Gilchrist (1999). "The financial accelerator in a quantitative business cycle framework." Handbook of macroeconomics, 1, 1341-1393.

Borio, C., and H. Zhu (2012). "Capital regulation, risk-taking and monetary policy: a missing link in the transmission mechanism?" Journal of Financial stability, 8(4), 236-251.

Carlstrom, C., and T. Fuerst (1997). "Agency costs, net worth, and business fluctuations: A computable general equilibrium analysis." The American Economic Review, 893-910.

Chiguil-Rojas, A., G. Esquivel, and J. Leal (2024). "La transmisión de la política monetaria a través del crédito bancario en México." El trimestre económico, 91(363), 603662.

Cloyne, J., C. Ferreira, M. Froemel, and P. Surico (2023). "Monetary policy, corporate finance, and investment." Journal of the European Economic Association, European Economic Association, vol. 21(6), pages 2586-2634.

Crouzet, N., and N. R. Mehrotra (2020). "Small and large firms over the business cycle." *American Economic Review* 110.11, 3549-3601.

De Leo, P., G. Gopinath, and Ș. Kalemli-Özcan (2022). "Monetary policy and the short rate disconnect in emerging economies." National Bureau of Economic Research, No. w30458.

Dedola, L. and F. Lippi (2005). "The monetary transmission mechanism: evidence from the industries of five OECD countries." Eur. Econ. Rev. 49 (6), 1543–1569.

Demirgüç-Kunt, A., and V. Maksimovic (1998). "Law, finance, and firm growth." The Journal of Finance, 53(6), 2107-2137.

Demirgüç-Kunt, A., and V. Maksimovic (1999). "Institutions, financial markets, and firm debt maturity." Journal of financial economics, 54(3), 295-336.

Djankov, S., C. McLiesh, and A. Shleifer (2007). "Private credit in 129 countries." Journal of Financial Economics 84 (2): 299–329.

Durante, E., A. Ferrando, and P. Vermeulen (2022). "Monetary policy, investment and firm heterogeneity." European Economic Review, 148, 104251.

Farazi, S. (2014). "Informal firms and financial inclusion: status and determinants." Journal of international commerce, Economics and policy, 5(03), 1440011.

Ferrando, A., and K. Mulier (2015). "Firms' financing constraints: Do perceptions match the actual situation?" The Economic and Social Review, 46(1, Spring), 87-117.

Gerali, A., S. Neri, L. Sessa, and F. M. Signoretti (2010). "Credit and banking in a DSGE model of the Euro Area." Journal of money, Credit and Banking, 42, 107-141.

Gertler, M. (1988). "Financial structure and aggregate economic activity: an overview." J. Money Credit Bank. 20 (3), 559–588.

Gertler, M., and N. Kiyotaki (2015). "Banking, liquidity, and bank runs in an infinite horizon economy." American Economic Review, 105(7), 2011-2043.

Gertler, M., and P. Karadi (2015). "Monetary policy surprises, credit costs, and economic activity." Am. Econ. J.: Macroecon. 7 (1), 44–76.

Gnewuch, M., and D. Zhang (2025). “Monetary policy, firm heterogeneity, and the distribution of investment rates.” Journal of Monetary Economics, 149, 103721.

Hadlock, C.J. and J. R. Pierce (2010). “New evidence on measuring financial constraints: moving beyond the KZ index.” Rev. Financ. Stud. 23 (5), 1909–1940.

Iacoviello, M. (2005). “House prices, borrowing constraints, and monetary policy in the business cycle.” American economic review, 95(3), 739-764.

Ioannidou, V., S. Ongena, and J. L. Peydró (2015). “Monetary policy, risk-taking, and pricing: evidence from a quasi-natural experiment.” Review of Finance, 19(1), 95-144.

Jarociński, M., and P. Karadi (2020). “Deconstructing monetary policy surprises: the role of information shocks.” Am. Econ. J.:Macroecon. 12 (2), 1–43.

Jeenas, P. (2019). “Firm balance sheet liquidity, monetary policy shocks, and investment dynamics.”

Jermann, U., and V. Quadrini (2012). “Macroeconomic effects of financial shocks.” American Economic Review, 102(1), 238-271.

Jiménez, G., S. Ongena, J. L. Peydró and J. Saurina (2014). “Hazardous times for monetary policy: what do twenty-three million bank loans say about the effects of monetary policy on credit risk-taking?” Econometrica, 82(2), 463-505.

Jordá, O. (2005). “Estimation and inference of impulse responses by local projections.” Amer. Econ. Rev. 95 (1), 161–182.

Kalemli-Özcan, Ş., Laeven, L., and Moreno, D. (2022). "Debt Overhang, Rollover Risk, and Corporate Investment: Evidence from the European Crisis." Journal of the European Economic Association, 20(6), 2353–2395.

Kashyap, A. K., and J. C. Stein (2000). “What do a million observations on banks say about the transmission of monetary policy?” American Economic Review, 90(3), 407-428.

Kiyotaki, N., and J. Moore (1997). “Credit cycles.” Journal of political economy, 105(2), 211-248.

La Porta, R., F. Lopez-de-Silanes, A. Shleifer, and R. W. Vishny (1998). “Law and finance.” Journal of political economy, 106(6), 1113-1155.

La Porta, R., and A. Shleifer (2008). “The unofficial economy and economic development.” National Bureau of Economic Research, no. w14520.

La Porta, R., and A. Shleifer (2014). “Informality and development.” Journal of economic perspectives, 28(3), 109-126.

Levine, R. (1998). “The legal environment, banks, and long-run economic growth.” Journal of money, credit and banking, 596-613.

Levine, R. (1999). “Law, finance, and economic growth.” Journal of financial Intermediation, 8(1-2), 8-35.

Li, Xiaoming, Zheng Liu, Yuchao Peng, and Zhiwei Xu. 2026. "Bank Risk-Taking, Credit Allocation, and Monetary Policy Transmission: Evidence from China." American Economic Journal: Macroeconomics 18 (1): 384–415.

Mejía-Castelazo, O., M. T. Ferro, J. J. Rodríguez, and E. V. Espinosa (2025). “El canal de crédito en México durante el periodo pospandemia.” Investigación Económica, 84(334), 97-120.

Menkhoff, L., D. Neuberger, and O. Rungruxsirivorn (2012). “Collateral and its substitutes in emerging markets’ lending.” Journal of Banking and Finance, 36(3), 817-834.

Morais, B., J. L. Peydró, J. Roldán-Peña, and C. Ruiz-Ortega (2019). “The International Bank Lending Channel of Monetary Policy Rates and QE: Credit Supply, Reach-for-Yield, and Real Effects.” Journal of Finance, 74(1), 55–90.

Monnet, C., and E. Quintin (2005). “Optimal contracts in a dynamic costly state verification model.” Economic Theory, 26(4), 867-885.

Nakamura, E., and J. Steinsson (2018). “High-frequency identification of monetary non neutrality: the information effect.” Quarterly Journal of Economics, Vol. 133, pp. 1283– 1330.

Ottonello, P., and T. Winberry (2020). “Financial heterogeneity and the investment channel of monetary policy.” Econometrica, 88(6), 2473-2502.

Peersman, G. and F. Smets (2005). "The industry effects of monetary policy in the euro area." Econom. J. 115 (503), 319–342.

Pirozhkova, E., G. Ricco, and N. Viegi (2024). "Trouble every day: Monetary policy in an open emerging economy."

Stock, J. H., and M. W. Watson (2018). "Identification and estimation of dynamic causal effects in macroeconomics using external instruments." The Economic Journal, 128(610), 917-948.

Vicondoa, A. (2019). "Monetary news in the United States and business cycles in emerging economies." Journal of International Economics, 117, 79-90.