Banking on nonbanks*

Bruno Albuquerque† Eugenio Cerutti‡ Melih Firat§ Benedikt Kagerer¶

November 12, 2026

Abstract

We study how banking groups adjust credit supply when loan-supply macroprudential policies tighten. Using global syndicated corporate loan data and a new parent-subsidiary ownership dataset, we show that banking groups reallocate lending from bank subsidiaries toward affiliated nonbank financial institutions (NBFIs). NBFI subsidiaries expand lending relative to bank subsidiaries within the same group and in absolute terms, offsetting more than half of the contraction in bank lending. This intra-group reallocation channel is reversed for capital-based measures that affect the group's capital position. Our findings show how the regulatory perimeter shapes credit allocation within banking groups and deepens bank–nonbank interconnectedness.

Keywords: Banking groups; Nonbank subsidiaries; Macroprudential policies; Syndicated loans
JEL classification: G21, G23, G24, G28

*This document includes data derived from data provided under license by Dealogic ION. ION retains and reserves all rights in such data. The views in this paper represent only our own and should therefore not be reported as representing the views of the International Monetary Fund, its Executive Board, or IMF management. We benefited from valuable comments and suggestions from Jose Berrospide, Mehdi Beyhaghi, Antoine Bouveret (discussant), Ricardo Correa, Dominic Cucic (discussant), Andrea Deghi, Cooper Howes, Xianguo Huang (discussant), Thomas Kroen, Shohini Kundu (discussant), María Soledad Martínez Pería, Enrico Sette (discussant), Alexandros Vardoulakis, and Vladimir Yankov; from participants at several research seminars, including at the Federal Reserve Board, the International Monetary Fund, the European Central Bank, the Bank of England, and at the University of Cambridge; and from feedback received at several conferences, such as the 25^{th} Annual FDIC Bank Research Conference, the ECB Research Workshop 'Unintended consequences of macroprudential policy: distributional effects and changes in financial intermediation', the CEAR-FRB Atlanta-Danmarks Nationalbank Conference 'Stability Implications of Nonbank Provision of Financial Services', the 8^{th} CEPR Summer Conference of Financial Intermediation and Corporate Finance, the HKIMR-BIS-IMF Joint Conference on 'Global Interconnections and Financial Stability', and the EEA-ESEM 2026. Lu Zhao provided excellent research assistance.

†International Monetary Fund, and Univ Coimbra, CeBER, Faculty of Economics. Email: BAlbuquerque@imf.org.

‡International Monetary Fund. Email: ECerutti@imf.org.

§International Monetary Fund. Email: MFirat@imf.org.

¶University of Cambridge. Email: bmck3@cam.ac.uk.

1 Introduction

The tightening of bank regulation after the 2007-09 Global Financial Crisis (GFC) coincided with a rapid expansion of nonbank financial institutions (NBFIs).[1] A defining feature of modern financial systems is that banks and nonbanks often operate within the same financial group: regulated bank subsidiaries coexist with less regulated nonbank affiliates under a common parent. This creates an important but understudied margin of policy adjustment. When regulation raises the cost of lending through one legal entity, banking groups may preserve credit supply and borrower relationships by shifting intermediation to another affiliate. This paper asks whether macroprudential regulation affects not only how much credit banking groups provide, but also where within the group that credit is intermediated.

This question is increasingly relevant as NBFIs—comprising non-deposit-taking financial intermediaries such as broker-dealers, investment funds, asset managers, pension funds, and insurance companies—have become central to corporate credit. By 2024, NBFIs accounted for about 51 percent of global financial assets, up from 43 percent in 2008 (Financial Stability Board 2025). In the global syndicated loan market, nonbanks originated roughly 50 percent of loans to nonfinancial corporations (NFCs) in 2024, compared with about 30 percent during the GFC (Albuquerque et al. 2026). Yet an important part of this growth has occurred inside banking groups. Figure 1 shows that the share of NBFI subsidiaries in total banking-group lending in the syndicated loan market rose from about 24 percent in 2010 to roughly 32 percent in 2024.[2] The trend is especially pronounced in the United States, where NBFI subsidiaries account for more than half of syndicated lending by U.S. banking groups (Figure A.1 in Online Appendix A). These patterns suggest that the relevant regulatory perimeter may be the financial group rather than the bank subsidiary alone.

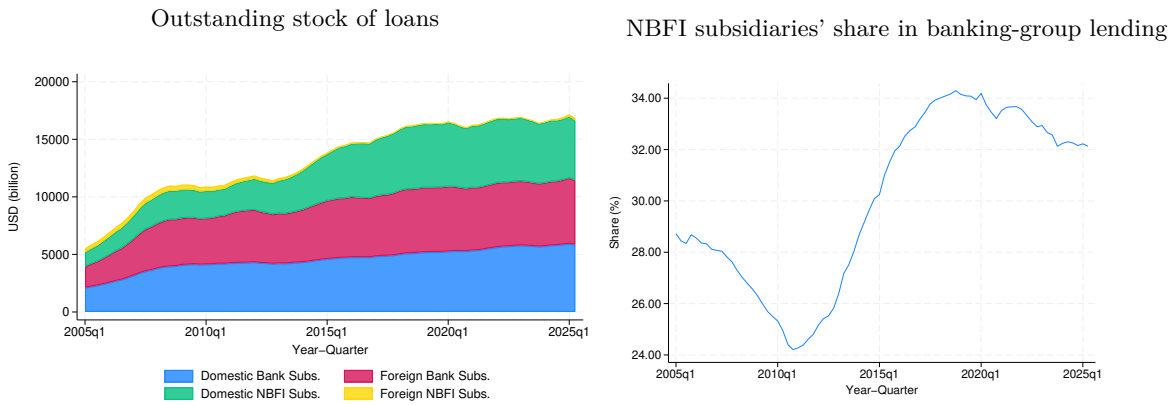
We study whether loan-supply macroprudential policy (MaPP) tightening induces banking groups to reallocate corporate syndicated lending from bank subsidiaries toward affiliated NBFIs. The mechanism is a regulatory-perimeter wedge within the organization. Loan-supply measures, reserve requirements, and related prudential actions can raise the marginal regulatory cost of supplying credit through a bank entity without imposing an equivalent standalone constraint on a nonbank affiliate. This asymmetry creates scope to reorganize loan origination

[1] For instance, Buchak et al. (2018), Kim et al. (2018), Irani et al. (2021), Claessens et al. (2023), Lee et al. (2024), Bednarek et al. (2025), Erel and Inozemtsev (2025), Albuquerque et al. (2026).

[2] We use the terms subsidiaries and affiliates interchangeably. The same applies to banking groups and parent banks, and NBFIs and nonbanks.

inside the group. The mechanism does not require NBFIs to be unregulated; it requires the relevant constraint to bind differently across affiliated entities or at different levels of prudential consolidation.

Figure 1: Banking groups' lending to NFCs in the corporate syndicated loan market



Notes: Left panel: volume of outstanding syndicated loans from banking groups to NFCs by domestic bank subsidiaries (blue area), foreign bank subsidiaries (red area), domestic NBFI subsidiaries (green area), and foreign NBFI subsidiaries (yellow area). Right panel: share of syndicated loans originated by NBFI subsidiaries in total banking-group lending.

This organizational perspective connects the paper to broader questions about the boundaries of regulated firms. Regulation directed at one entity can change the allocation of activities within a complex organization even when aggregate ownership and borrower relationships remain unchanged. A large literature shows that parent banks often offset domestic regulatory tightening by reallocating lending across borders through foreign bank subsidiaries that are subject to host-country rules, the so-called 'regulatory arbitrage' (Houston et al. 2012, Ongena et al. 2013, Danisewicz et al. 2017, Franch et al. 2021, Demirgüç-Kunt et al. 2023). Regulatory gaps can also shape global syndicate formation (Gao and Jang 2021) and lead bank holding companies (BHCs) to shift activity or capital across bank and nonbank affiliates (Demyanyk and Loutskina 2016, Cetorelli and Kundu 2026). We build on this insight by studying whether loan-supply MaPP tightening induces banking groups to reallocate corporate syndicated lending from bank subsidiaries toward domestic affiliated NBFIs.[3]

The distinction between affiliation and institutional type is central. Thakor and Merton (2024) develop a theory in which insured-deposit funding gives banks a trust and financing advantage over nonbanks, especially when trust deteriorates. We complement their analysis by showing that the bank-nonbank boundary also operates inside banking organizations: affiliated nonbanks can draw on group-level relationships, information, and funding capacity even though

[3] Cetorelli and Prazad (2025) provide a complementary view: parent banks may create nonbank affiliates not only to navigate regulatory constraints, but also to diversify funding channels and manage liquidity risks.

they face a different regulatory treatment from bank subsidiaries. The comparison with independent NBFIs allows us to distinguish an organizational response from a generic expansion of less-regulated lenders.

We study this regulatory-perimeter mechanism in the syndicated loan market, which provides an ideal setting because (i) loans can be originated and retained by both banks and nonbanks, and (ii) syndicated loans represent a major source of NFC financing, accounting for around 60 percent of NFCs' outstanding global market debt (Albuquerque et al. 2026). Syndicated lending is also balance-sheet intensive and involves origination, underwriting, distribution, and retention decisions that can be allocated across affiliated entities. This makes it a natural setting to study whether banking groups adjust where credit exposures are booked when regulatory constraints tighten.

Our empirical analysis combines global syndicated corporate loan data with a new parent-subsidiary ownership dataset that links banking groups to their bank and nonbank subsidiaries over 2000–2024. The dataset covers 963 banking groups across 27 lender countries (21 AEs and 6 EMDEs) over 2005Q1–2023Q4. We map the ultimate parent company of bank and nonbank lending entities that are active in the syndicated loan market using regulatory filings, broker-dealer registries, national business registries, and large language models (LLMs). We focus on the top 250 NBFIs and the top 250 bank lending entities, which account for roughly 85–90 percent of total lending within each group. This dataset allows us to compare the lending response of bank and NBFI subsidiaries within the same banking group following MaPP tightening. To measure regulatory tightening, we use the iMaPP database of Alam et al. (2025) and focus on MaPP instruments that directly constrain banks' lending capacity: loan-supply restrictions, stress-testing-related prudential measures, and reserve requirements. We identify MaPP shocks using a residualized MaPP index that purges cyclical macrofinancial conditions, and we validate the results using a high-frequency announcement-based strategy for six large AEs.

Our baseline specification is at the lender–borrower–quarter level and includes banking-group fixed effects and firm×quarter fixed effects. The identifying variation therefore compares bank and NBFI subsidiaries within the same banking group lending to the same borrower in the same quarter. This design isolates within-group substitution in credit supply across affiliates while controlling for time-varying borrower demand (Khwaja and Mian 2008).

Our main findings are as follows. First, banking groups reallocate syndicated lending from bank subsidiaries toward affiliated NBFIs after loan-supply MaPP tightening. A one-standard-

deviation tightening reduces bank-subsidiary lending by 1.0 percent, while NBFI subsidiaries expand by 2.0 percent relative to banks and by 1.0 percent in absolute terms. The magnitude is economically meaningful: using the average lending share of NBFI subsidiaries in our sample, banking groups offset more than half of the contraction in bank-subsidiary lending induced by tighter regulation. The effect is stronger among banking groups with weaker balance sheets, is driven mainly by U.S. groups and, to a lesser extent, euro-area lenders, and is concentrated among investment banks and broker-dealers. The response, however, depends on where regulation binds: when tightening is capital-based and more likely to constrain the consolidated banking group, affiliated NBFIs instead contract lending, and thus no longer offset bank lending. While we do not observe internal funding flows directly, the baseline response is consistent with evidence that U.S. banking groups fund NBFI affiliates on more favorable terms than bank subsidiaries (Bai et al. 2026).[4]

Our second result concerns the international dimension of the reallocation channel. Prior work shows that multinational banks respond to domestic regulatory tightening by shifting credit through foreign bank subsidiaries. We show that banking groups use both foreign bank affiliates and NBFI affiliates, but for different purposes. These subsidiaries help offset the impact of domestic regulation on cross-border lending, especially in core foreign markets where the banking group has an established presence. Domestic NBFI subsidiaries, by contrast, cushion the impact on domestic lending. Thus, banking groups use a dual strategy: foreign affiliates mitigate the effect of regulation abroad, while domestic NBFIs mitigate the effect at home.

Finally, we show that the increase in nonbank lending is not a broad nonbank-sector response. Independent NBFIs—those not affiliated with banking groups—reduce lending relative to bank-owned banks and NBFIs following MaPP tightening, highlighting the importance of banking-group affiliation. This pattern is consistent with two complementary channels. First, bank-owned NBFIs may benefit from internal capital markets, group-level client relationships, and access to the parent bank's funding network, while independent NBFIs lack such intra-group and may be more exposed to external funding conditions. This effect is strongest in foreign markets where banking groups have a large presence, suggesting that parent banks use NBFI subsidiaries to preserve market share. Second, compositional differences also matter: independent NBFIs are concentrated among investment funds and asset managers, which reduce lending after MaPP

[4]This limitation is shared by studies that infer internal capital-market adjustments from differential lending responses across group entities. For example, Cerutti and Claessens (2017) study intra-group frictions using cross-border and local-affiliate lending rather than directly observed internal transfers.

shocks, whereas bank-owned NBFIs are concentrated among investment banks and broker-dealers, which drive the baseline reallocation toward affiliated nonbanks.

Our results are robust to a range of alternative specifications, such as: (i) using high-frequency MaPP announcements; (ii) along the extensive margin; (iii) inter-banking group substitution; (iv) excluding reserve requirements and prudential policies related to stress testing; (v) accounting for cross-country differences or time-varying changes within banking groups; and (vi) using a regression-based approach from Blickle et al. (2026) to impute the missing loan shares. However, the channel is not present for all regulatory instruments. When MaPP tightening is capital-based, the lending reallocation channel through affiliated NBFIs disappears: bank-owned NBFIs reduce lending relative to other lenders, while independent NBFIs do not display the same contraction. This pattern is consistent with the view that capital-based measures are more likely to bind the consolidated banking-group balance sheet, leaving less scope for regulatory migration across affiliated entities (Ongena et al. 2013, Aiyar et al. 2014, Danisewicz et al. 2017, Franch et al. 2021, Fabiani and Neanidis 2025). It also relates to Cetorelli and Kundu (2026), who show that Basel III capital requirements led BHCs to reallocate equity from nonbank affiliates toward bank subsidiaries, and to Irani et al. (2021), whose evidence on nonbank entry is based on bank capital constraints, and who find limited evidence that such reallocation occurs through affiliated nonbanks.

We also show that the same mechanism operates differently in corporate bond underwriting. Following MaPP tightening, banking groups reduce bond underwriting across affiliates, with no differential expansion by affiliated NBFIs, while independent NBFIs gain market share. This contrast is informative because bond underwriting is less balance-sheet intensive than syndicated lending and because banking groups already conduct much of their bond underwriting through NBFI affiliates. The baseline mechanism is therefore not a generic response across all regulatory instruments or all credit markets. It is strongest when MaPP measures directly target loan supply and create a regulatory wedge that raises the marginal cost of balance-sheet-intensive syndicated lending through bank subsidiaries.

Our paper contributes to three strands of the literature. First, we contribute to the literature on regulatory arbitrage and the international transmission of bank regulation. Existing research emphasizes cross-border adjustments through foreign bank affiliates in response to regulatory differences (Houston et al. 2012, Ongena et al. 2013, Karolyi and Taboada 2015, Danisewicz et al. 2017, Frame et al. 2020, Franch et al. 2021, Demirgüç-Kunt et al. 2023). We show that banking

groups have an additional margin of adjustment: they can reallocate lending across affiliated bank and nonbank subsidiaries within the same group. This mechanism operates through a regulatory-perimeter wedge rather than only through geographic differences in regulation.

Second, we contribute to the literature on bank-nonbank interconnectedness and internal capital markets within financial conglomerates. Recent papers use U.S. regulatory filings to study the role of nonbank subsidiaries inside BHCs and the transfer of funding or equity across affiliates (Cetorelli and Prazad 2025, Bai et al. 2026, Cetorelli and Kundu 2026). We complement this work by constructing a global ownership dataset for bank and nonbank subsidiaries active in the syndicated loan market, and by showing that these organizational links shape the transmission of macroprudential policy to corporate credit.

Third, we contribute to the literature on the transmission of macroprudential policy and bank regulation through nonbanks. Albuquerque et al. (2026) show that nonbank lenders mitigate the impact of MaPP (and monetary policy) on corporate lending. We sharpen this bank-nonbank distinction by showing that ownership matters: the response is concentrated among NBFIs affiliated with banking groups. We also distinguish loan-supply MaPP shocks from capital-based measures, showing that the type of regulatory instrument matters for whether credit migrates toward affiliated NBFIs. In addition, and in contrast to studies of specific regulatory episodes that show migration of corporate credit to nonbanks, including the 2013-14 U.S. interagency guidance on leveraged lending (Kim et al. 2018), and Basel III implementation in the U.S. (Irani et al. 2021) and Korea (Lee et al. 2024), we examine time-series MaPP shocks across a broad international sample. Finally, by compiling MaPP announcements for six large AEs and measuring bank stock return surprises around these events, we contribute to the emerging literature on high-frequency identification of MaPP shocks (Bluwstein and Patozi 2024, Duprey and Tuzcuoglu 2025, Drechsel and Miura 2026).

The findings have implications beyond syndicated lending. When regulated and differently regulated entities coexist under common control, policies aimed at one subsidiary can reorganize activity rather than reduce it at the consolidated level. Evaluating regulation therefore requires attention to organizational boundaries, consolidated exposures, and the links through which regulated banks and affiliated nonbanks share clients, funding capacity, and risk. The results also suggest that monitoring the nonbank sector in isolation may miss an important source of policy leakage and interconnectedness: nonbank credit can expand because it remains embedded within a banking organization.

The remainder of the paper is organized as follows. Section 2 discusses the regulatory perimeter and develops the empirical predictions. Section 3 describes the data and banking-group ownership dataset. Section 4 presents the baseline results. Section 5 reports the high-frequency MaPP identification. Section 6 examines the scope of the reallocation channel across MaPP instruments and corporate bond underwriting. Section 7 reports additional robustness checks, and Section 8 concludes.

2 Regulatory perimeter and internal credit allocation

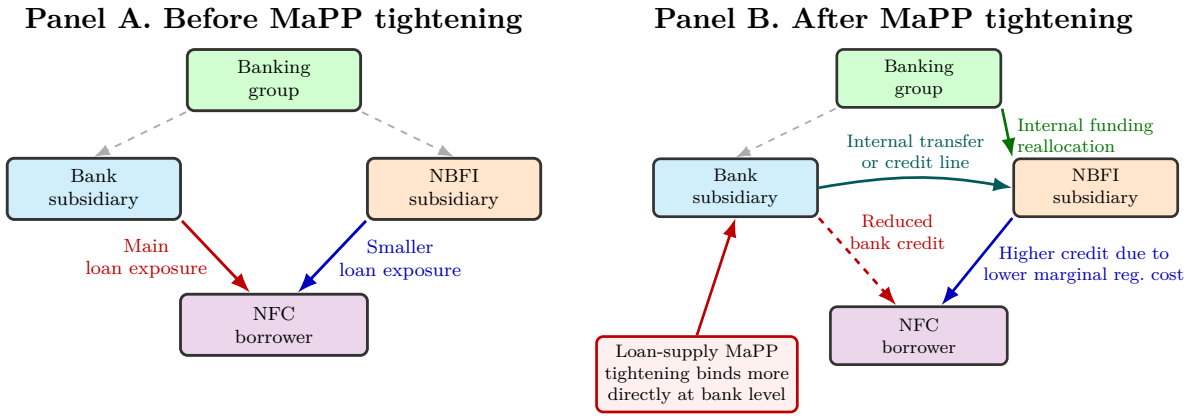
The main aim of this paper is to compare the lending response of bank and NBFI subsidiaries within the same banking group after MaPP tightening. The mechanism we have in mind is that MaPP tightening raises the marginal regulatory cost of supplying credit through the bank subsidiary, while leaving greater scope for credit activity to be conducted through affiliated NBFIs. This mechanism does not assume that NBFIs are outside the regulatory perimeter. Rather, it requires that the relevant prudential constraint does not bind the NBFI affiliate in the same way, through the same regulatory instrument, or at the same entity level as it binds the bank subsidiary or the banking organization. The relevant wedge may therefore arise from differences in the regulated entity, activity, funding source, or level of prudential consolidation. This regulatory asymmetry is central to Cetorelli and Kundu (2026), who show that internal capital markets can become a mechanism for regulatory arbitrage when prudential standards bind asymmetrically across subsidiaries of the same organization.

This distinction is particularly relevant in syndicated loan markets. Syndicated lending involves multiple stages of intermediation (origination, underwriting, distribution, and retention) in which exposures can be allocated across affiliated entities within a financial conglomerate. Figure 2 summarizes the proposed mechanism. Before MaPP tightening, the bank subsidiary is the main lending arm of the banking group (Panel A). When lending through the bank subsidiary becomes more costly due to tighter regulation, the group may preserve borrower relationships and market share by reallocating part of the exposure toward an affiliated NBFI (Panel B). This reallocation may be supported by internal funding from the parent company (Bai et al. 2026), repos (Li et al. 2026), credit lines or syndicated term loans from banks (Albuquerque et al. 2026), or by the NBFI affiliate's own funding capacity.[5] Consistent with this interpretation,

[5]These funding channels are not unrestricted. Direct lending or other transfers from a regulated bank to an affiliated NBFI may be subject to quantitative exposure limits, collateral requirements, arm's-length conditions, or ring-fencing restrictions, depending on the jurisdiction.

Albuquerque et al. (2026) show that after MaPP tightening banks expand lending to NBFIs relative to NFCs, a pattern that is consistent with a lower marginal regulatory cost of lending to NBFIs. This suggests that macroprudential tightening can shift credit intermediation within the financial system. Our contribution is to show that part of this reallocation occurs within banking groups themselves, from bank subsidiaries to affiliated NBFIs.

Figure 2: Mechanism: regulatory perimeter and internal credit allocation



Notes: The figure illustrates the intra-group reallocation channel. Before MaPP tightening, the bank subsidiary is the main lending arm of the banking group. After MaPP tightening, the regulatory shock raises the marginal cost of supplying credit through the bank subsidiary. The banking group partly preserves borrower relationships by reallocating syndicated loans toward an affiliated NBFI subsidiary. The reallocation can be supported by internal funding transfers, or credit lines from bank entities to affiliated NBFIs.

The regulatory perimeter is central to this mechanism. Banking groups are typically subject to consolidated supervision under the Basel III framework, but this does not eliminate regulatory differences at the entity and activity level (Cetorelli and Kundu 2026). For example, several loan-supply MaPP measures—that we consider in Section 3.4—are designed to influence domestic credit conditions and are often applied at the local entity, market, or product level. Loan-growth limits, sectoral credit restrictions, FX lending limits, loan-to-deposit constraints, provisioning or distribution-related measures, and reserve requirements increase the marginal cost of credit supplied through the regulated bank without imposing an equivalent standalone constraint on affiliated NBFIs. By contrast, capital-based measures, such as capital requirements, capital conservation buffers, countercyclical capital buffers, and leverage ratios are solvency-oriented measures that often bind at the consolidated banking-organization level. In that case, assets and exposures booked by affiliated financial subsidiaries still affect the parent's consolidated capital or leverage position. Reallocating a loan from the bank subsidiary to an NBFI affiliate therefore provides less regulatory relief when the binding constraint is consolidated capital.

We next discuss the regulatory perimeter for specific measures in the largest jurisdictions in our sample: U.S., U.K., and the euro area. For U.S. banking groups, MaPP measures are concen-

trated in loan-loss provisioning, stress-test related measures, and restrictions on profit and dividend distribution. The loan-loss-provisioning actions largely relate to Current Expected Credit Loss (CECL), a broad accounting standard that can affect banks and nonbanks holding credit exposures. However, since the CECL measures concern temporary relief and transition arrangements for banking organizations' regulatory capital, they can create a bank-specific regulatory-capital wedge. Other measures include the CCAR/DFAST stress tests, single-counterparty credit limits, and restrictions on dividends and share repurchases. Although some of these measures not only apply at the bank entity level but also at the BHC, they generally do not impose on nonbank affiliates the same standalone bank-prudential requirement faced by insured depository institutions. Broker-dealers, for example, remain subject to securities-market regulation, including net-capital and financial-responsibility rules, but this is a distinct regime from bank capital, liquidity, reserve, and loan-supply regulation.[6] This regulatory wedge is important in our setting because investment banks and broker-dealers account for a large share of bank-affiliated NBFI lending in our sample. This type of within-group regulatory wedge has an important precedent in Demyanyk and Loutskina (2016), who show that BHCs used mortgage-company affiliates to mitigate capital requirements and originate riskier mortgages.

The same logic applies, with some differences, in the euro area. Euro-area banking groups are subject to the EU prudential framework and to supervision under the Single Supervisory Mechanism (SSM), with significant institutions supervised directly by the ECB and less significant institutions supervised by national authorities under ECB oversight. While capital and leverage requirements are designed to capture risks on a consolidated banking-group basis, the loan-supply measures in our baseline MaPP index are typically intended to affect credit conditions in the domestic market, applying to the regulated institutions, rather than to all affiliates of the banking group worldwide. These measures include reserve requirements, loan restrictions, loan-loss-provisioning measures, FX lending restrictions, and distribution restrictions on profits and dividends. Reserve requirements provide the clearest regulatory wedge. They affect deposit-funded bank intermediation and do not bind affiliated nonbanks since these institutions do not fund themselves with reservable deposits. In turn, distribution-related measures may bind the bank or the banking group more broadly, but they still do not generally impose the

[6]The regulatory wedge in the United States reflects the different regimes applying to entities within the same BHC. Commercial banks are supervised by the Federal Reserve, the OCC, and the FDIC, and are subject to Basel III capital, liquidity, supervisory, and safety-and-soundness requirements (Avraham et al. 2012). Nonbank affiliates are overseen by functional regulators: broker-dealers by the SEC and FINRA, asset managers primarily by the SEC, and insurers by state authorities. These regimes focus on investor protection and market integrity rather than bank-style prudential requirements. However, Sections 23A and 23B of the Federal Reserve Act and Regulation W limit intra-group transactions between insured banks and their affiliates.

same standalone lending or reserve requirement on affiliated NBFIs.

The U.K. has one of the most integrated prudential architectures for large financial groups, suggesting limited regulatory scope and incentive for lending reallocation within groups. The Prudential Regulatory Authority (PRA) is the main supervisor of banks and of major nonbank affiliates of U.K. banking groups. This joint supervision ensures that U.K. nonbank affiliates are closer to the prudential perimeter than comparable affiliates in other jurisdictions. In addition, the ring-fencing regime limits internal flexibility by requiring the largest banking groups to separate core retail banking services from investment banking and international activities. This separation reduces the ability of the banking group to move funding, capital, or credit exposures freely between the ring-fenced bank and non-ring-fenced entities.[7] As a result, the marginal regulatory and funding-cost differences between bank and NBFI affiliates are smaller and internal reallocation is operationally more constrained than in the U.S. or the euro area.

In the context of the above discussion, the regulatory wedge across affiliates yields five empirical predictions that we take to the data in Section 4.

Prediction 1. MaPP tightening reduces syndicated lending by bank subsidiaries, as the marginal regulatory cost of lending through the bank entity increases.

Prediction 2. Affiliated NBFI subsidiaries expand syndicated lending relative to bank subsidiaries after MaPP tightening, partially offsetting the contraction in bank lending.

Prediction 3. If the reallocation reflects a regulatory-perimeter channel rather than a reach-for-yield channel, the shift toward affiliated NBFIs should not be disproportionately channeled toward riskier borrowers.

Prediction 4. The reallocation from bank subsidiaries to affiliated NBFIs is stronger when the bank-level regulatory constraint is more likely to bind, i.e., among weaker banking groups.

Prediction 5. The reallocation channel may not operate after capital-based MaPP tightening, as capital and leverage requirements are more likely to bind the consolidated banking group.

[7] Chavaz and Elliott (2026) find that ring-fencing encouraged affected U.K. banks to expand retail mortgage lending and reduce capital-market credit provision, including syndicated credit lines and underwriting.

3 Data

3.1 Syndicated loans

We use syndicated loan data from Dealogic covering nearly all primary-market loans issued worldwide by nonfinancial firms. In this market, firms borrow from lender consortia that jointly supply credit and set legal terms. Syndicated loans are central to global finance, accounting for roughly 60 percent of NFCs' outstanding global market debt (Albuquerque et al. 2026), and about one-third of total cross-border bank lending (Cerutti et al. 2015). The dataset provides detailed loan-level information, including syndicate structure, borrower characteristics, loan size, maturity, type (e.g., term loans, credit lines), and pricing. We focus on the US dollar amount of newly issued loans, deflated by each country's CPI. In some exercises we examine price effects using the all-in drawn spread, i.e., the interest rate margin plus fees over LIBOR.

This dataset is well suited to our study because loans can be intermediated by banks and nonbanks. Following Albuquerque et al. (2026), we classify banks using SIC codes beginning with 60 (depository institutions). Nonbanks are non-deposit-taking financial intermediaries with SIC codes 61-67, excluding real estate firms (most codes starting with 65) and certain mortgage brokers (6162).[8] To deal with potential misclassification, we cross-check that nonbank lenders are not identified as banks in Capital IQ. For lenders without SIC codes, we use text-based methods, flagging banks through keywords such as 'bank,' 'banco,' 'banca,' 'banque', and subsequently identifying investment banks through the term 'investment'. We exclude international financial institutions (e.g., the World Bank, the European Investment Bank) and development banks. Our nonbank sample includes mainly investment banks and broker-dealers (64 percent), but also investment funds, asset managers (including hedge funds, and private equity), as well as insurance companies and pension funds (Table 1).

Table 1: Types of bank-owned NBFIs

Type	Number	Share
Investment banks, broker-dealers	784	64.2
Business credit institutions	26	2.1
Insurance and pension funds	26	2.1
Investment funds & asset managers	152	12.4
Other NBFI subsidiaries	234	19.2
Total	1,222	100

Notes: Number and share of unique bank-owned NBFIs.

Lenders' participation amounts are typically missing in syndicated loan datasets. Following

[8] We allocate the following codes starting in 65 to nonbanks: 6510 (Real Estate Operators & Lessors), 6519 (Lessors of Real Property), and 6532 (Real Estate Dealers).

Duchin and Sosyura (2014) and Albuquerque et al. (2026), we impute missing loan shares by assigning 50 percent of the loan to lead arrangers and distributing the remainder equally among other participants. This reflects evidence that lead arrangers usually retain the largest share (Sufi 2007, Ivashina 2009). Our results are robust when using the regression-based approach from Blickle et al. (2026) in Section 7, consistent with the findings that alternative imputation methods yield similar results (Cerutti et al. 2015, Doerr and Schaz 2021, Aldasoro et al. 2025).

Our final sample spans 27 lender countries (21 AEs and 6 EMDEs) from 2005Q1 to 2023Q4 (Table A.1 in Appendix A). We cover 963 unique banking groups, which together hold 4,871 subsidiaries, of which 75 percent are banks and 25 percent NBFIs. Among banking groups with at least one NBFI subsidiary, each banking group has on average 12.4 bank subsidiaries and 6.2 NBFI subsidiaries. On the borrower side, we cover 52,380 unique nonfinancial firms across 150 countries (38 AEs and 112 EMDEs). Compared with Albuquerque et al. (2026), we cover a broader set of countries and extend the sample to include the COVID-19 period. In Section 4.4, we expand the sample to 939 nonbanking parent companies to study the lending behavior of NBFIs not owned by banking groups relative to that of bank-owned NBFIs. Although independent NBFIs account for about two-thirds of all NBFI entities, their syndicated loan share is much smaller—9 percent, compared with roughly 26 percent by bank-owned NBFIs.

NBFIs typically participate in larger tranches, especially bank-owned NBFIs, and charge higher spreads (Table A.2 in Appendix A). Independent NBFIs charge considerably higher spreads, suggesting that they may operate in riskier segments. By contrast, median loan maturities are similar across lender types, at around five years.

3.2 Balance sheet data

To explore the heterogeneity of the effects of MaPP shocks, we use balance sheet data on banking group and nonfinancial firms from S&P Compustat and Capital IQ. The match is imperfect because balance sheet data are available only for listed firms. We link the datasets using Capital IQ identifiers from Dealogic and the Capital IQ–Compustat link from S&P. For banking groups, we retrieve leverage ratios (debt to equity), logarithm of total assets as a proxy for size, nonperforming loans as a percentage of total loans (NPLs), return on assets (ROA), and Tier 1 capital ratios. We proxy credit risk with the probability of default (PD) over the next 24 months, a modified version of Merton's distance-to-default model, from the National University of Singapore's Credit Research Initiative (NUS-CRI). Overall, we identify 513 unique

listed banks with Compustat balance sheet information.

For nonfinancial firms, we use the following variables to capture firms' credit risk: (i) the PD over the next 24 months from NUS-CRI; (ii) the leverage ratio, measured as the sum of total debt (short- and long-term debt) as a share of total assets; (iii) the age of the firm; (iv) a zombie dummy from Albuquerque and Iyer (2024), i.e., unprofitable and unviable firms whose interest coverage ratio (ICR) is below one, the leverage ratio is above the median firm in the same country-industry pair, and real sales growth is negative, with all indicators being met for at least two consecutive years; (v) 'vulnerable' firms, defined as firms with high debt (top quintile of the distribution) and low liquid assets (bottom quintile of the distribution), following Albuquerque (2024); (vi) firms with a loan-weighted average spread over the past five years in the top quartile of the sample distribution in each quarter; and (vii) leveraged loans, i.e., borrowers whose spread exceeds 150 basis points (bps) over LIBOR, a conventional benchmark used by financial market participants. We match around 5.6k unique firms with Compustat data, and roughly 19.3k firms with non-missing Dealogic data on spreads.

3.3 Banking group ownership structure

We construct a novel dataset on banking group ownership structures, linking bank and nonbank subsidiaries from 2000 to 2024. This dataset fills a gap in the literature, as prior work does not provide information on the ownership linkages between parent banks and their NBFI affiliates (Claessens and Van Horen 2015, Schwert 2018), thus overlooking the increasingly important role of NBFIs within financial conglomerates.[9] Cetorelli and Prazad (2025), Bai et al. (2026), and Cetorelli and Kundu (2026) are the exceptions: these papers use regulatory data to identify bank and nonbank subsidiaries of U.S. BHCs to study how internal fund or equity transfers within banking groups shape lending dynamics (Bai et al. 2026), how they act as a liquidity insurance mechanism (Cetorelli and Prazad 2025), and how they can potentially deplete nonbanks' equity position (Cetorelli and Kundu 2026).

We start by taking the ultimate parent field from Dealogic, i.e., based on majority control rights. The ultimate parent is the entity that ultimately owns or controls more than 50% of the reporting institution, or that has the ability to exercise dominant influence over management

[9] Cetorelli and Prazad (2025) document a large increase in the asset share of NBFI subsidiaries within U.S. BHCs over the past three decades, while Avraham et al. (2012) argue that part of this expansion reflected legislative changes, especially the 1999 Gramm-Leach-Bliley Act that broadened the permissible activities of BHCs to include investment banking.

or policies. This information, however, is only available as a static snapshot—it does not reflect changes in ownership over time due to mergers, acquisitions, or restructurings. To overcome this limitation, we construct a time-varying ownership structure for each lender entity, enabling us to trace changes in the ultimate control within banking groups over time.

Our sample focuses on the top 250 bank and top 250 nonbank lender entities appearing in the Dealogic syndicated loan dataset. They account for around 90 percent of total lending by NBFIs in our sample, and for roughly 84 percent of total lending by banks. This ensures that we capture the overwhelming majority of global syndicated loan market activity.

To establish the evolution of ultimate ownership, we compile information from FINRAs BrokerCheck, SEC filings (Forms 10-K, 8-K, and BD), Companies House (U.K.), national business registries, and other regulatory disclosures that document changes in control, mergers, restructurings, and entity liquidations. These sources provide dated information on parent-subsidiary relationships, enabling us to map ownership events to specific years. We further augment these sources with publicly available annual reports, historical press releases, regulatory acquisition approvals, and global Legal Entity Identifier relationship data. Together, these sources allow us to cross-validate ownership transitions and distinguish between legal mergers, internal reorganizations, partial divestitures, and genuine changes in the ultimate controlling entity.

We also leverage LLMs to help us reconcile naming inconsistencies across sources, detect when different legal entities correspond to the same economic group, and identify missing ownership links that are not explicitly recorded in Dealogic. For each lender, we reconstruct a continuous ownership timeline and record all changes in its ultimate parent, such as mergers (e.g., the combination of BB&T and SunTrust Banks into Truist Financial Corporation and Truist Bank in 2019), takeovers (e.g., Bank of Scotland into Lloyds Banking Group in 2009), restructurings following distress (e.g., Fortis Bank into BNP Paribas Fortis in 2008), or rebranding events without a change in control. This systematic approach captures complex multi-layered ownership hierarchies and documents the precise timing of major structural shifts. For instance, our dataset records that Credit Suisse First Boston was owned by Credit Suisse International until June 12, 2023, after which it was absorbed into the UBS Group following the government-facilitated rescue. Finally, we exclude subsidiaries that became government-owned, especially during the GFC, including those that received capital injections from the U.S. Treasury through the 2009 Troubled Asset Relief Program (TARP).

Our methodology produces a comprehensive, time-varying global map of bank and nonbank

ownership structures for the syndicated loan market. We acknowledge that this ownership structure may be incomplete, as banking groups may own or control additional entities active in other markets, such as private credit. The full list of ownership changes can be found in Online Appendix A, Table A.1 for bank subsidiaries, and Table A.2 for nonbank subsidiaries.

3.4 Macroprudential policy shocks

We resort to the iMaPP macroprudential database of Alam et al. (2025) to retrieve MaPP actions. This comprehensive dataset records changes in 17 MaPP instruments across 134 countries. Figure A.2 in Online Appendix A shows that authorities in both AEs and EMDEs have increasingly used macroprudential policies since the GFC.

We focus on measures directly constraining banks' lending capacity, split into three categories. The first set of measures focuses on loan supply: limits to credit growth, loan-loss provisioning requirements, loan restrictions, loan-to-deposit ratio caps, and limits on FX lending. The second category is reserve requirements. The final set includes other prudential measures, including stress testing, restrictions on profit distribution, and structural measures (e.g., limits on exposures between financial institutions). Stress testing is particularly relevant for the U.S., where mandatory stress testing was introduced for large BHCs following the 2010 Dodd-Frank Wall Street Reform and Consumer Protection Act ('Dodd-Frank Act') and implemented from 2012 onward. In addition, dividend distribution restrictions were widely implemented across jurisdictions, including in Europe, during the early phase of the COVID-19 pandemic in 2020. All these MaPP measures are coded as binary variables, with a value of one denoting a tightening, minus one denoting a loosening, and a zero when there is no change in policy.

Recent work has advanced the identification of MaPP shocks using high-frequency data, either by combining information from Federal Reserve speeches with sign restrictions (Drechsel and Miura 2026) or by documenting banking regulation announcements in the United Kingdom and Canada (Bluwstein and Patozi 2024, Duprey and Tuzcuoglu 2025). Collecting bank regulation announcements is challenging for some jurisdictions in our sample—or even impossible given the lack of official documents reporting that information. We therefore adopt the residual-based approach introduced by Chari et al. (2022) as our baseline. To capture the overall MaPP stringency, we first cumulate and aggregate the binary indicators from the iMaPP database at the country level of the parent company. Because MaPP actions may respond endogenously to macrofinancial conditions, we purge MaPP actions of the state of the economy by regressing

the MaPP index on country fixed effects and lagged macroeconomic and financial controls. The resulting residuals are the exogenous MaPP shocks:

$$MaPP_{c,t} = \beta_1 Macro_{c,t-1} + \beta_2 Financial_{c,t-1} + \alpha_c + \epsilon_{c,t}, \tag{1}$$

where c denotes the country of the parent company at quarter t. The (lagged) macroeconomic controls include real GDP growth, real effective exchange rate (REER) growth, year-on-year CPI inflation, and the five-year ahead real GDP forecast. Financial variables include the year-on-year change in real house prices, private credit-to-GDP growth, ten-year government bond yield, ten-year government bond yield gap (relative to the equivalent U.S. bond yield), Chinn-Ito index of financial openness, and banks' average Z-score. The resulting shock series is balanced between tightening and loosening episodes (Figure A.3 in Online Appendix A).

Our MaPP shocks exhibit expected properties: a contractionary MaPP shock strengthens banks' resilience but dampens real activity. Following a one-standard-deviation MaPP tightening, bank balance sheet health improves (higher Z-score), while GDP growth, private credit, and bank stock prices decline (Figure A.4 in Online Appendix A).[10]

4 Main results

4.1 Empirical model

Our analysis is carried out at the lender-borrower-quarter level. We test the differential lending behavior of NBFI subsidiaries relative to bank subsidiaries within the same banking group following a MaPP tightening shock. We run the following specification:

$$\begin{aligned} Log(Loans)_{l,j,i,t} &= \beta_1 MaPP_{c,t-1} + \beta_2 MaPP_{c,t-1} \times NBFI\ subs._{l,j} + \beta_3 NBFI\ subs._{l,j} \\ &+ \gamma_j + \mu_{i,t} + \epsilon_{l,j,i,t}, \end{aligned} \tag{2}$$

where the dependent variable is the logarithm of the US dollar amount of new syndicated loans of lender l within banking group j granted to nonfinancial firm i in quarter t. $MaPP_{c,t-1}$ are the lagged MaPP shocks at the banking-group country level, and $NBFI\ subs._{l,j}$ is equal to one

[10] We use local projections to estimate the dynamic effects of MaPP shocks on real GDP growth, private credit growth, bank stock price growth, and changes in banks' Z-scores. The Z-score, sourced from the World Bank's World Development Indicators, is an inverse measure of default risk, with higher values indicating greater bank stability. We include country and time fixed effects, with standard errors clustered at the country level.

when loans are intermediated by a NBFI subsidiary within a banking group.

We add banking-group fixed effects (γ_j) to focus the analysis on substitution effects in the syndicated loan market between bank and nonbank subsidiaries *within* the same banking group. β_1 captures the lending response of bank subsidiaries following a one-standard deviation MaPP tightening shock, while the main coefficient of interest, β_2, measures the differential lending provided by NBFI subsidiaries relative to bank subsidiaries within the same banking group. We also control for time-varying borrower characteristics with firm×quarter fixed effects ($\mu_{i,t}$). The inclusion of these fixed effects—in the spirit of Khwaja and Mian (2008)—implies that the identification of β_2 relies on variation in lending across different subsidiary types (bank versus nonbank) that belong to the same parent bank, lend to the same borrower in the same quarter. In robustness checks, we relax this assumption by controlling for credit demand using industry-location-size-time (ILST) fixed effects, following Degryse et al. (2019). ILST fixed effects compare borrowers within the same two-digit industry, country, size bin, and quarter, with firm size grouping firms into quartile bins of total borrowing volume within each country-year pair. Standard errors are clustered at the firm level to address within-firm correlation and potential dependence across multiple loans to the same borrower.

4.2 Banks' regulatory-induced reallocation? Lending through NBFIs

We run Equation (2) to analyze the differential lending to nonfinancial firms of NBFI subsidiaries relative to bank subsidiaries within the same banking group. Column (1) of Table 2 shows that bank lending in the syndicated loan market falls by 2.2 percent after a one-standard deviation MaPP tightening shock. Lower credit supply is consistent with tighter banking regulation constraining banks' lending capacity (Begenau and Landvoigt 2022, Albuquerque et al. 2026). The size of this effect decreases when controlling for demand with firm×quarter fixed effects, suggesting that demand plays a key role in loan dynamics after MaPP shocks (column 2).

Our key finding shows that banking groups *increase* credit supply through their NBFI subsidiaries, both relative to their bank subsidiaries and in absolute terms (column 3): bank subsidiaries reduce lending by 1.0 percent, while NBFI subsidiaries increase lending by 2.0 percent relative to bank subsidiaries, and by 1.0 percent in absolute terms. This result is consistent with *Predictions 1* and *2* in Section 2: MaPP tightening increases the marginal regulatory cost of holding the exposure in the bank entity, thus inducing an intra-group reallocation of credit supply from more tightly regulated bank affiliates toward NBFI subsidiaries within the same

group. Although we do not observe direct intra-group funding flows, our results are aligned with the role of global banks' internal capital markets in subsidizing lending to their nonbank affiliates (Bai et al. 2026). In this context, tighter MaPP may prompt parent banks to reallocate funds toward NBFI subsidiaries, possibly on more favorable terms, thereby enabling them to expand lending and partially offset the group-level impact of MaPP tightening.

A back-of-the-envelope calculation illustrates the magnitude of this new mechanism. Using the average lending share of NBFI subsidiaries (28.4 percent) in our sample, we estimate that banking groups with NBFI affiliates were able to offset more than half of the contractionary effect of MaPP tightening on syndicated lending.[11]

Table 2: Effect of macroprudential policy shocks on credit supply

	(1) All	(2) All	(3) All	(4) U.S.	(5) U.K.	(6) EA
MaPP shock	-0.022***	-0.004***	-0.010***			-0.003
	(0.003)	(0.001)	(0.001)			(0.003)
MaPP shock × NBFI subs.			0.020***	0.053***	-0.003	0.005*
			(0.002)	(0.004)	(0.011)	(0.003)
NBFI subs.			0.039***	0.067***	-0.072***	0.024***
			(0.003)	(0.005)	(0.016)	(0.007)
Time FE	✓					
Banking group FE	✓	✓	✓	✓	✓	✓
Firm × Time FE		✓	✓	✓	✓	✓
Observations	719,874	696,913	696,913	201,751	31,580	134,242
R^2	0.284	0.894	0.894	0.852	0.842	0.888

Notes: Dependent variable is the log of new syndicated loans. Sample restricted to selected countries in columns (4) to (6). Standard errors clustered by firm. Asterisks, *, **, and ***, denote statistical significance at the 10%, 5%, and 1% levels.

Our main findings are driven by U.S. banking groups (column 4) and, to a lesser extent, by euro area banking groups (column 6).[12,13] Our findings complement the recent evidence in Albuquerque et al. (2026) that nonbanks increase lending relative to banks following MaPP tightening. Our contribution is to show that banking groups mitigate the impact of tighter banking regulation by shifting lending from bank subsidiaries to their nonbanks. The absence of a significant effect for U.K. banking groups may be related to the distinctive features of the U.K. regulatory framework, i.e., its relatively integrated prudential architecture for large

[11] We combine the estimated effects for NBFI and bank subsidiaries, implying a limited reduction in syndicated lending at the group level of -0.43 percent (1.0 × 0.284 - 1.0 × 0.716 = -0.43 percent), compared with -1.0 percent for bank entities alone. This corresponds to a mitigation ratio of (-0.43 + 1.0) / -1.0 = -0.57, or -57 percent.

[12] Despite differences in regulation between the U.S. and the euro area, statistically significant results on the lending reallocation to euro area NBFI affiliates are consistent with the growth of NBFI lending to NFCs over the past decades: Schnabel (2025) reports that the share of nonbank credit to nonfinancial corporations increased from 10 percent of all credit granted by financial institutions in 1999 to about 30 percent in 2024.

[13] The MaPP shock in the specifications for the U.S. and the U.K. is common across borrowers and lenders, preventing us from estimating the average effect for bank subsidiaries (absorbed by firm×quarter fixed effects).

financial groups, and the ring-fencing between retail banking services and investment banking that reduce the scope for internal reallocation across bank and nonbank affiliates.

Our results are robust when relaxing the identification of demand by replacing firm×quarter with ILST fixed effects (Table B.1 in Online Appendix B). Our novel regulatory-induced lending reallocation mechanism also materializes along the extensive margin, with NBFI subsidiaries more likely to form new lending relationships in response to MaPP tightening, but we find the opposite for nonbank subsidiaries of U.K. and euro area banking groups (Table B.2).

At the same time, MaPP tightening is associated with higher loan spreads, especially for borrowers with greater prior reliance on nonbank lenders.[14] In column (2) of Table 3, we estimate that a one-standard deviation MaPP tightening increases spreads by 10.2 bps for borrowers with no nonbank borrowing over the previous five years. The interaction term in the second row implies that this pass-through is larger for borrowers with higher prior nonbank reliance: a one-standard-deviation increase in the nonbank share raises the spread response by 5.7 basis points (20.715×0.273). This corresponds to an additional effect of about 56 percent relative to the baseline MaPP pass-through for borrowers with no prior nonbank borrowing. This increase comes on top of the already higher spreads paid on average by borrowers that rely more on nonbank lenders (coefficients in the third row). We show that these differential pricing effects remain qualitatively robust when exploiting within-firm variation (column 3), and when focusing on U.S. or euro area borrowers (columns 4 and 6).

Examining heterogeneity among nonbanks, we find that our results are primarily driven by investment banks and broker-dealers (Table B.3 in Online Appendix B). Interestingly, invest-

[14] We follow the spirit of the lending specifications in Aldasoro et al. (2025), and Albuquerque et al. (2026), and aggregate the data at the facility-borrower-quarter level because spreads do not vary across lenders within the same facility issued to a given borrower in a given quarter. We estimate the following regression:

$$\begin{aligned} Spread_{f,i,t} &= \beta_1 MaPP_{f,t-1} + \beta_2 MaPP_{f,t-1} \times NBFI\ shr._{i,t-1} + \beta_3 NBFI\ shr._{i,t-1} \\ &+ Ctrls_{f,t} + \mu_{c,s,t} + \epsilon_{f,i,t}, \end{aligned}$$

where the dependent variable is the all-in drawn spread over LIBOR (in bps) on facility f granted to borrower i in quarter t. Since syndicated loan facilities typically involve lenders from multiple jurisdictions, we construct $MaPP_{f,t-1}$ as the loan-weighted average of country-specific MaPP lender shocks across all lenders participating in facility f. $MaPP_{f,t-1}$ thus captures the average regulatory shock faced by the syndicate financing a given facility, weighted by each lender's participation. We allow the pricing effect of MaPP shocks to vary with borrowers' prior reliance on nonbank credit; the variable NBFI $\text{shr}_{i,t-1}$ is the lagged share of borrower i's syndicated borrowing provided by nonbank lenders over the previous five years. The coefficient β_1 measures the effect of MaPP tightening on loan spreads for borrowers with no prior nonbank borrowing over the previous five years, while β_2 measures whether this pass-through is larger or smaller for borrowers with greater prior reliance on nonbank credit. Facility-level controls include years to maturity, the log facility amount, and loan type (term loans, credit lines, and other). In our preferred specification, we include borrower country×sector×quarter fixed effects, $\mu_{c,s,t}$, which compare spreads across facilities issued to borrowers in the same country, sector, and quarter. We do not include borrower fixed effects in the baseline because they would shift identification to within-borrower changes in lagged nonbank share. Since $NBFI\ shr._{i,t-1}$ is measured over the previous five years and is therefore highly persistent, adding firm fixed effects would absorb much of the relevant variation.

Table 3: Effect of macroprudential policy shocks on credit spreads

	(1) All	(2) All	(3) All	(4) U.S.	(5) U.K.	(6) EA
MaPP shock	7.239***	10.166***	-2.745	10.609***	5.902	-6.450
	(2.710)	(3.250)	(2.992)	(3.525)	(17.533)	(12.458)
MaPP shock × NB shr.	18.711***	20.715***	9.932**	20.223***	43.490	42.105*
	(4.264)	(4.434)	(4.095)	(4.588)	(30.115)	(21.666)
NBFI shr.	22.822***	20.953***	3.254	21.908***	37.065	16.027
	(4.425)	(4.595)	(4.994)	(4.763)	(24.909)	(19.930)
Facility controls	✓	✓	✓	✓	✓	✓
Borrower country FE	✓					
Sector FE	✓					
Borrower country × Sector × Time FE		✓	✓	✓	✓	✓
Firm FE			✓			
Observations	56,099	54,402	51,311	43,088	1,274	4,239
R^2	0.227	0.332	0.721	0.268	0.497	0.578

Notes: Data aggregated at the facility-borrower-quarter level. Dependent variable is the all-in drawn spread (in bps). *NBFI shr.* is the share of borrower-level syndicated loan volume originated by nonbanks over the previous five years. Facility controls refer to years to maturity, the log of the facility amount, and the loan type (term loans, credit lines, and other). Standard errors clustered by borrower. Asterisks, *, **, and ***, denote statistical significance at the 10%, 5%, and 1% levels.

ment funds and asset managers (including hedge funds, private equity, and other alternative investment vehicles) do not appear to increase lending following tighter MaPP shocks. One possible explanation is that parent banks may predominantly shift lending from their bank subsidiaries to their investment bank arms, which tend to already be well established in the syndicated loan market. In addition, investment funds and asset managers may be more active in private or bilateral credit markets (e.g., direct lending and private debt funds) than in the syndicated loan market. This may explain why any MaPP-induced reallocation toward those forms of credit would not be fully captured in our syndicated loan dataset. Finally, we conjecture that leverage constraints may also play a role: investment funds and asset managers are typically less leveraged than other NBFIs, such as investment banks, relying primarily on investor capital rather than borrowed funds, which may restrict their ability to expand lending.

An open question is whether the increase in lending by NBFI subsidiaries reflects purely the reallocation of lending within the banking group due to the regulatory wedge, or whether it reflects greater risk-taking due to reach-for-yield behavior. Prior research suggests that tighter home-country regulation, by reducing bank profitability, may induce multinational banks to take on more risk abroad—for instance, by relaxing credit standards through their foreign subsidiaries (Ongena et al. 2013) or by establishing new subsidiaries abroad (Demirgüç-Kunt et al. 2023). We examine the risk-taking hypothesis in our setting by augmenting Equation (2) to test whether lending to risky borrowers increases following tighter MaPP:

$$
\begin{aligned}
Log(Loans)_{l,j,i,t} &= \beta_1 MaPP_{c,t-1} + \beta_2 MaPP_{c,t-1} \times NBFI\ subs._{l,j} + \beta_3 NBFI\ subs._{l,j} \\
&+ Risky_{i,t-1} \times (\beta_4 MaPP_{c,t-1} + \beta_5 MaPP_{c,t-1} \times NBFI\ subs._{l,j} + \beta_6 NBFI\ subs._{l,j}) \\
&+ \gamma_j + \mu_{i,t} + \epsilon_{l,j,i,t}, \qquad (3)
\end{aligned}
$$

where $Risky_{i,t-1}$ is a predetermined, time-varying dummy variable proxying risky borrowers. We use several balance sheet variables to capture firms' credit risk: high-PD firms, defined as firms with a PD over the next 24 months falling in the top quartile of the distribution; a dummy variable capturing firms with a loan-weighted average spread over the past five years in the top quartile of the sample distribution; a dummy variable representing leveraged loans; highly leveraged firms, defined as firms with a leverage ratio in the top quartile of the distribution; young firms, defined as firm age belonging to the first quartile; a zombie dummy from Albuquerque and Iyer (2024) that captures unprofitable and unviable firms; and 'vulnerable' firms with high debt and low liquid assets (Albuquerque 2024). The coefficient of interest β_5 measures the additional lending provided by NBFI subsidiaries to risky borrowers relative to other borrowers in response to a one-standard deviation MaPP tightening.

In Table 4 we test each risky dummy one at a time. Across several alternative indicators of borrowers' credit risk, we do not find any statistical evidence that the increase in lending by NBFI subsidiaries during MaPP shocks is disproportionately channeled to risky borrowers. If anything, the fourth row in columns (2) and (3) shows that NBFIs may favor lending to less risky borrowers—firms with lower past spreads and borrowers not classified as leveraged loans. Although NBFIs tend to be more exposed to risky borrowers (the last row suggests higher lending to high-PD firms, highly leveraged firms, and firms with limited liquid assets), we do not find that their exposure increases in response to MaPP tightening shocks, consistent with the findings in Albuquerque et al. (2026). We also do not find that NBFI subsidiaries increase their exposure to zombie firms due to tighter regulation.[15] Overall, by substituting lending from bank to nonbank subsidiaries, banking groups seem to decrease, or at least maintain, the overall risk in their lending portfolio (based on the sum of the coefficients in the third and fourth rows). This behavior is consistent with the idea of the regulatory wedge between affiliates driving the lending reallocation, rather than reach-for-yield behavior (*Prediction 3*).

[15] Albuquerque and Mao (2026) show that monetary policy tightening can incentivize banks to offer more favorable credit terms to zombie firms in order to prevent defaults. Our result, by contrast, suggests that macroprudential policies operate differently in shaping banks' incentives to lend to zombie firms.

Table 4: Lending to risky borrowers

	(1) PD	(2) Spread 5y	(3) Lev. loan	(4) Lev. ratio	(5) Age	(6) Vuln	(7) Zombie
MaPP shock	-0.005	-0.014***	-0.019***	-0.004	-0.014***	-0.006*	-0.009***
	(0.003)	(0.002)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)
MaPP shock × NBFI subs.	0.016***	0.034***	0.058***	0.021***	0.015***	0.019***	0.022***
	(0.005)	(0.003)	(0.005)	(0.005)	(0.006)	(0.005)	(0.005)
MaPP shock × Risky	-0.009	-0.003	-0.001	-0.010	0.009	0.001	0.022
	(0.007)	(0.004)	(0.004)	(0.007)	(0.008)	(0.007)	(0.016)
MaPP shock × NBFI subs. × Risky	-0.002	-0.014**	-0.012**	-0.015	0.001	-0.015	-0.006
	(0.010)	(0.006)	(0.006)	(0.010)	(0.010)	(0.014)	(0.020)
NBFI subs.	0.041***	0.039***	0.044***	0.036***	0.033***	0.038***	0.036***
	(0.008)	(0.004)	(0.006)	(0.008)	(0.012)	(0.007)	(0.007)
NBFI subs. × Risky	0.019*	0.010	0.004	0.032***	-0.012	0.032*	-0.039*
	(0.012)	(0.006)	(0.007)	(0.012)	(0.013)	(0.016)	(0.021)
Banking group FE	✓	✓	✓	✓	✓	✓	✓
Firm × Time FE	✓	✓	✓	✓	✓	✓	✓
Observations	103,949	345,509	281,128	112,040	52,731	107,051	147,417
R^2	0.801	0.833	0.839	0.803	0.881	0.803	0.882

Notes: Dependent variable is the log of new syndicated loans. Each column refers to different time-varying proxies of Risky borrowers. *PD* captures firms with the two-year probability of default in the top quartile of the distribution; *Spread 5y* refers to firms with an average spread in the top quartile over the past five years; *Lev. loan* stands for leveraged loans, defined as firms with a spread over 150 bps; *Lev. ratio* captures highly leveraged firms, i.e., firms with total debt over assets in the top quartile of the distribution; *Age* refers to firm age falling in the first quartile of the distribution; *Vuln* refers to vulnerable firms with high debt and low liquid assets; and *Zombie* is a dummy variable capturing unproductive and unviable firms. Standard errors clustered by firm. Asterisks, *, **, and ***, denote statistical significance at the 10%, 5%, and 1% levels.

We next examine how NBFI and bank lending behavior varies with the financial strength of their parent banking groups.[16] Specifically, we assess whether financially weaker banks redirect more lending through their NBFI subsidiaries following MaPP tightening. In this regression, we replace banking-group fixed effects with individual-lender fixed effects, as our goal is to examine how the responses of lenders—banks and nonbanks—differ *between* banking groups with varying balance sheet strength (e.g., those with high versus low capital ratios). We also add several lagged time-varying bank controls, namely the logarithm of total assets, the return on assets, NPLs, Tier 1 capital ratio, the leverage ratio, and the two-year probability of default.

We capture financial strength of the banking group using four proxies: (i) the probability of default (PD), (ii) nonperforming loans (NPLs), (iii) the Tier 1 capital ratio, and (iv) size, measured as the logarithm of total assets. For the first two measures, we construct time-varying dummy variables that identify 'weak' banking groups as those in the top quartile of the distribution of PDs or NPLs. Similarly, we classify the ones with capital ratios or total assets

[16] We use the balance sheet of the parent bank, as the lending behavior of subsidiaries is typically more sensitive to the cash flow and capital position of the parent group rather than that of the subsidiary itself (Houston et al. 1997, De Haas and van Lelyveld 2010, Cetorelli and Goldberg 2011, De Haas and Van Horen 2013).

in the bottom quartile of the sample distribution as weak banking groups.

The third row of Table 5 shows that weaker banking groups tend to provide less lending through their bank affiliates following MaPP tightening. This result seems to be driven by a differential response to regulatory tightening: banking groups with weaker balance sheets—higher distress risk, lower capitalization, or smaller size—increase lending through affiliated NBFI subsidiaries by more (fourth row). This finding is consistent with regulatory constraint binding more among financially weaker banking groups, thus creating incentives for internal lending reallocation towards the less-regulated nonbanks (*Prediction 4*). It also aligns with available empirical evidence that low-capitalized banks expand foreign lending when regulation tightens at home, as they face more binding constraints and higher funding costs at home, which incentivizes them to lend in markets with less restrictive regulation (Demirgüç-Kunt et al. 2023, Fabiani and Neanidis 2025). Our contribution is to highlight a complementary, previously undocumented mechanism: financially weaker banking groups appear to shift lending more toward their NBFI affiliates, which are likely to be less affected by direct regulatory constraints.

Table 5: Banking group characteristics

	(1) PD	(2) NPL	(3) T1R	(4) Size
MaPP shock	-0.015***	-0.017***	-0.001	0.013***
	(0.003)	(0.003)	(0.004)	(0.005)
MaPP shock × NBFI subs.	0.002	0.007**	-0.009*	-0.022***
	(0.003)	(0.003)	(0.005)	(0.005)
MaPP shock × Bank charact.	-0.007	-0.005	-0.019***	-0.040***
	(0.005)	(0.014)	(0.004)	(0.005)
MaPP shock × NBFI subs. × Bank charact.	0.025***	-0.013	0.025***	0.025***
	(0.006)	(0.018)	(0.005)	(0.008)
Bank charact.	-0.007	-0.054***	0.048***	0.006
	(0.006)	(0.013)	(0.005)	(0.011)
Banking group controls	✓	✓	✓	✓
Lender FE	✓	✓	✓	✓
Firm × Time FE	✓	✓	✓	✓
Observations	233,003	233,003	233,003	233,003
R^2	0.846	0.846	0.846	0.846

Notes: Dependent variable is the log of new syndicated loans. Each column refers to a specific bank characteristic: *PD* and *NPL* refer to banks with a two-year PD (NPL) in the top quartile of the sample distribution, and *T1R* and *Size* to banks with Tier 1 capital ratio (log of total assets) in the first quartile of the sample distribution. Standard errors clustered by firm. Asterisks, *, **, and ***, denote statistical significance at the 10%, 5%, and 1% levels.

Overall, the results in this section are consistent with *Predictions 1-4* in Section 2. Following loan-supply MaPP tightening shocks, bank subsidiaries reduce syndicated lending while affiliated NBFIs expand relative to banks, partially offsetting the contraction at the group level.

The reallocation is stronger among weaker banking groups, consistent with a binding bank-level regulatory-cost channel. Moreover, this reallocation is not associated with greater risk-taking.

4.3 Foreign subsidiaries and cross-border lending

Our findings can be placed in the literature studying the role of cross-country regulatory differences in shaping capital flows. Research shows that banks reallocate funds toward jurisdictions with looser regulation (Houston et al. 2012, Ongena et al. 2013, Danisewicz et al. 2017, Franch et al. 2021, Demirgüç-Kunt et al. 2023), are more likely to establish branches or subsidiaries in countries with lighter regulation (Houston et al. 2012, Frame et al. 2020, Demirgüç-Kunt et al. 2023), and tend to acquire banks in more permissive regulatory environments (Karolyi and Taboada 2015). This literature focuses exclusively on foreign bank subsidiaries, not NBFIs.

In theory, banking groups can use their foreign bank subsidiaries to offset tighter regulation at home since they are subject to host-country regulation rather than the parent's home-country rules.[17] We examine whether banks also use foreign NBFI subsidiaries, in addition to domestic NBFIs, a margin that has not been explored. Given their lighter regulatory treatment, these entities are unlikely to fall squarely under either home- or host-country regulation.

Against this backdrop, we investigate whether banking groups rely on foreign bank subsidiaries to mitigate regulation at home, and whether our earlier results on NBFIs are driven primarily by domestic or foreign entities. This distinction allows us to contribute to the literature in one of two possible ways. If foreign NBFIs were driving our main results, our findings would largely align with existing evidence on the role of foreign entities in the transmission of regulatory differences, rather than pointing to a distinct new channel (Houston et al. 2012, Ongena et al. 2013, Danisewicz et al. 2017, Cerutti et al. 2017, Cerutti and Zhou 2018, Franch et al. 2021, Demirgüç-Kunt et al. 2023). By contrast, if domestic NBFIs are the key driver, this would point to a previously undocumented intra-group reallocation channel through which banking groups mitigate the effects of tighter regulation.

We replace the risky borrower dummy in Equation (3) with a foreign subsidiary dummy that captures whether a subsidiary (bank or NBFI) is located outside the parent bank's home country.

[17] We focus on subsidiaries in this paper, not branches. Foreign bank branches are legally part of the parent bank and remain under the home-country regulator, while subsidiaries are legally distinct entities incorporated in the host country, therefore subject to regulation in the host country. For instance, a foreign branch of a U.S. bank in our dataset will appear under the parent U.S. bank's name, and syndicated loans booked through the branch are counted as part of the U.S. banking group. This distinction makes subsidiaries the relevant vehicle through which differences in regulatory regimes across jurisdictions affect lending decisions. For a comparison between branches and subsidiaries, see Danisewicz et al. (2017) and Franch et al. (2021).

Columns (2) and (3) of Table 6 are consistent with the literature's earlier findings: foreign subsidiaries help parent banks cushion the impact of tighter regulation at home. In particular, column (3) shows that foreign bank subsidiaries increase lending by 2.4 percent relative to domestic bank subsidiaries (1.1 percent in absolute terms). The picture looks different for NBFIs. Domestic NBFIs expand lending by 2.1 percent relative to domestic bank subsidiaries, and by 1.2 percent relative to their foreign counterparts, which do not adjust lending in response to MaPP shocks (the sum of all coefficients yields a statistically insignificant point estimate of -0.4 percent). Taken together, these findings reinforce our earlier novel result on the key role of NBFI subsidiaries: the overall effect is driven by domestic rather than by foreign NBFIs.

Table 6: The role of foreign subsidiaries

	(1) All	(2) All	(3) All	(4) Cross-border	(5) Cross-border	(6) Cross-border	(7) Cross-border (excl. EA)
MaPP shock	-0.004***	-0.006***	-0.013***	-0.005***	-0.008***	-0.008***	-0.012***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
MaPP shock × Foreign subs.		0.013***	0.024***		0.019***	0.018***	0.030***
		(0.004)	(0.004)		(0.004)	(0.004)	(0.006)
MaPP shock × NBFI subs.			0.021***			0.001	0.003
			(0.002)			(0.003)	(0.004)
MaPP shock × Foreign subs. × NBFI subs.			-0.036***			0.005	-0.017
			(0.009)			(0.010)	(0.015)
Foreign subs.		-0.049***	-0.039***		-0.025***	-0.032***	-0.011
		(0.004)	(0.004)		(0.005)	(0.005)	(0.007)
NBFI subs.			0.040***			-0.017***	-0.023***
			(0.003)			(0.005)	(0.006)
Foreign subs. × NBFI subs.			-0.035***			0.031***	0.045***
			(0.010)			(0.011)	(0.016)
Banking Group FE	✓	✓	✓	✓	✓	✓	✓
Firm × Time FE	✓	✓	✓	✓	✓	✓	✓
Observations	696,913	696,909	696,909	258,743	258,742	258,742	153,061
R^2	0.894	0.894	0.894	0.854	0.854	0.854	0.860

Notes: Dependent variable is the log of new syndicated loans. Sample is restricted to cross-border lending in columns (4) to (7). Column (7) excludes euro area lenders. Standard errors clustered by firm. Asterisks, *, **, and ***, denote statistical significance at the 10%, 5%, and 1% levels.

Columns (4) to (7) restrict the sample to cross-border flows, where the borrower is located in a different country from the parent bank. Column (4) shows that cross-border lending declines on average after a MaPP tightening shock in the source country, with foreign affiliates mitigating the fall (column 5). But in this setting, foreign bank and NBFI subsidiaries play a prominent role in offsetting the impact of tighter regulation, not domestic NBFIs (column 6). This suggests that banks rely more on domestic NBFIs to sustain lending at home, while foreign bank and NBFI subsidiaries are used primarily to support lending abroad (but foreign NBFIs account for a small share of lending).[18] Increased lending of domestic NBFIs and foreign affiliates underscores the role of banking groups' internal capital markets in reallocating funds across borders. We

[18]Banking groups do not frequently use their foreign NBFIs to participate in the corporate syndicated loan market; foreign NBFIs account for only 2.2 percent of all banking-group lending over the estimation sample, and this share has been declining over time, representing 0.9 percent in 2024.

obtain qualitatively similar results when excluding euro area lenders in column (7), to account for the possibility that reciprocity in some macroprudential policies within the euro area may mitigate leakages through cross-border flows between euro area countries.

We further explore cross-border lending heterogeneity by examining if parent banks mitigate MaPP shocks more strongly in their core markets, i.e., in countries where they have a relatively large presence. For each banking group, we compute the average share of loans to a given country relative to its total cross-border lending. We then define a *high country loan share* dummy equal to one when this share is in the top quartile of the distribution across all banking groups, and a *low country loan share* dummy equal to one when it is in the bottom quartile.

Banking groups use their foreign affiliates to mitigate the credit supply contraction in markets where they have a large presence (columns 1-2 of Table B.4 in Online Appendix B). Column (2) shows that foreign banks increase lending by 5.5 percent in core markets relative to other markets (sum of third and fourth rows), and foreign NBFIs by 1.1 percent (0.4 + 5.1 - 3.7 - 0.7). We find similar results in columns (3)-(4): foreign subsidiaries cut lending in non-core markets, consistent with global banks scaling back lending in non-core countries during liquidity and regulatory shocks to preserve lending to core countries (De Haas and van Lelyveld 2010, Cetorelli and Goldberg 2012, Aiyar et al. 2014).

Overall, we have shown that banking groups rely not only on foreign bank affiliates, but also on domestic NBFIs to buffer the impact of regulation on lending. Moreover, banks appear to use these entities for distinct purposes: foreign bank and NBFI subsidiaries mitigate the effect of regulation on cross-border lending—especially in core markets where banking groups have a large presence—while domestic NBFIs cushion the effect on lending at home. From the banking groups' perspective, there are benefits to keeping lending channels close to home. Domestic NBFIs can more easily share management, risk systems, and internal information flows with their parent, making it less costly to redirect funds through them. This dual strategy allows parent banks to reduce the impact of tighter macroprudential regulation both abroad, as documented in earlier studies, and—newly shown here—at home.[19]

[19] In Online Appendix C, we investigate how banking groups adjust credit supply when MaPP tightening occurs instead in the country of the borrower. We find in Table C.1 that when foreign bank subsidiaries face tighter regulation, parent banks partly offset the resulting contraction in credit supply by channeling lending through domestic and foreign NBFI subsidiaries, which typically fall outside the regulatory perimeter. This highlights the flexibility of multinational banking groups in engaging in regulatory mitigation across borders, depending on where the MaPP tightening takes place.

4.4 Bank-owned NBFIs vs independent NBFIs

We have seen how MaPP shocks affect the differential lending response of NBFIs relative to banks within banking groups. In this section, we extend the sample to NBFIs not owned by banking groups. This allows us to test whether the observed increase in lending by NBFI subsidiaries following MaPP shocks is specific to banking-group affiliation or reflects the NBFI business model more broadly and their lighter regulatory treatment, irrespective of ownership.

The expanded sample includes 939 nonbanking groups. In total, we have 2,950 bank entities, 1,692 independent NBFIs not affiliated with banking groups, and 824 bank-owned NBFI subsidiaries. Bank-owned NBFIs are roughly half as numerous as independent NBFIs, but account for a substantially larger share of syndicated loans: around 26 percent of all loans compared to 9 percent for independent NBFIs (Figure A.5 in Online Appendix A). We expand Equation (2):

$$\begin{aligned} Log(Loans)_{l,j,i,t} &= \beta_1 MaPP_{c,t-1} + NBFI_{l,j} \times (\beta_2 MaPP_{c,t-1} + \beta_3 MaPP_{c,t-1} \times BG\ subs_j + \beta_4 BG\ subs_j) \\ &+ \gamma_l + \mu_{i,t} + \epsilon_{l,j,i,t}, \end{aligned} \tag{4}$$

where $NBFI_{l,j}$ is a dummy variable equal to one for independent nonbank lenders owned by nonbanking groups j, while $BG\ subs_j$ is a dummy for lenders belonging to banking groups (previously the NBFI subsidiary dummy, renamed for clarity). Since we are interested in the differential lending response of bank-owned NBFIs relative to independent NBFIs, we run this specification with individual lender fixed effects γ_l. The coefficient β_1 measures the average lending response of bank entities to a MaPP shock, β_2 captures the additional lending response for independent NBFIs, and β_3 indicates the additional lending response of bank-owned NBFI subsidiaries relative to independent NBFIs.

We find that NBFIs not affiliated with banking groups reduce lending to NFCs by 0.7 percent relative to banks after a one-standard-deviation MaPP tightening shock, while bank-owned NBFIs increase lending relative to independent NBFIs by 1.8 percent (column 3 of Table 7). This pattern is driven by U.S. lenders (column 4), consistent with earlier results. This evidence suggests that independent NBFIs behave fundamentally differently from NBFI subsidiaries of banking groups. Importantly, this finding complements Albuquerque et al. (2026): the increase in lending by nonbanks after MaPP tightening (and possibly also after a monetary policy shock) is driven exclusively by NBFIs affiliated with banking groups. The importance of banking-group affiliation also appears in other settings. Albuquerque and Firat (2026) show that the increase

in NBFI corporate bond underwriting during banking crises is driven predominantly by NBFIs affiliated with banking groups, rather than by independent NBFIs.

Table 7: Effect of macroprudential policy shocks on credit supply: adding independent NBFIs

	(1) All	(2) All	(3) All	(4) U.S.	(5) U.K.	(6) EA
MaPP shock	-0.029***	-0.006***	-0.009***			-0.003
	(0.003)	(0.001)	(0.001)			(0.003)
MaPP shock × NBFI			-0.007**	-0.021***	0.013	0.003
			(0.003)	(0.007)	(0.036)	(0.004)
MaPP shock × NBFI × BG subs.			0.018***	0.062***	-0.019	0.002
			(0.003)	(0.007)	(0.037)	(0.004)
NBFI × BG subs.			0.000	-0.097**	-0.015	0.030
			(0.016)	(0.047)	(0.099)	(0.021)
Time FE	✓					
Lender FE	✓	✓	✓	✓	✓	✓
Firm × Time FE		✓	✓	✓	✓	✓
Observations	782,594	761,629	761,629	234,795	32,599	150,994
R^2	0.303	0.895	0.895	0.856	0.847	0.890

Notes: Dependent variable is the log of new syndicated loans. *BG* stands for Banking Group. Sample restricted to selected countries in columns (4) to (6). Standard errors clustered by firm. Asterisks, *, **, and ***, denote statistical significance at the 10%, 5%, and 1% levels.

Why do independent NBFIs fail to expand their market share in the syndicated loan market when bank regulation tightens? We consider two complementary explanations. The first is a competition and funding-advantage channel. Bank-owned NBFIs may benefit from the parent banking group's internal capital markets, client relationships, and access to group-level funding (Ashcraft 2008).[20]. Independent NBFIs, by contrast, lack these intra-group funding channels and may rely more heavily on external credit from banks or wholesale funding markets. When MaPP tightening raises the marginal cost of bank credit, these funding conditions may become less favorable for independent NBFIs, limiting their ability to expand lending precisely when bank-owned NBFIs can draw on internal group support. In fact, the heavy reliance of independent NBFIs on external funding from banks, including through instruments such as reverse repos (Financial Stability Board 2025, Li et al. 2026), exposes them to funding frictions when MaPP tightening reduces banks' willingness or ability to supply credit. In this environment, banking groups may instead allocate scarce funding to their own NBFI subsidiaries, allowing them to sustain lending and preserve the group's overall market presence.

[20] A large literature documents the benefits of being affiliated with a banking group. In the United States, banking reforms in the late 1980s strengthened internal support within holding companies: distressed affiliates were more likely to receive capital support, recovered faster, and faced lower subsequent failure risk (Ashcraft 2008). More broadly, parent-bank financial strength affects subsidiary outcomes as stronger parents can support affiliate lending, while domestic shocks can also be transmitted through the group to foreign affiliates (Houston et al. 1997, De Haas and van Lelyveld 2010, Cetorelli and Goldberg 2011, De Haas and Van Horen 2013).

To explore this channel, we compare the lending response of independent and bank-owned NBFIs across countries where banking groups have a large market presence.[21] Column (1) of Table B.5 in Online Appendix B shows that, following a MaPP tightening shock, independent NBFIs increase lending by 3.9 percent and 3.7 percent, respectively relative to bank-owned bank and NBFI subsidiaries in countries where banking groups do not have a large presence. By contrast, the triple interaction term $MaPP_{c,t-1} \times NBFI_{l,j} \times \text{Ctry shr}_{w,t-1}$ indicates that independent NBFIs reduce lending substantially relative to bank-owned subsidiaries in countries where banking groups have a high share of lending. This phenomenon is present in domestic and cross-border markets (column 2-3). We interpret this as evidence that banking groups engage in stronger lending reallocation at home, primarily through their NBFI subsidiaries, when they have a large market stake. In those markets, parent banks appear to use their NBFI subsidiaries to preserve borrower relationships and market share, thereby crowding out independent NBFIs.

The second explanation is compositional. Independent and bank-owned NBFIs differ in the types of institutions they contain. Independent NBFIs are dominated by investment funds and asset managers, accounting for 44 percent, while broker-dealers account for only 19 percent (Table A.3 in Appendix A). By contrast, bank-owned NBFIs are dominated by investment banks and broker-dealers, which account for 64 percent of bank-owned NBFI subsidiaries (Table 1). This composition matters because our earlier results by NBFI type showed that the lending reallocation toward bank-owned NBFIs is driven primarily by investment banks and broker-dealers, while investment funds and asset managers reduce lending.

We confirm this interpretation by estimating the lending response separately by NBFI type. Table B.6 in Online Appendix B shows that the negative average response of independent NBFIs after MaPP tightening is driven by investment funds and asset managers. This contrasts with the response of independent broker-dealers (bank-owned broker-dealers continue to display a stronger lending response). Thus, the differential response between independent and bank-affiliated NBFIs reflects both ownership and composition. Ownership matters because bank-

[21] We run the following specification:

$$\begin{aligned} Log(Loans)_{l,j,i,w,t} &= \beta_1 MaPP_{c,t-1} + \beta_2 MaPP_{c,t-1} \times NBFI_{l,j} + \beta_3 MaPP_{c,t-1} \times NBFI_{l,j} \times BG\ subs_j \\ &+ Ctry\ shr_{w,t-1} \times (\beta_4 MaPP_{c,t-1} + \beta_5 MaPP_{c,t-1} \times NBFI_{l,j} + \beta_6 MaPP_{c,t-1} \times NBFI_{l,j} \times BG\ subs_j) \\ &+ \gamma_l + \mu_{i,t} + \epsilon_{l,j,i,w,t}, \end{aligned}$$

where $Ctry\ shr_{w,t-1}$ is a dummy variable equal to one if the share of syndicated loans originated by banking groups in country w, relative to total syndicated loans in their portfolios at time $t-1$, falls in the top quartile of the sample distribution. We first aggregate loans across all banking groups, allowing us to examine the lending response of independent NBFIs in countries where banking groups, in aggregate, hold a large market share. We focus particularly on β_5 and β_6, which capture the lending response to MaPP shocks of independent NBFIs and bank-owned NBFIs, respectively, relative to bank subsidiaries in high-banking group loan share countries.

affiliated NBFIs can benefit from internal capital markets and group-level client relationships. Composition matters because the bank-owned NBFI sample is concentrated in investment banks and broker-dealers, which are central players in syndicated loan origination and distribution, while the independent NBFI sample is concentrated in investment funds and asset managers, whose business model and funding structure make them less likely to expand balance-sheet-intensive syndicated lending when bank regulation tightens.

These findings sharpen the interpretation of our main result. The lending reallocation is not a generic shift from banks to all nonbanks. Rather, it is a shift toward specific nonbank affiliates inside banking groups, especially broker-dealers. Independent NBFIs, and particularly investment funds and asset managers, do not perform the same offsetting role in the syndicated loan market. This supports the view that the relevant mechanism is not simply lighter regulation of nonbanks, but the combination of a regulatory wedge, banking-group affiliation, and the institutional specialization of broker-dealer subsidiaries in syndicated loan markets.

5 High-frequency identification of MaPP announcements

5.1 Construction of MaPP announcements

We check the robustness of our baseline analysis with residualized MaPP shocks through a high-frequency (HF) identification strategy based on announcements. This approach follows the identification methods widely used in the monetary policy literature and, more recently, by Drechsel and Miura (2026) for U.S. banking regulation shocks. We construct a comprehensive set of lender-based MaPP announcements for the six largest country lenders in our sample: the U.S., Japan, the U.K., Germany, France, and Canada. For Canada, we rely on the event list compiled by Duprey and Tuzcuoglu (2025), while for all the other countries we draw on the iMaPP database. Two considerations are central to building our shock series.

First, the iMaPP database reports both announcement and implementation dates for each macroprudential measure. We extract the initial announcement date for each measure, including cases in which the announcement and implementation occur on the same day. Second, most MaPP announcements are recorded only at the monthly frequency, which is insufficient for a high-frequency event-study design. To recover precise daily timestamps, we manually identify the exact release dates by consulting official regulatory communication documents, including central bank press releases, supervisory authority bulletins, and government gazettes. We then

cross-check and validate the timing and the content of each announcement using LLM-assisted searches. This two-step procedure ensures that event dates are accurate and comparable across countries, enabling us to construct a consistent high-frequency MaPP shock series.

Table 8 summarizes the number of lender-based MaPP announcements by country, totaling 196 announcements. Among all events, only seven overlap with monetary policy announcements, two in Germany and France, and one each in the U.S., U.K., and Japan. Excluding these events does not affect the results. To maintain consistency with the residual-based MaPP baseline shocks, we restrict the set of measures to lender-based MaPP announcements that exclude capital-based measures, resulting in 132 events.

Table 8: Number of MaPP announcements by country and type

Country	Capital-based	Lender-based excl. cap.	Total
CAN	9	12	21
DEU	6	32	38
FRA	11	33	44
GBR	22	17	39
JPN	5	6	11
USA	11	32	43
Total	64	132	196

Notes: Capital-based refers to announcements related to capital requirements, CCyB, and conservation buffers. *Lender-based excl. cap.* includes all remaining MaPP measures.

With the identified MaPP announcement dates, we construct high-frequency MaPP surprises from daily excess returns on bank stock prices relative to the aggregate stock market. Specifically, for each announcement a, country c, and day t, we define the MaPP surprise as:

$$s_{a,c} = (\log p^{Bank}_{t_{a,c}} - \log p^{Bank}_{t-1_{a,c}}) - (\log p^{Mkt}_{t_{a,c}} - \log p^{Mkt}_{t-1_{a,c}}), \tag{5}$$

where $p^{Bank}_{t_{a,c}}$ denotes the end-of-day stock price of the banking-sector index in country c on announcement day a, and $p^{Mkt}_{t_{a,c}}$ is the country-level aggregate stock market index. By subtracting the aggregate market return, we isolate the portion of banks stock price reaction that is specific to the banking sector and not driven by movements in NFCs or broad market conditions.

We focus on one-day excess returns for two reasons. First, we lack intraday stock price data for all six countries in our sample, which prevents us from employing the narrower event windows commonly used in the monetary policy literature. Second, expanding the window to multiple days (e.g., two- or three-day cumulative returns) increases the likelihood of capturing other market-relevant news, such as macroeconomic releases or other policy announcements,

that may contaminate the measured response to MaPP announcements. Restricting attention to a one-day window therefore provides a relatively cleaner and more comparable measure of MaPP surprises across countries (with two-day windows examined as a robustness check).

We aggregate the daily MaPP surprises to the quarterly frequency by cumulating all surprises within each quarter. As in our baseline measure, we then standardize the resulting quarterly series. Table A.3 in Online Appendix A shows that the volatility of the HF and baseline MaPP shocks is comparable, although the HF shocks tend to be more contractionary.

5.2 Main results

Table 9 presents the results from Equation (2) using HF MaPP surprises. Columns (1)-(2) report the baseline MaPP shocks, with column (2) restricting the sample to the six countries for which HF surprises are available (results remain qualitatively unchanged). When considering MaPP announcements, parent banks curtail credit by 0.9 percent through their bank affiliates, while expanding affiliated NBFI lending by 1.5 percent relative to bank subsidiaries (column 3). This confirms that lender-based MaPP measures directly constrain parent banks' lending, thus strengthening banking groups' incentives to shift credit intermediation toward NBFI affiliates. Also consistent with our main results, the effects are driven by U.S. banking groups, while we do not find any statistically significant responses for U.K. and selected European lenders.

Table 9: Effect of high-frequency macroprudential policy shocks

	(1) Base	(2) Base: HF smpl	(3) HF	(4) U.S.	(5) U.K.	(6) DE	(7) FR	(8) Spreads
MaPP shock	-0.010***	-0.016***	-0.009***					-1.351
	(0.001)	(0.002)	(0.002)					(4.291)
MaPP shock × NBFI subs.	0.020***	0.022***	0.015***	0.039***	-0.007	-0.020	0.002	0.744
	(0.002)	(0.002)	(0.002)	(0.004)	(0.010)	(0.013)	(0.006)	(4.733)
NBFI subs.	0.039***	0.055***	0.019***	0.014*	0.032	0.013	-0.010	35.213***
	(0.003)	(0.003)	(0.005)	(0.007)	(0.029)	(0.022)	(0.015)	(4.931)
Banking group FE	✓	✓	✓	✓	✓	✓	✓	
Firm × Time FE	✓	✓	✓	✓	✓	✓	✓	
Facility controls								✓
Borrower country × Sector × Time FE								✓
Observations	696,913	534,142	332,712	134,723	15,815	11,337	16,989	32,944
R^2	0.894	0.899	0.910	0.860	0.884	0.885	0.932	0.321

Notes: Columns (1)-(7): the dependent variable is the log of new syndicated loans. Column (8): the dependent variable is the all-in drawn spread, with the data aggregated at the facility-borrower-year level; *NBFI subs.* is the share of borrower-level syndicated loan volume originated by nonbanks in total loans over the previous five years, and facility controls refer to years to maturity, the log of the facility amount, and the loan type (term loans, credit lines, and other). Columns (1)-(2) use the baseline MaPP shocks, with column (2) restricting the sample to country lenders with HF shocks. Columns (3)-(8) use the HF shocks. The sample is restricted to selected country lenders in columns (4)-(7). Standard errors clustered by firm. Asterisks, *, **, and ***, denote statistical significance at the 10%, 5%, and 1% levels.

The increase in lending by NBFI subsidiaries is not accompanied by an additional increase in

spreads relative to bank subsidiaries (column 8). However, and as in the baseline, borrowers that rely more on nonbank lenders tend to experience higher spreads on average. Our overall results remain qualitatively unchanged when using instead a two-day change in the excess returns of bank stock prices (columns 2 and 5 of Table B.7 in Online Appendix B). This addresses potential concerns from the possibility that some MaPP announcements took place after stock market closing hours. Moreover, our results also remain strongly robust when considering estimated daily abnormal returns in bank stock prices instead of excess returns (columns 3 and 6).[22]

6 Scope of the reallocation channel

This paper has documented that banking groups respond to MaPP tightening by reallocating syndicated lending from bank subsidiaries toward affiliated NBFIs. In this section, we examine the scope of this mechanism along two dimensions. First, we ask whether the reallocation channel depends on the type of MaPP instrument, especially whether it survives when we exclude reserve requirements and stress-testing measures, and whether it is present for capital-based measures. Second, we ask whether the same reallocation margin appears in another major credit market for nonfinancial corporations, namely corporate bond underwriting.

The type of MaPP instrument matters because the associated regulatory perimeter differs across measures. As discussed in Section 2, loan-supply measures, reserve requirements, and prudential measures related to stress testing are often designed to affect domestic credit conditions and may bind at the local entity, market, or product level. By contrast, capital-based measures, namely capital requirements, countercyclical capital buffers, conservation buffers, and leverage ratios are solvency-oriented measures that more often bind at the consolidated banking-organization level. In that case, loan exposures booked by affiliated NBFIs may still affect the parent banking group's consolidated capital or leverage position, reducing the scope for regulatory migration across legal entities.

We first exclude reserve requirements, which provide a clear regulatory wedge as they apply to deposit-funded bank intermediation. Table 10 reports results using the extended sample: bank subsidiaries, independent NBFIs, and NBFI subsidiaries of banking groups. This specification is useful because it allows us to distinguish between a broad nonbank response and a response that is specific to NBFIs affiliated with banking groups. Column (2) shows that

[22] Abnormal returns are the residuals from regressions of bank stock prices on a constant and the aggregate stock market index of each country, thus relaxing the assumption that banks' market betas are equal to one.

the results are qualitatively unchanged: independent NBFIs reduce lending relative to banks, while bank-owned NBFIs expand relative to independent NBFIs. We further exclude stress-testing-related measures, particularly relevant in the United States. Column (3) shows that the reallocation toward bank-owned NBFIs becomes stronger: MaPP tightening that directly affects loan supply creates particularly strong incentives to lend through NBFI subsidiaries.

We next examine capital-based MaPP measures. Prior work suggests that policies targeting banks' capital positions may have muted short-run effects on loan supply because banks are often given time to meet new requirements (Gambacorta and Murcia 2020). But capital-based measures should also leave less scope for shifting lending toward affiliated NBFIs because they often tighten the consolidated balance-sheet constraint of the banking group (Ongena et al. 2013, Aiyar et al. 2014, Danisewicz et al. 2017, Franch et al. 2021, Fabiani and Neanidis 2025). Column (4) shows a markedly different pattern from the baseline. Bank subsidiaries do not significantly reduce lending after capital-based MaPP shocks, and independent NBFIs do not respond differently from banks. By contrast, bank-owned NBFIs reduce lending significantly relative to independent NBFIs, and by 1.5 percent in absolute terms. This result thus shows that independent NBFIs, which are outside banking groups, do not contract relative to banks; the contraction is concentrated among NBFIs affiliated with banking groups. Thus, unlike measures focused directly on loan supply, capital-based measures do not induce an offsetting expansion through affiliated NBFIs.

Table 10: Alternative MaPP shocks

	(1) Baseline	(2) Base excl. RR	(3) Base excl. RR and ST	(4) Capital-based
MaPP shock	-0.009***	-0.007***	-0.015***	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)
MaPP shock × NBFI	-0.007**	-0.008**	-0.011***	0.002
	(0.003)	(0.003)	(0.003)	(0.003)
MaPP shock × NBFI × BG subs.	0.018***	0.015***	0.035***	-0.016***
	(0.003)	(0.003)	(0.003)	(0.003)
NBFI × BG subs.	0.000	0.002	0.006	0.002
	(0.016)	(0.016)	(0.016)	(0.016)
Lender FE	✓	✓	✓	✓
Firm × Time FE	✓	✓	✓	✓
Observations	761,629	761,629	761,629	761,629
R^2	0.895	0.895	0.895	0.895

Notes: Dependent variable is the log of new syndicated loans. *BG* stands for Banking Group. Column (1) uses the baseline MaPP shocks; column (2) removes reserve requirements; column (3) removes reserve requirements and stress-testing; column (4) focuses on capital-based measures, namely leverage limits, countercyclical buffers, conservation buffers, and capital requirements. Standard errors clustered by firm. Asterisks, *, **, and ***, denote statistical significance at the 10%, 5%, and 1% levels.

This pattern supports *Prediction 5* in Section 2. When MaPP tightening takes the form of loan-supply or other non-capital measures, the regulatory wedge between bank and nonbank affiliates creates scope for banking groups to reallocate lending toward affiliated NBFIs. When the tightening is capital-based, the relevant constraint is more likely to bind the consolidated banking group. In that case, affiliated NBFIs draw on the same group-level capital and funding capacity as bank subsidiaries, reducing the scope for regulatory migration across legal entities. The fact that independent NBFIs do not display the same contraction reinforces the interpretation that the capital-based result operates through the banking-group perimeter rather than through a general decline in nonbank lending capacity.

Our results relate to Cetorelli and Kundu (2026), who show that Basel III capital requirements led BHCs to reallocate equity from nonbank affiliates toward bank subsidiaries, making nonbank affiliates more fragile. Our capital-based MaPP results point in the same direction: when the shock tightens capital constraints that are more likely to bind at the consolidated banking-group level, affiliated NBFIs do not provide the same offsetting margin as in our baseline loan-supply MaPP shocks. This is also consistent with Irani et al. (2021), who study bank capital constraints in the U.S. syndicated loan market and show that nonbanks acquire loan shares when capital-constrained banks reduce exposure. Their Basel III exercise, which exploits surprise features of the U.S. implementation around 2012Q2, is particularly close in spirit to our capital-based MaPP shocks. Importantly, while they find strong evidence of nonbank entry overall, their evidence that this reallocation occurs through affiliated nonbanks is limited.

We then ask whether the same reallocation mechanism operates outside the syndicated loan market. Corporate bonds are an important source of NFC financing. According to the OECD Global Debt Report 2025, outstanding corporate bonds issued by NFCs amounted to about USD 15.8 trillion at end-2024, while outstanding corporate syndicated loans to NFCs amounted to about USD 21 trillion (OECD 2025). We use corporate bond data from Dealogic to examine whether banking groups also shift bond underwriting from bank affiliates toward affiliated NBFIs after MaPP tightening. An advantage of the bond data is that Dealogic reports the majority of the underwriting amounts attributed to each underwriter.

Table 11 shows that the bond-market response differs sharply from the syndicated-loan response. In the sample restricted to banking groups, and controlling for firm$\times$time fixed effects, we show in columns (2) and (3) that MaPP tightening is associated with lower bond underwriting by banking-group affiliates, but there is no statistically significant differential response between

bank and NBFI affiliates. Therefore, unlike in the syndicated loan market, banking groups do not appear to shift bond underwriting from bank subsidiaries toward affiliated NBFIs after MaPP tightening. When we extend the sample to independent NBFIs, columns (4)-(7) show that independent NBFIs gain relative market share, especially driven by U.S. lenders.

Interestingly, this pattern differs from the response to banking crises. Albuquerque and Firat (2026) show that, during banking crises, NBFIs contract syndicated lending relative to banks but expand corporate bond underwriting, with the latter response driven predominantly by bank-affiliated NBFIs. They interpret this divergence as reflecting the different functions performed by intermediaries across the two markets: syndicated lending requires balance-sheet risk bearing and monitoring, while bond underwriting relies more heavily on origination and distribution capacity. The contrast with our results suggests that the organizational response depends not only on the intermediation function, but also on the nature of the shock.

Why, unlike during banking crises, does MaPP tightening not induce reallocation toward NBFI affiliates in bond underwriting? First, bond underwriting is less balance-sheet-intensive than syndicated lending. The underwriter's exposure typically relates to placement and underwriting risk, rather than to direct balance-sheet exposure. Although underwriters may temporarily warehouse risk or absorb unsold securities, shifting bond underwriting from a bank to an NBFI affiliate likely provides less regulatory relief than shifting the exposure associated with a given syndicated loan. Second, syndicated loans generate intermediation rents and relationship benefits that are less available in bond markets. Schwert (2020) shows that bank loans earn a substantial premium relative to bond-implied credit spreads after accounting for seniority, consistent with borrowers valuing bank-provided services such as screening, certification, flexibility, and speed of execution. Similarly, Gao and Jang (2021) argue that syndicated lending offers advantages over bond-market investment because participants can rely on lead arrangers' screening and monitoring expertise, whereas investing in bonds does not generate the same private information. Third, banking groups already conduct most bond underwriting through NBFI affiliates, with an average sample share of around 75-80 percent, leaving less room for an additional shift from bank to nonbank entities after MaPP tightening.

Overall, the evidence in this section supports the interpretation that our main result is specific to balance-sheet-intensive syndicated lending and to MaPP measures that create a differential regulatory wedge across bank and nonbank affiliates. The reallocation channel is weaker or reversed when regulation binds the consolidated capital position of the banking group,

and it does not operate in the same way in corporate bond underwriting, where the intermediary function is more distribution-based and less tied to balance-sheet credit exposure.

Table 11: Effect of macroprudential policy shocks on bond market origination

	(1) All	(2) All	(3) All	(4) All	(5) U.S.	(6) U.K.	(7) EA
MaPP shock	0.005	-0.039***	-0.035***	0.000	-0.028**	0.021	-0.004
	(0.007)	(0.005)	(0.006)	(0.006)	(0.011)	(0.018)	(0.011)
MaPP shock × NBFI				0.014*	0.032**	-0.044	0.009
				(0.007)	(0.013)	(0.061)	(0.015)
MaPP shock × NBFI × BG subs.			-0.006	-0.014**	-0.031***	0.038	0.018
			(0.005)	(0.007)	(0.011)	(0.062)	(0.015)
NBFI × BG subs.			-0.039***	-0.007	-0.024	0.402	0.121
			(0.008)	(0.065)	(0.075)	(0.719)	(0.106)
Sample	BG	BG	BG	All lenders	All lenders	All lenders	All lenders
Time FE	✓						
Banking group FE	✓	✓	✓				
Lender FE				✓	✓	✓	✓
Firm × Time FE		✓	✓	✓	✓	✓	✓
Observations	271,681	252,511	252,511	367,100	121,151	6,562	27,205
R^2	0.277	0.815	0.815	0.838	0.705	0.771	0.774

Notes: The dependent variable is the log of new corporate bond issuance. *BG* stands for Banking Group. The sample in columns (1)-(3) is restricted to BG, while columns (4)-(7) extend the sample to include independent NBFIs. Sample restricted to selected countries in columns (5)-(7). Standard errors clustered by firm. Asterisks, *, **, and ***, denote statistical significance at the 10%, 5%, and 1% levels.

7 Additional robustness checks

We assess the robustness of our baseline findings reported in column (3) of Table 2.

First, we include individual lender fixed effects in Table B.8 in Online Appendix B to isolate the differential effect of MaPP shocks on NBFI versus bank subsidiaries across lenders.[23] We find evidence of inter-group credit supply substitution: banking groups increase lending via their NBFI affiliates relative to bank subsidiaries by roughly 0.9 percent. This between-group effect is around half the size of the within-group effect of Table 2, suggesting that substitution from bank to nonbank subsidiaries is stronger within banking groups than across them. As in the baseline, we observe qualitatively similar patterns for U.S. and euro area lenders.

Second, we examine whether cross-country differences, such as regulatory frameworks, or time-varying changes within banking groups, such as leverage, profitability, or size, affect our

[23]The individual lender fixed effects absorb all time-invariant characteristics of each subsidiary. The estimated coefficient on the MaPP × NBFI interaction therefore identifies differential responses across lenders rather than strictly at the banking-group level. When parents have multiple subsidiaries, some within-group variation is absorbed by these fixed effects. We refer to this as the 'between-group' effect for expositional simplicity, but technically it reflects the average differential effect across lenders in our sample.

baseline results. To address cross-country heterogeneity, we add country-banking group × time fixed effects. Column (2) of Table B.9 in Online Appendix B shows that the estimated effects are similar to the baseline results in column (1). To account for time-varying heterogeneity within banking groups, we first include a set of lagged bank-level controls: the logarithm of total assets, return on assets, nonperforming loans (NPLs), the Tier 1 capital ratio, the leverage ratio, and the two-year PD (column 3). The estimates remain virtually unchanged. We further tighten the specification by adding banking group × time fixed effects, which absorb all unobserved time-varying characteristics at the group level. Even under this demanding specification, our main results remain qualitatively unchanged (column 4). Finally, we continue to find that the effects are primarily driven by U.S. and euro area banking groups (columns 5 and 7).

Third, as our results are primarily driven by U.S. entities, we exclude loans above USD 100 million, which could fall under the U.S. SNC Program. Such loans, even when issued by nonbank subsidiaries, are reported to and examined by the Federal Reserve and thus subject to a higher degree of supervision. In a subsequent exercise, we remove subsidiaries of U.S. BHCs with total consolidated assets above USD 100 billion as these groups are required to report loan exposures above USD 1 million held anywhere in the conglomerate under FR Y-14Q. Although the sample size declines substantially under these restrictions, aggregate and U.S. results confirm our main findings that NBFI subsidiaries expand loan origination in response to regulatory tightening (Table B.10 in Online Appendix B).

Fourth, we ensure that our results are robust to recent evidence on lenders' post-origination participation shares. Blickle et al. (2026) report that lead arrangers in the U.S. frequently sell their loan exposure after origination, although this is more evident for Term B loans, i.e., riskier loans typically bought by nonbanks. They provide guidance on estimating post-origination loan shares for Dealscan users through a regression-based approach. We adapt their code to our Dealogic variables to approximate post-origination participation shares. This approximation, however, comes with caveats. First, the coefficients provided by Blickle et al. (2026) are estimated for U.S. syndicated loans, while we cover a sample of multi-country loans, potentially leading to an imprecise imputation. Second, they consolidate the analysis at the banking group, thus excluding the granular information about loan origination from bank and nonbank subsidiaries. With these caveats in mind, it is reassuring to see that the regulatory-induced lending reallocation we have explored in this paper remains present even after accounting for possible changes in loan ownership in the secondary market (Table B.11 in Online Appendix B).

Fifth, we add time fixed effects to Equation (1) to control for the potential role of global factors in driving differences in macroprudential policy stance across countries. Table B.12 in Online Appendix B shows that our baseline results are not sensitive to this modification in computing the MaPP shocks. In addition, we consider MaPP shocks lagged by two, three, and four quarters to account for the possibility that syndicate formation may occur several months after the realization of the shock. As shown in Table B.13 in Online Appendix B, our baseline results with a one-quarter lag remain qualitatively unchanged.

Sixth, we add an interaction term to Equation (2) to test whether the results differ between subsidiaries acting as lead arrangers. Column (2) in Table B.14 in Online Appendix B shows that nonbank lead arrangers extend 1.4 percent more credit to NFCs relative to bank subsidiaries that also act as lead arrangers. Moreover, we split the sample into credit lines and term loans in columns (3)-(4), and find that the results remain qualitatively similar, with a slightly stronger role for NBFI subsidiaries in term loans than in credit lines.

Finally, we employ alternative clustering approaches. Table B.15 in Online Appendix B indicates that our baseline results remain statistically significant when clustering the standard errors by firm and time (column 2), by banking group (column 3), by firm, banking group and time (column 4), and by country-banking group $\times$ time (column 5).

8 Conclusion

We document a new intra-group reallocation channel through which banking groups respond to loan-supply macroprudential tightening. Using global syndicated corporate loan data, we show that bank subsidiaries reduce lending after MaPP tightening, while affiliated NBFIs expand lending relative to bank subsidiaries. This reallocation offsets more than half of the contraction in group-level syndicated lending. The effect is strongest among U.S. banking groups, and is driven primarily by investment banks and broker-dealers. It is also specific to bank-affiliated NBFIs: independent NBFIs do not provide the same offsetting margin.

These findings show that the regulatory perimeter shapes not only the amount of credit supplied by banking groups, but also where within the group credit is intermediated. By increasingly 'banking on their nonbanks', banking groups can preserve borrower relationships and mitigate the costs of regulation, but they also attenuate the transmission of macroprudential policy in the syndicated loan market and deepen bank–nonbank interconnectedness, poten-

tially weakening regulators' efforts to contain systemic risk. This interconnectedness can create financial-stability concerns if stress at NBFI affiliates transmits back to the parent banking group or affiliated bank subsidiaries through fire sales, or funding disruptions (Cetorelli et al. 2023). This concern is consistent with Cetorelli and Kundu (2026), who show that Basel III-induced internal capital reallocation within BHCs can leave nonbank affiliates less capitalized and more fragile, exposing the consolidated organization to nonbank distress.

At the same time, there are important scope conditions. When regulation takes the form of capital-based measures that are more likely to bind the consolidated banking group, the lending reallocation channel through affiliated NBFIs disappears. The same mechanism is also not present in corporate bond underwriting, where intermediation is less balance-sheet-intensive and banking groups already conduct much of the activity through NBFI affiliates. The bank-to-nonbank reallocation channel is therefore not a generic response across all forms of regulation or all credit markets. Rather, it is specific to settings in which regulation raises the marginal cost of bank balance-sheet lending while leaving affiliated NBFIs less directly constrained.

Our findings point to a broader implication for regulatory design. Macroprudential policy can be partly mitigated when regulation binds unevenly across affiliated entities inside the same financial group. Better measurement of bank-owned NBFI balance sheets, credit exposures, and intra-group funding links is therefore important for assessing the full transmission of prudential regulation. System-wide stress tests, enhanced information sharing, and closer monitoring of bank–nonbank linkages can help regulators evaluate whether risk is reduced at the consolidated level or shifted toward less directly constrained affiliates.

Finally, while our analysis centers on syndicated loans, NBFIs are also active in other credit segments, including the rapidly rising private credit market. An important avenue for future research is whether tighter macroprudential policies have contributed to the expansion of private credit, a market that increasingly competes with leveraged loans and high-yield bonds. Compared with syndicated lending, private credit markets are more opaque, and screening and monitoring are normally carried out by private credit funds rather than by banks, who typically possess significant advantages in information acquisition and borrower screening. Understanding how borrower risk is assessed and monitored as credit intermediation shifts toward these institutions is central for evaluating the financial-stability consequences of regulatory migration.

Appendix A: Data

Table A.1: List of lender countries

Country	Share	Country	Share
AUS	1.90	IRL	0.30
AUT	0.40	ITA	2.37
BEL	0.30	JPN	12.16
BRA	0.19	KOR	0.18
CAN	8.40	MYS	0.22
CHE	2.52	NLD	3.03
CHN	3.09	NOR	0.51
DEU	5.65	PRT	0.12
DNK	0.31	SGP	0.86
ESP	3.16	SWE	0.71
FIN	0.63	THA	0.12
FRA	6.43	USA	35.13
GBR	10.29	ZAF	0.27
IND	0.76		

Notes: Loan share is the average loan share for each lender country in the estimation sample.

Table A.2: Loan characteristics

	Obs	Mean	STD	P25	P50	P75
Banks						
Term Length	220,526	5.19	4.15	3.00	5.00	6.00
Tranche Value (US million)	228,666	241.84	461.27	23.32	78.87	242.40
# Lender	231,400	5.86	5.33	2.00	4.00	7.00
Lender Share	916,147	0.18	0.19	0.06	0.12	0.25
All-in-Pricing (bps)	404,973	232.68	147.81	125.00	200.00	300.00
Margin-Pricing (bps)	285,307	225.72	142.56	125.00	200.00	300.00
Bank-owned NBFI subsidiaries						
Term Length	122,253	4.89	2.83	3.00	5.00	5.50
Tranche Value (US million)	126,270	351.44	558.34	48.22	143.75	393.77
# Lender	127,083	7.30	6.10	3.00	6.00	9.00
Lender Share	295,478	0.18	0.17	0.07	0.12	0.25
All-in-Pricing (bps)	200,189	249.63	152.96	140.00	225.00	325.00
Margin-Pricing (bps)	168,558	244.12	150.84	137.50	200.00	325.00
Independent NBFIs						
Term Length	57,174	6.17	4.27	4.00	5.00	7.00
Tranche Value (US million)	61,044	270.79	475.07	31.98	96.48	286.72
# Lender	62,914	7.28	6.79	3.00	5.00	9.00
Lender Share	107,160	0.23	0.23	0.07	0.12	0.25
All-in-Pricing (bps)	70,058	386.80	183.72	250.00	375.00	500.00
Margin-Pricing (bps)	57,185	391.58	175.53	275.00	375.00	500.00

Notes: Summary statistics of loan-level characteristics by lender type, restricted to loans to nonfinancial borrowers.

Table A.3: Types of independent NBFIs

Type	Number	Share
Investment banks, broker-dealers	317	18.7
Business credit institution	94	5.6
Insurance and pension fund	227	13.4
Investment funds and asset managers	741	43.8
Other NBFIs	313	18.5
Total	1,692	100

Notes: Number and share of unique independent NBFIs.

References

Aiyar, S., Calomiris, C. W., Hooley, J., Korniyenko, Y. and Wieladek, T. (2014), 'The international transmission of bank capital requirements: Evidence from the UK', *Journal of Financial Economics* **113**(3), 368–382.

Alam, Z., Alter, A., Eiseman, J., Gelos, G., Kang, H., Narita, M., Nier, E. and Wang, N. (2025), 'Digging Deeper–Evidence on the Effects of Macroprudential Policies from a New Database', *Journal of Money, Credit and Banking* **57**(5), 1135–1166.

Albuquerque, B. (2024), 'Corporate debt booms, financial constraints and the investment nexus', *Journal of Applied Econometrics* **39**(5), 766–789.

Albuquerque, B., Cerutti, E., Chen, N. and Firat, M. (2026), 'From banks to nonbanks: Macroprudential and monetary policy effects on corporate lending', *American Economic Journal: Macroeconomics* . Forthcoming.

Albuquerque, B. and Firat, M. (2026), Bonding through crises with NBFIs, IMF Working Paper 2026/197, International Monetary Fund.

Albuquerque, B. and Iyer, R. (2024), 'The Rise of the Walking Dead: Zombie Firms Around the World', *Journal of International Economics* **152**, 104019.

Albuquerque, B. and Mao, C. (2026), 'The Zombie Lending Channel of Monetary Policy', *Management Science* **72**(9), 8166–8195.

Aldasoro, I., Doerr, S. and Zhou, H. (2025), 'Non-bank lending during crises', *Review of Finance* **29**(6), 1809–1832.

Ashcraft, A. B. (2008), 'Are Bank Holding Companies a Source of Strength to Their Banking Subsidiaries?', *Journal of Money, Credit and Banking* **40**(2-3), 273–294.

Avraham, D., Selvaggi, P. and Vickery, J. I. (2012), 'A structural view of U.S. bank holding companies', *Federal Reserve Bank of New York Economic Policy Review* **18**(2), 65–81.

Bai, J., Campello, M. and Muthukrishnan, P. (2026), Loan-funded Loans: Equity-like Liabilities inside Bank Holding Companies, NBER Working Paper 34801, National Bureau of Economic Research.

Bednarek, P., Briukhova, O., Ongena, S. and von Westernhagen, N. (2025), 'Effects of bank capital requirements on lending by banks and non-bank financial institutions', *Journal of Financial Intermediation* **63**, 101167.

Begenau, J. and Landvoigt, T. (2022), 'Financial Regulation in a Quantitative Model of the Modern Banking System', *The Review of Economic Studies* **89**(4), 1748–1784.

Blickle, K., Fleckenstein, Q., Hillenbrand, S. and Saunders, A. (2026), 'Do Lead Arrangers Retain their Lead Share?', *The Journal of Finance* . Forthcoming.

Bluwstein, K. and Patozi, A. (2024), The effects of macroprudential policy announcements on systemic risk, Bank of England working papers 1080, Bank of England.

Buchak, G., Matvos, G., Piskorski, T. and Seru, A. (2018), 'Fintech, regulatory arbitrage, and the rise of shadow banks', *Journal of Financial Economics* **130**(3), 453–483.

Cerutti, E. and Claessens, S. (2017), 'The Great Cross-Border Bank Deleveraging: Supply Constraints and Intra-Group Frictions', *Review of Finance* **21**(1), 201–236.

Cerutti, E., Claessens, S. and Laeven, L. (2017), 'The use and effectiveness of macroprudential policies: New evidence', *Journal of Financial Stability* **28**, 203–224.

Cerutti, E., Hale, G. and Minoiu, C. (2015), 'Financial crises and the composition of cross-border lending', *Journal of International Money and Finance* **52**, 60–81.

Cerutti, E. and Zhou, H. (2018), Cross-border Banking and the Circumvention of Macroprudential and Capital Control Measures, IMF Working Papers 18/217, International Monetary Fund.

Cetorelli, N. and Goldberg, L. S. (2011), 'Global Banks and International Shock Transmission: Evidence from the Crisis', *IMF Economic Review* **59**(1), 41–76.

Cetorelli, N. and Goldberg, L. S. (2012), 'Liquidity management of U.S. global banks: Internal capital markets in the great recession', *Journal of International Economics* **88**(2), 299–311.

Cetorelli, N. and Kundu, S. (2026), Regulatory arbitrage within the firm, Staff Report 1196, Federal Reserve Bank of New York. Revised July 2026.

Cetorelli, N., Landoni, M. and Lu, L. (2023), Non-Bank Financial Institutions and Banks' Fire-Sale Vulnerabilities, Staff Report 1057, Federal Reserve Bank of New York.

Cetorelli, N. and Prazad, S. (2025), The nonbank footprint of banks, Staff Reports 1118, Federal Reserve Bank of New York.

Chari, A., Dilts-Stedman, K. and Forbes, K. (2022), 'Spillovers at the extremes: The macroprudential stance and vulnerability to the global financial cycle', *Journal of International Economics* **136**, 103582.

Chavaz, M. and Elliott, D. (2026), 'Side effects of separating retail and investment banking: Evidence from the United Kingdom', *Review of Finance* **30**(3), 1071–1108.

Claessens, S., Cornelli, G., Gambacorta, L., Manaresi, F. and Shiinad, Y. (2023), 'Do Macroprudential Policies Affect Non-bank Financial Intermediation?', *International Journal of Central Banking* **19**(5), 185–236.

Claessens, S. and Van Horen, N. (2015), 'The Impact of the Global Financial Crisis on Banking Globalization', *IMF Economic Review* **63**(4), 868–918.

Danisewicz, P., Reinhardt, D. and Sowerbutts, R. (2017), 'On a tight leash: Does bank organizational structure matter for macroprudential spillovers?', *Journal of International Economics* **109**, 174–194.

De Haas, R. and Van Horen, N. (2013), 'Running for the Exit? International Bank Lending During a Financial Crisis', *The Review of Financial Studies* **26**(1), 244–285.

De Haas, R. and van Lelyveld, I. (2010), 'Internal capital markets and lending by multinational bank subsidiaries', *Journal of Financial Intermediation* **19**(1), 1–25.

Degryse, H., De Jonghe, O., Jakovljević, S., Mulier, K. and Schepens, G. (2019), 'Identifying Credit Supply Shocks with Bank-Firm data: Methods and Applications', *Journal of Financial Intermediation* **40**(C).

Demirgüç-Kunt, A., Horváth, B. L. and Huizinga, H. (2023), 'Regulatory arbitrage and loan location decisions by multinational banks', *Journal of International Economics* **145**, 103840.

Demyanyk, Y. and Loutskina, E. (2016), 'Mortgage companies and regulatory arbitrage', *Journal of Financial Economics* **122**(2), 328–351.

Doerr, S. and Schaz, P. (2021), 'Geographic diversification and bank lending during crises', *Journal of Financial Economics* **140**(3), 768–788.

Drechsel, T. and Miura, K. (2026), The Macroeconomic Effects of Bank Regulation: New Evidence from a High-Frequency Approach, NBER Working Paper 35071, National Bureau of Economic Research.

Duchin, R. and Sosyura, D. (2014), 'Safer ratios, riskier portfolios: Banks' response to government aid', *Journal of Financial Economics* **113**(1), 1–28.

Duprey, T. and Tuzcuoglu, K. (2025), 'High-frequency effects of macroprudential policy announcements', *Economics Letters* **250**, 112264.

Erel, I. and Inozemtsev, E. (2025), 'Evolution of Debt Financing Toward Less-Regulated Financial Intermediaries in the United States', *Journal of Financial and Quantitative Analysis* **60**(3).

Fabiani, J. and Neanidis, K. C. (2025), 'The bank-lending channel of macroprudential policy: Evidence from cross-border bank flows', *Journal of International Economics* **157**, 104135.

Financial Stability Board (2025), Global Monitoring Report on Nonbank Financial Intermediation 2025, Technical report, Financial Stability Board.

Frame, W. S., Mihov, A. and Sanz, L. (2020), 'Foreign investment, regulatory arbitrage, and the risk of us banking organizations', *Journal of Financial and Quantitative Analysis* **55**(3), 955–988.

Franch, F., Nocciola, L. and Zochowski, D. (2021), 'Cross-border effects of prudential regulation: Evidence from the euro area', *Journal of Financial Stability* **53**, 100820.

Gambacorta, L. and Murcia, A. (2020), 'The impact of macroprudential policies in Latin America: An empirical analysis using credit registry data', *Journal of Financial Intermediation* **42**, 100828.

Gao, J. and Jang, Y. (2021), 'What Drives Global Lending Syndication? Effects of Cross-Country Capital Regulation Gaps', *Review of Finance* **25**(2), 519–559.

Houston, J. F., Lin, C. and Ma, Y. (2012), 'Regulatory Arbitrage and International Bank Flows', *The Journal of Finance* **67**(5), 1845–1895.

Houston, J., James, C. and Marcus, D. (1997), 'Capital market frictions and the role of internal capital markets in banking', *Journal of Financial Economics* **46**(2), 135–164.

Irani, R. M., Iyer, R., Meisenzahl, R. R. and Peydró, J.-L. (2021), 'The rise of shadow banking: Evidence from capital regulation', *The Review of Financial Studies* **34**(5), 2181–2235.

Ivashina, V. (2009), 'Asymmetric information effects on loan spreads', *Journal of Financial Economics* **92**(2), 300–319.

Karolyi, G. A. and Taboada, A. G. (2015), 'Regulatory arbitrage and cross-border bank acquisitions', *The Journal of Finance* **70**(6), 2395–2450.

Khwaja, A. I. and Mian, A. (2008), 'Tracing the Impact of Bank Liquidity Shocks: Evidence from an Emerging Market', *American Economic Review* **98**(4), 1413–1442.

Kim, S., Plosser, M. C. and Santos, J. A. (2018), 'Macroprudential policy and the revolving door of risk: Lessons from leveraged lending guidance', *Journal of Financial Intermediation* **34**, 17–31.

Lee, H., Lee, S. and Paluszynski, R. (2024), 'Capital Regulation and Shadow Finance: A Quantitative Analysis', *The Review of Economic Studies* **91**(5), 3047–3084.

Li, J., Ma, Y., Mendicino, C. and Supera, D. (2026), Bank to Non-Bank Lending and the Reallocation of Credit, Working Paper Series 3220, European Central Bank.

OECD (2025), *Global Debt Report 2025: Financing Growth in a Challenging Debt Market Environment*, OECD Publishing, Paris. OECD Global Debt Report.

Ongena, S. R. G., Popov, A. A. and Udell, G. F. (2013), ''When the Cats Away the Mice Will Play': Does Regulation at Home Affect Bank Risk-Taking Abroad?', *Journal of Financial Economics* **108**(3), 727–750.

Schnabel, I. (2025), 'Resisting deregulation: safeguarding bank resilience in an evolving financial landscape', Presentation at the Farewell Symposium in honour of Klaas Knot, De Nederlandsche Bank, Amsterdam. Available at: https://www.ecb.europa.eu/press/key/date/2025/html/ecb.sp251003_1_annex~132f784986.en.pdf.

Schwert, M. (2018), 'Bank capital and lending relationships', *The Journal of Finance* **73**(2), 787–830.

Schwert, M. (2020), 'Does borrowing from banks cost more than borrowing from the market?', *The Journal of Finance* **75**(2), 905–947.

Sufi, A. (2007), 'Information Asymmetry and Financing Arrangements: Evidence from Syndicated Loans', *The Journal of Finance* **62**(2), 629–668.

Thakor, R. T. and Merton, R. C. (2024), 'Trust in lending', *The Review of Economics and Statistics* . Forthcoming.