FEDERAL RESERVE BANK *of* ATLANTA **WORKING PAPER SERIES**

Trade Uncertainty and U.S. Bank Lending

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Working Paper 2024-16a
October 2024 (Revised February 2025)

Abstract: This paper uses U.S. credit register data and the 2018–19 "trade war" to study the effects of uncertainty on domestic credit supply. Exploiting differences in banks' ex-ante exposure to trade uncertainty, we find that increased uncertainty is associated with a broad lending contraction across their customer firms. This result is consistent with banks responding to uncertainty with wait-and-see behaviors, where more exposed banks curtail risky exposures, reduce loan maturities, and adjust loan supply along both intensive and extensive margins. The lending contraction is larger for more capital-constrained banks and has significant real effects, especially for bank-dependent firms.

JEL classification: G21, F34, F42

Key words: uncertainty, bank loans, trade finance, credit supply, trade war

https://doi.org/10.29338/wp2024-16

The authors are grateful to Michelle Alexopoulos, Chris Boehm, Nick Bloom, Valentina Bruno, Steven Davis, Lorenzo Garlappi, Kristine Hankins, Tarek Hassan, Dalida Kadyrzhanova, Peter Karadi, Matteo Iacovellio, Abel Iglesias, Seung Lee, Ralf Meisenzahl, Lubos Pastor, Diane Pierret, Andrea Polo, Andrea Presbitero, Veronica Rappoport, Brad Setser, Bo Sun, Eugene Tan, Lena Tonzer, Liliana Varela, Frank Warnock, and participants at numerous conferences and seminars for useful suggestions. They thank Stephanie Sezen, Diego Silva, and Kelsey Shipman for research assistance. The views expressed here are those of the authors and not necessarily those of the Federal Reserve Bank of Atlanta or the Federal Reserve System. Any remaining errors are the authors' responsibility.

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1 Introduction

Concerns about trade uncertainty have been on the rise in the wake of events such as Brexit, the pandemic, and recent trade tensions. Whereas it is well understood that a rise in uncertainty increases the variance of project returns faced by firms, which in turn affects their investment behavior,[1] the effects of uncertainty, and those of trade uncertainty specifically, on financial intermediaries is less clear. In particular, the channels through which uncertainty affects bank lending and the real sector may differ from how first-moment shocks to borrowers or bank balance sheets operate, on which the literature traditionally focuses.[2] Against this backdrop, we ask if and how trade uncertainty is propagated by banks to the domestic economy. Additionally, we seek to understand the mechanisms through which uncertainty more broadly affects bank credit supply.

We assess the effects of uncertainty on U.S. banks' credit supply by exploiting the sharp rise in trade uncertainty that occurred during the 2018–2019 escalation of trade tensions between the U.S. and some of its trading partners, which has been referred to as a "trade war." In early 2018, the United States began to target several import-competing sectors with tariffs, often grounded in national security concerns. These tariffs were imposed on imported goods from China, the E.U., Canada, and Mexico. Targeted products and industries included solar panels, steel, vehicles, washing machines, and goods related to technology and intellectual property rights (e.g., electronics). In turn, several countries retaliated with tariffs on U.S. goods such as agricultural products and challenged the U.S. tariffs at the World Trade Organization. These actions not only had a direct impact on targeted industries, but also affected firms that used these sectors' goods as inputs. These policy actions also increased uncertainty along several dimensions, including the duration of tariffs, other products and industries being targeted in the future, and potential retaliation.[3]

Whereas a negative sectoral shock typically leads banks to shift credit away from that sector (Holmstrom and Tirole, 1997; Froot and Stein, 1998), an uncertainty shock widens the distribution of loan returns within and across sectors and can lead banks to curtail lending more broadly—

[1] For example, see a textbook treatment by Dixit and Pindyck (1994).

[2] See, for example, Peek and Rosengren (2000); Khwaja and Mian (2008); Ivashina and Scharfstein (2010); Cornett et al. (2011); Puri et al. (2011); Giannetti and Laeven (2012); De Haas and Van Horen (2013); Chodorow-Reich (2014); Iyer et al. (2014); Popov and Van Horen (2015); Gilje et al. (2016); Ongena et al. (2018); Galaasen et al. (2021); Bidder et al. (2021); Mayordomo and Rachedi (2022); Federico et al. (2023).

[3] A notable example of how uncertainty was created without any tariffs being imposed is the use of a threat of a 5% tariff on all Mexican goods in May 2019 to have Mexico tighten the southern border. A deal was agreed upon in July 2019 and the tariff was never imposed. See Brown and Kolb (2023) for a detailed timeline of the trade war.

much like the option value of investing for non-financial firms—and to pursue safer investments. To investigate this possibility, we exploit cross-sectional bank heterogeneity in exposure to uncertainty before the trade war to test for the credit supply effect of an increase in uncertainty. We hypothesize that banks' lending decisions might be driven by a "wait-and-see" strategy, whereby the more affected banks are more likely to pull back from risk-taking when uncertainty prevails. In addition, the size of this response might be amplified by a capital constraints channel by which banks' credit supply depends on their capital levels. We also ask whether the estimated changes in credit supply affect the investment behavior of bank-dependent firms.

Our first novel finding is that an increase in uncertainty is associated with a larger credit contraction for more exposed banks, that is, those banks with a larger ex-ante share of loans to firms in sectors facing a greater increase in trade uncertainty. This result holds even for the sample of borrowers that are relatively less exposed to an increase in trade uncertainty. Second, the contraction in credit supply holds while controlling for actual tariffs imposed (a "first-moment effect") and is not driven by expected or realized losses in banks' portfolios, but rather by difficulties predicting future loan returns and planning capital needs due to uncertainty, and is stronger for banks with lower capital buffers. The findings suggest banks respond to uncertainty with "wait-and-see" behavior, where more exposed banks curtail risky commercial lending exposures and increase holdings of securities. Third, the real outcomes for firms are worse when they borrow from the more exposed banks and when they are more reliant on bank credit.

Our analysis uses comprehensive microdata collected through the Federal Reserve (FR) Y-14Q form (known as the "U.S. credit register"), which comprise of individual loan commitments to domestic firms by large U.S. banks. We use this data set to examine a wide range of lending outcomes and to construct our key measure of bank exposure to trade uncertainty, which combines loan exposures with firm-level measures of trade uncertainty. Firm-level trade uncertainty measures are sourced from text analysis of the transcripts of listed firms' quarterly earnings calls (Hassan et al., 2019, 2023, 2024b). Given that the firms in the credit register and those spanned by the transcript data do not overlap perfectly, we construct our measure of bank exposure to trade uncertainty by aggregating the firm-level uncertainty measures to the sector-level,[4] and then assigning sector-

[4]We do this to maximize coverage of firms in the Y-14Q data as the firm-level uncertainty measures are available only for listed firms. We check whether our baseline results are robust in a weighted-least squares regression that controls for the underlying size of the firm sample used in constructing the sector-level measure.

level uncertainty to individual borrowers in the credit register based on their sectoral classification. Next, we aggregate this information at the bank level by taking the average change in uncertainty between 2016–2017 and 2018–2019 across sectors, weighted by banks' loan shares in a given sector, lagged several years relative to the start of the sample. This approach makes the bank exposure measure more likely predetermined with respect to economic conditions during the sample period.

We employ this measure in a standard difference-in-differences (DID) estimation framework that relates lending outcomes to banks' ex-ante exposure to trade uncertainty interacted with a *Post* dummy for the 2018–2019 period and zero for the preceding two years. Bank exposure to uncertainty is weakly positively correlated with banks' exposure to actual trade policy as captured by the ex-ante loan portfolio share to firms in tariff-hit sectors. To ensure that our results capture the impact of *uncertainty* regarding loan returns and not the impact of implemented trade policy, all specifications control for banks' exposure to actual tariffs. Banks that are more exposed to uncertainty also tend to be somewhat larger and have less capital, but are similar to other banks in terms of funding reliance on core deposits and sectoral specialization. Our specifications control for these additional factors.

Main results. Our first result, that an increase in uncertainty is associated with a larger credit contraction for more exposed banks, is consistent with real-options theory, whereby non-financial firms respond to increased uncertainty by adopting a wait-and-see attitude (Dixit and Pindyck, 1994). More exposed banks appear more cautious in deploying capital to risky activities, reducing loan growth, charging higher spreads, tightening collateral requirements, and granting fewer new loans than other banks. This relative credit contraction holds for *all* of the banks' borrowers, including those that are less directly exposed to an increase in trade uncertainty. More exposed banks also reduce the maturity of loans and are more likely to grant loans that can be called in early (so-called "demandable" loans), which affords them more flexibility in their capital allocation. These results are not driven by systematic differences between high and low-uncertainty borrowers, as the two groups of borrowers have similar balance sheet characteristics, including parallel pre-trends in investment rates and sales revenue growth before the trade war.

The second set of results points to the existence of a capital constraints channel, as exposed banks with lower levels of capital contract their lending more. Consistent with the theoretical insight

that exposed banks should reduce their risky portfolio share as the variance of returns increases, we additionally find that exposed banks re-balance their asset allocations away from commercial loans and into safer assets, notably securities. In addition, exposed banks are more likely to downgrade the creditworthiness of their borrowers, as reflected in higher assessed probabilities of default, but do not increase loan loss reserves nor do they experience higher loan delinquencies or writedowns. These findings are consistent with lending decisions being driven by a rise in return volatility as opposed to a shift in mean returns. These results also suggest that higher uncertainty, by generating a wider dispersion in loan returns, creates difficulties in banks' assessment of potential gains or losses and related capital planning, with material effects on lending decisions even in the absence of a realized balance sheet shock.

The third set of results focuses on the consequences of exposed banks' relative credit contraction for real economic activity. We test whether firms that are more exposed to trade uncertainty through their banks—that is, firms more dependent on loans from exposed banks—are also affected or whether they are able to neutralize the credit crunch by accessing alternative sources of funding. We find that the more exposed firms have lower debt growth, lower investment rates, and lower asset growth during the trade war than other firms. This effect is not driven by firms' dependence on banks with loan exposures to tariff-hit sectors. In addition, we control for the direct impact of trade uncertainty and tariffs on firms' real activity by including time-varying fixed effects at the sector-county level. Finally, more exposed firms with a higher reliance on bank debt as a source of external financing have worse real outcomes than other firms, suggesting that banks can amplify the effects of uncertainty on the domestic economy through their lending decisions.

Our point estimates in the full sample of firms imply that a one standard deviation (SD) increase in bank exposure to trade uncertainty is associated with a 5.0 percentage point (ppt) decline in bank-firm loan growth (compared to 0% median loan growth for the sample), a 6.8 basis points (bps) increase in spreads (compared to 200 bps median loan spread for the sample), and a 0.5% lower probability of new loan origination. Economic magnitudes are similar for estimates using a sub-sample of low-uncertainty firms. Moreover, a one SD increase in firms' exposure to trade uncertainty via their relationship with exposed banks is associated with a decline in firms' investment rate of between 4.8 and 5.3 ppts during 2018–2019 (or close to one-fifth of one SD of the investment rate). These results suggest that exposed banks' relative credit supply contraction

has an adverse effect on exposed firms' real outcomes.

Threats to identification. A key identification challenge in isolating the effects of trade uncertainty on credit supply is the fact that banks' credit supply and firms' credit demand are both likely to react to changes in the trade environment. For instance, loan growth may slow down if firms in high-uncertainty sectors postponed investment plans. By contrast, loan growth may increase if these firms built inventories or diversified their supply chains in response to higher uncertainty. However, a demand-side interpretation of our findings is inconsistent with our main result that more exposed banks exhibit lower loan growth (quantity) but higher spreads (price). Second, we analyze usage rates of bank credit lines, a more direct gauge of shifts in firm-level demand. We find no differences in credit line utilization between firms in high and low-uncertainty sectors in 2018–2019, suggesting no change in credit demand for firms with pre-committed credit lines. Third, our lending specifications control for quarterly firm-level demand by including firm×quarter fixed effects (Khwaja and Mian, 2008; Jiménez et al., 2020), which allows us to compare lending outcomes from banks with varying degrees of exposure to uncertainty to a given firm and time period.

Additional tests increase confidence in the interpretation of our results. First, a placebo test indicates that banks with different levels of exposure to trade uncertainty have similar lending patterns before the sample period, suggesting that unobservable bank characteristics do not explain our results. Second, our results are not driven by uncertainty in sectors other than trade, such as the environment, security, technology, or health. Results are robust to alternative explanations for our main findings, including the possibility that changes in macroeconomic conditions—such as fluctuations in the value of the U.S. dollar and in commodity prices—correlate with the trade environment and affect bank lending. Our results are also invariant to controlling for bank cyclicality and for bank exposures to tradable-goods producing sectors, in which firms are more exposed to exchange rate fluctuations.

Several extensions show that alternative methodological choices further support our main findings. The baseline findings are invariant to specification changes such as (a) including a finer set of fixed effects that allow lending outcomes to vary with loan and collateral type, (b) accounting for variations in the precision of sectoral estimates of trade uncertainty with a weighted-least-squares estimation; and (c) allowing for potential anticipation effects of the trade war.

Related literature. Our paper contributes to several strands of literature. First, we contribute to the literature on the real and financial effects of uncertainty (Bloom, 2014; Buch et al., 2015; Baker et al., 2016; Berger et al., 2020; Kaviani et al., 2020). Global banks play an important role in the international transmission of financial stresses through lending and liquidity flows (Schnabl, 2012; De Haas and Van Horen, 2013; Amiti and Weinstein, 2018). Some papers document consequences of uncertainty for bank lending (Alessandri and Bottero, 2020; Jasova et al., 2021; Wu and Suardi, 2021; Crozet et al., 2022), while others relate uncertainty to global liquidity or capital flows (Rey, 2015; Avdjiev et al., 2020; Kalemli-Özcan and Kwak, 2020). The literature emphasizes different reasons why aggregate risk conditions may affect bank credit, including banks' value-at-risk constraints and leverage (Bruno and Shin, 2015). Relative to this strand of literature, we focus on a specific type of uncertainty—around the trade environment—and its implications for the activities of banks that support international trade.

Second, existing studies provide evidence that banks facilitating international trade amplify the effects of first-order balance sheet shocks on firms and households (Amiti and Weinstein, 2011; Niepmann, 2015; Michalski and Ors, 2012; Niepmann and Schmidt-Eisenlohr, 2017a,b; Paravisini et al., 2023). Our focus is instead on (a) the directional effect from trade to banks and (b) the effect of uncertainty, both of which have received little attention. Federico et al. (2023) document that China's accession to the World Trade Organization in 2001 and the related rise in competition from Chinese imports caused higher nonperforming loans at Italian banks. This balance sheet shock, in turn, had a sizeable credit reallocation effect away from directly-affected firms to other firms. Relatedly, Hankins et al. (2022) show that the 2018 metal and steel tariffs reduced the supply of auto loans by U.S. finance companies. Whereas we share with these papers a focus on the effects of trade policies on credit, our contribution emphasizes the effects of uncertainty around trade policy as opposed to those of the policy itself (for which we directly control). In addition, we document that U.S. exposed banks do not experience a balance sheet shock nor do they expect one, as nonperforming loans and loan loss provisioning do not change during the trade war, and that their lending decisions respond to higher uncertainty even in the absence of such a shock.

Finally, our work builds on the insights of a growing literature on the economic effects of trade wars, which has a particular emphasis on U.S.-China trade relations. Evidence has been building on the real effects of the 2018–2019 tariff changes (Handley and Limao, 2017; Caldara et al., 2020;

Novy and Taylor, 2020; Fajgelbaum et al., 2023). Research has also documented an almost complete pass-through of the tariff burden to U.S. prices (Amiti et al., 2019; Cavallo et al., 2021) and adverse effects on consumption (Waugh, 2019), investment (Amiti et al., 2020), and employment (Flaaen and Pierce, 2024). Our results emphasize that the impact of trade policy on the real economy go beyond first-moment effects and that trade policy uncertainty induces additional banking sector responses even without balance sheet losses. In turn, this response may amplify or dampen the real effects of the policy change itself.

2 Hypotheses on Bank Responses to Trade Uncertainty

For purposes of our analysis, it is important to distinguish a "standard" bank balance sheet shock that affects actual or expected returns to lending to a particular sector from an uncertainty shock. Whereas the typical balance sheet shock unambiguously generates losses or gains to the bank's balance sheet, an uncertainty shock by itself need not do so. Instead, uncertainty increases the dispersion of loan returns and raises the prospect of future balance sheet gains or losses without those gains or losses necessarily materializing. As a result, banks' lending responses to a rise in uncertainty will likely differ from those to changes in realized returns.

The literature shows that banks often react to negative shocks in particular sectors by reducing their exposures to those sectors and reallocating resources to sectors with higher returns.[5] By contrast, increased uncertainty makes it difficult to assess the range and magnitude of loan returns and their effects on capital ratios. Standard portfolio allocation models predict that an increase in asset payoff volatility leads to a reduction in the risky portfolio share (Markowitz, 1952).[6] Therefore, difficulties in capital planning when uncertainty increases, may lead banks to defensively refrain from deploying capital to risky activities, thus cutting back lending broadly across borrowers.

Corporate finance theory offers additional insights on the potential responses of banks to uncertainty. Investment-under-uncertainty theories argue that the irreversible features of fixed asset purchases affect the timing of non-financial firms' investments in periods of uncertainty (Bernanke,

[5] An exception may be specialized banks with significant exposures to an adversely-affected sector. Such banks may choose instead to maintain their exposures to that sector to limit borrower defaults and balance sheet losses (Blickle et al., 2023), preserve profitable customer relationships (Petersen and Rajan, 1995; Bolton et al., 2016) and reputational capital (Boot et al., 1993; Dinç, 2000).

[6] Our assumption that banks display some level of risk aversion follows results in the literature, such as Ratti (1980); Sealey (1980); Ho and Saunders (1981); Altunbas et al. (2017).

1983; Pindyck, 1991; Caballero and Pindyck, 1992; Dixit and Pindyck, 1994). Empirical studies establish a negative relation between uncertainty and investment, as firms tend to postpone investment until uncertainty subsides (Bloom et al., 2007; Bloom, 2009; Handley and Limao, 2015).

In a similar vein, banks facing costs of lending (e.g., resources required by loan officers) may react to rising uncertainty by adopting lending strategies akin to firms' wait-and-see behavior. When it comes to risky commercial lending, banks' wait-and-see behavior may manifest as a slowdown in loan growth, higher spreads, or tighter collateral requirements. Banks may also seek more optionality to modify loan agreements. For instance, loan maturities may be shortened to reduce the period between financial audits, which, in turn, would allow loan officers to evaluate borrower creditworthiness more frequently. In addition, banks may extend more demandable loans, which would give them more flexibility in capital allocation because demandable loans can be called back on a short notice.

Our empirical tests are grounded by three main conjectures. The first conjecture hypothesizes that, once we control for credit demand, banks that are more exposed to trade uncertainty will exhibit behavior similar to economic agents studied in the investment-under-uncertainty literature:

Conjecture 1 *A rise in uncertainty may lead exposed banks to adopt a wait-and-see attitude, reducing credit supply broadly across borrowers.*

Turning to sources of heterogeneity in bank lending behavior, credit supply adjustments following uncertainty shocks could be associated with bank capital constraints through the external finance premium for banks (Bernanke, 2007). As uncertainty over loan returns increases and capital planning becomes more difficult, banks with lower capital ratios have an additional incentive to "self-insure" by safeguarding capital for precautionary reasons. Raising capital is costly and takes time, so these banks may become less willing to bear risks in the form of new lending, which suggests stronger credit supply contractions for banks with lower levels of capital. Concretely, we examine evidence for this channel within the following conjecture:

Conjecture 2 *Consistent with capital constraints, lower-capital banks exposed to uncertainty may contract lending by more than higher-capital exposed banks.*

A final conjecture pertains to the real implications for the firms that borrow from exposed banks.

This issue is especially relevant when credit market frictions limit firms' ability to substitute their debt financing across banks or to other sources of funds. An extensive literature documents the close link between banks' financial health and the performance of their bank-dependent borrowers (see, e.g., Kang and Stulz (2000); Chava and Purnanandam (2011); Chodorow-Reich (2014); Schwert (2018)). Accordingly, we hypothesize the following:

Conjecture 3 *Real outcomes are worse for firms that borrow from banks with higher exposures to uncertainty than for other firms.*

3 Data and Bank Exposure to Trade Uncertainty

3.1 The U.S. "Credit Register"

Our empirical tests leverage microdata from a credit register—the FR Y-14Q H1 Wholesale credit schedule. These loan-level data are collected quarterly from U.S. and foreign Bank Holding Companies (henceforth 'banks') as part of the annual Dodd-Frank stress tests. Reporting banks have assets above $50 billion during our sample period. As a result, the Y-14Q data set covers the near-universe of commercial loans from large U.S. banks, which account for close to three-quarters of outstanding loan balances and 90% of banking sector assets (Frame et al., 2023). The reporting panel of banks fluctuates between 30 and 35 banks during 2016:Q1–2019:Q4.

The FR Y-14Q data set contains loan-level information on commercial and industrial (C&I) loans (of minimum size $1 million) to domestic borrowers. We use information on the value of loans outstanding to non-financial firms (excluding firms in the utilities and financial sectors) and other characteristics of the loans, such as the type of loan (e.g., line of credit or term loan), loan pricing (e.g., spreads for floating-rate loans), maturity, whether the loan is secured by collateral, and collateral type (fixed assets, accounts receivable and inventories, blanket liens, etc.). For each loan, banks report their own estimates of the probability of default over a one-year horizon, computed in line with the Basel II guidelines using internal risk ratings-based models that are evaluated by bank supervisors. In addition, banks report annual borrower characteristics such as total assets, profitability, cash holdings, tangibility, sales revenue, and capital expenditure. The vast majority of the bank borrowers in the data set, which account for 64% of non-financial business debt liabilities

and 80% of U.S. output (Caglio et al., 2021), are private firms. Quarterly bank balance sheet and income statement items come from the Consolidated Financial Statements for Holding Companies form FR Y-9C.

Descriptive statistics for the loans, banks, and firms in our main regression sample are reported in Table 1. The median loan in our sample has a size of $8 million and a spread of 200 bps (over the prime bank rate or LIBOR). Median loan growth across bank-firm pairs in the regression sample, computed relative to the start of the sample period (2016:Q1), is 0%. Median remaining time to maturity is 2.5 years, 13.4% of loans are demandable, and 6.5% of loans are new originations. Close to 35% of firms belong to high-uncertainty sectors and 22.2% in tariff-hit sectors.

3.2 Bank Exposure to Trade Uncertainty

A key element of our analysis is the measure of bank ex-ante exposure to trade uncertainty. Construction of this variable proceeds in three steps. First, we use estimates of firm-level trade risk and uncertainty for U.S. firms from Hassan et al. (2019) to obtain trade uncertainty measures that vary at the (3-digit NAICS) sector level. Second, we assign these sector-level uncertainty measures to borrowers in the credit register based on their sectoral classification. Third, we aggregate this information at the bank level using banks' initial loan shares to firms across sectors.

Hassan et al. (2019) use text analysis to calculate the frequency of terms concerning trade and uncertainty for publicly-listed firms in quarterly earnings conference call transcripts. This approach leverages computational linguistics tools to construct measures of firm risk. Text analysis allows the authors to calculate the share of earnings calls language that identifies risks associated with specific topics. Key for our analysis is one such topic—trade risk and uncertainty—that captures discussions related to international trade and potential risk and uncertainty jointly (e.g., the words "tariffs" and "uncertain" occurring in a call). Uncertainty is a second-moment characteristic, as represented by the range of top biagrams in this analysis.[7]

Choice of "trade war" period. Figure 1 shows the evolution of this measure between 2014 and 2019. As seen in panel A, trade uncertainty spikes in 2018 and remains high in 2019. Moreover,

[7]The top biagrams for trade in the training library used by the authors include trade agreement, barriers, free trade, markets, trade relations, duties, globalization, labor standards, and policy objectives. Bigrams for risk and uncertainty include risk/risks, uncertainty, variable, change, possibility, uncertain/uncertainty, doubt, prospect, variability, exposed, probability, unknown, unpredictable, and speculative, among others.

trade uncertainty rises considerably more than other sectoral risks such as those classified as environmental or economic. Using media- and earnings-calls text-based measures, Caldara et al. (2020) also document a sharp increase in trade policy uncertainty during 2018-2019, as shown in panel B, which they link to concerns about supply chain disruptions and higher costs of raw materials caused by the new tariffs. They argue that the more moderate rise in trade uncertainty in 2017 was driven by changes in corporate tax policy, notably the 2017 border tax adjustment proposal. Combined with the fact that tariff hikes on imported goods from United States' major trading partners started in February 2018 and paused in December 2019 with the U.S.-China Phase One deal, we settle on the period between 2018:Q1 and 2019:Q4 as reflecting "high trade uncertainty" or "trade war" for the analysis.[8]

Firm-level indicators of trade uncertainty are available only for listed firms in the Hassan et al. (2019) data set, while the credit register covers both public and private firms. Therefore, first we merge the uncertainty measures to the credit register *by sector*. We obtain average uncertainty for each 3-digit NAICS sector as the average of firm-level uncertainty across firms in that sector.[9] For the imputation of average uncertainty from listed firms to all firms, we rely on recent evidence that listed firms' equity valuations strongly predict economic activity at the industry level, especially for manufacturing sectors (Flynn and Ghent, 2022), which are over-represented in banks' loan portfolios. We then calculate the change in average trade uncertainty for each sector between 2016–2017 (before the trade war) and 2018–2019 (during the trade war).

Uncertainty versus tariff enactments across sectors. Table A1 reports the change in trade uncertainty across sectors for the sectors with the highest increase and decrease in trade uncertainty. It shows that firms in the manufacturing and transportation sectors account for a larger fraction of those that are most affected. However, sectors sort differently on exposure to uncertainty versus

[8] Benguria et al. (2022) and Grossman et al. (2024), among others, argue that the 2018–2019 cycle of retaliatory trade actions dramatically increased uncertainty in trade-oriented sectors by reversing decades of trade liberalization. In addition, our choice of trade war period is corroborated by the findings of Hassan et al. (2024a), who use text analysis of earnings calls for firms worldwide to identify marked increases in perceived country risk. Their analysis identifies a spike in country risk for China during the U.S.-China trade tensions between 2018:Q4 and 2019:Q4. Furthermore, given that trade uncertainty starts rising in 2017, we check that our headline results are robust when we drop data for the year 2017 from the analysis and compare lending outcomes in 2015–2016 versus 2018–2019.

[9] For this aggregation we use sectoral classifications from S&P Compustat for the firms. We aggregate the firm-level uncertainty information at the 3-digit NAICS level and not a more granular level to have sufficient firms in each sector for the average to be reliable. We check that our results are robust to accounting for the sparse firm-level data in some sectors with a weighted least squares estimation in the Online Appendix.

tariffs, with only 5 of 14 sectors in the high-uncertainty group actually receiving tariffs. The weak correlation between uncertainty and tariffs is also illustrated in Figure A1, which shows that the distributions of changes in uncertainty across sectors with or without tariffs largely overlap.

The second step to construct a measure of bank exposure to trade uncertainty involves merging the sectoral measures of trade uncertainty with banks' initial loan exposures. The initial bank share of loans to firms in individual sectors is computed relative to total bank loans and is the average over 2014–2015. This average helps (a) to construct a measure of bank ex-ante exposure (before the start of the sample period) that is arguably unrelated to economic conditions during the trade war and (b) to avoid relying on a single year of data which may result in a noisy measure. Combining these two inputs yields a continuous measure of bank-level exposure to trade uncertainty for bank-sector pair $\{b, s\}$ defined as:

$$Bank\ Exposure_{b,s}^{Uncertainty} = \sum_{s' \neq s} \omega_{bs',\text{2014-15}} \times \Delta Uncertainty_{s',\text{2018-19/2016-17}},$$

where s' represents any given sector except sector s. The exposure measure thus leaves out direct information on uncertainty for sector s and instead creates a loan share-weighted sum of changes in uncertainty of all other sectors that bank b lends to, where the term $\omega_{bs',\text{2014–15}}$ captures the share of the sum of loans to firms in sector s' in bank b's loan portfolio and $\Delta Uncertainty_{s',\text{2018–19/2016–17}}$ measures the change in trade uncertainty for sector s'. This approach for generating the bank-sector exposure measure closely follows the "leave-one-sector-out" approach suggested in Borusyak et al. (2022). In the cross-section of banks, the average and median bank loan exposures to trade uncertainty are positive (Table 1), which means that the average bank has an initial loan portfolio that is tilted towards sectors facing higher trade uncertainty during the sample period.

3.3 Diagnostic Tests

Our goal is to compare the lending decisions of banks that are more or less exposed to a rise in trade uncertainty. Such comparisons will be reliable under two identifying assumptions. The first assumption is that bank exposure to trade uncertainty is not systematically correlated with other bank-level shocks. That is, banks should not sort into certain sectors such that unobserved bank-level shocks are correlated to both a change in credit supply and with changes in uncertainty in

those same sectors (Borusyak et al., 2022). The second assumption is that firms in sectors more affected by trade uncertainty exhibit similar characteristics and investment policies before the trade war to other firms. Here we discuss the evidence behind these assumptions.

Bank exposure to trade uncertainty vs. other covariates. In Table A2 we regress bank exposure to trade uncertainty on standard bank characteristics, including balance sheet size, capital (common equity/assets), core deposit share in liabilities, sectoral specialization (defined as in Paravisini et al. (2023)),[10] as well as loan exposure to tariffs-hit sectors. This regression is run by pooling the banks in the Y-14Q data set for the 2016–2017 period, before the enactment of tariffs. In univariate regressions (columns 1–5), we find that more uncertainty-exposed banks tend to be larger, have less capital, and higher exposure to tariff-hit sectors. However, these covariates have little joint explanatory power for the bank exposure to trade uncertainty measure (the F-statistic is 2.16 and associated p-value is 0.0869 in column 6). Nevertheless, to ensure these observables do not play a confounding role, we include them as baseline control variables.

Pre-trends in firm performance. To test the second assumption, we sort firms into high- and low-uncertainty sectors, where high-uncertainty sectors (at the 3-digit NAICS level) are those above the 75$^{\text{th}}$ percentile of the distribution of change in trade uncertainty between 2016–2017 and 2018–2019. We then test whether the investment rates and sales growth of firms in those sectors were different from those of other firms before the trade war. As shown in Figure A2, there are no pre-existing trends in investment rates and sales growth by group in 2016 and 2017, but these outcomes diverge in 2018–2019. In addition, Table A3 reports differences across groups in a wide range of observable characteristics, including firm size (log-assets), liquidity (cash and marketable securities as a share of assets), tangibility (tangible assets as a share of assets), return on assets, reliance on bank debt (share of Y-14Q bank loans in total debt), balance sheet growth and the likelihood of being a public firm or a speculative-grade rated firm. A scale-invariant test of the size of the differences between high and low uncertainty firms (Imbens and Rubin, 2015) shows that variables are balanced across the two groups.

[10] Sectoral specialization is defined as in Paravisini et al. (2023) and identifies banks with outsized exposures to individual sectors at the end of 2017 as an indicator variable for bank-sector observations for which the loan share to individual (4-digit NAICS) sectors exceeds a certain threshold beyond which the exposure is deemed outsized.

4 Main Results

This section presents the empirical specifications and results of the estimations testing the conjectures. The results first assess whether trade uncertainty affects the supply of bank credit to U.S. firms (Sections 4.1, 4.2, and 4.3). Then we test for heterogeneity in bank responses to trade uncertainty depending on capital constraints (Section 4.4) and also examine how banks reallocate their assets when faced with increased trade uncertainty. Lastly, we present evidence of real effects for borrowing firms (Section 4.5).

4.1 Wait-and-see behavior: Trade uncertainty and bank credit supply

We start by assessing whether banks adjust their lending activities consistent with a wait-and-see approach. We present a portfolio of evidence to support this channel using information on the intensive and extensive margins of lending. According to Conjecture 1, an increase in bank exposure to trade uncertainty is associated with a reduction in the supply of bank credit broadly across firms. We test this conjecture with a DID specification linking trade uncertainty to lending outcomes:

$$\begin{aligned} y_{b,i,s,t} = \beta_1 Bank\ Exposure_{b,s}^{Uncertainty} \times Post_t + \beta_2 Bank\ Exposure_{b}^{Tariffs} \times Post_t + \\ + \beta_3 X_{b,t} + \beta_4 X_{b,t} \times Post_t + \gamma_{i,t} + \delta_{b,i} + e_{b,i,s,t}, \end{aligned} \tag{1}$$

where the dependent variable $y_{b,i,s,t}$ in the baseline regressions is loan growth (the growth of loan commitments from bank b to firm i in sector s relative to the beginning of the sample period) or the loan spread. The sample period includes all loans outstanding between 2016:Q1 and 2019:Q4. We define $Post_t$ as an indicator variable equal to one during 2018:Q1 through 2019:Q4, and zero during 2016:Q1 through 2017:Q4. $Bank\ Exposure_{b,s}^{Uncertainty}$ is our measure of bank exposure to trade uncertainty as defined in Section 3.2. A negative value for the coefficient of interest (β_1) in the loan growth specification (and a positive one in the loan spread specification) would provide evidence supporting Conjecture 1. Coefficients are estimated with Ordinary Least Squares (OLS) and standard errors are double clustered by bank-quarter and firm.

Specification (1) includes firm×quarter fixed effects ($\gamma_{i,t}$), which implies that β_1 is estimated off of differences in the lending behavior of banks with varying degrees of exposure to uncertainty vis-

à-vis a given firm in a given quarter. We also include firm×bank fixed effects ($\delta_{b,i}$), which allow for the possibility that loan demand is specific to the bank-firm pair because of endogenous matching between bank and firms (Chodorow-Reich, 2014). This may be the case when banks specialize in certain types of credit or borrowers (see, e.g., Ivashina et al. (2021) and Paravisini et al. (2023)).

A crucial control variable is the bank's ex-ante loan share to tariff-hit sectors ($Bank\ Exposure_b^{Tariffs}$), measured as the 2014–2015 average share of loan commitments to firms in sectors that received tariffs during 2018–2019.[11] This variable captures the lending impacts of changes in expected loan returns related to the actual imposition of tariffs (the first-moment effect). Equation (1) also contains standard determinants of bank lending decisions ($X_{b,t}$), such as size (log-total assets), capital (common equity divided by total assets), and core deposits (in percent of total liabilities). Although bank exposure to trade uncertainty is unrelated to lending specialization (as shown in Table A2), as an additional control we include a specialization measure that identifies banks with outsized exposures to individual sectors at the end of 2017 following Paravisini et al. (2023).[12]

Intensive margin. Table 2 reports estimates for loan growth and spreads based on specification (1) estimated for the full sample of borrowers and for a sub-sample of low-uncertainty firms. In columns 1 and 2, the coefficient of interest on the DID term ($Bank\ Exposure_{b,s}^{Uncertainty} \times Post_t$) is negative and statistically significant at the 1% level. It shows that rising trade uncertainty is associated with lower loan growth for more exposed banks, both for the full sample of firms and for low-uncertainty firms. Using the coefficients in columns 1 and 2, an increase in bank exposure to trade uncertainty by one SD (0.25) is associated with an average decline in loan growth by 5.0 and 5.4 ppts (relative to the median growth rate of loan commitments of 0% over the sample period) for all firms and low-uncertainty firms, respectively.

Estimates in columns 3 and 4 of Table 2 show that banks with higher exposure to trade uncertainty charge relatively higher loan spreads. Using the coefficients in column 3, an increase in bank exposure to trade uncertainty by one SD is associated with an average increase in lending spreads of 6.8 and 7.8 bps for all and low-uncertainty firms, respectively.[13] Although these changes are

[11] Tariff data at the 4-digit NAICS level is sourced from Flaaen and Pierce (2024). We take sectors to be tariff-hit if the new tariff share of costs is positive, for tariffs enacted through December 2019.

[12] Our baseline results are virtually identical if we use the specialization measure computed as the 2014–2015 average instead of the value for 2017 (Table A4).

[13] Furthermore, when we estimate the $Bank\ Exposure_{b,s}^{Uncertainty} \times Post_t$ coefficient separately in the sub-samples

small compared to the median spread in the sample (200 bps), the directional movement supports the conjecture that the supply of credit from banks exposed to trade uncertainty shifted inward.

Extensive margin. In Table 3 we report regression results for new loan originations based on equation (1). The specifications differ on the construction of the dependent variable and the aggregation level of the data to shed light on different lending margins. In columns 1–2 we run linear probability model regressions using loan-level data with a new-loan dummy as the dependent variable, and thus capture a "pure" extensive margin effect. By contrast, in columns 3–4 we run regressions aggregating the data up to the bank-firm level and specifying the dependent variable as the share of new loan volume in total loans outstanding, thus capturing a mixture of extensive and intensive margin effects. Across specifications, the estimated coefficient on the DID term is negative and statistically significant, implying that bank exposure to trade uncertainty affects the extensive margin of lending as well. In terms of economic relevance, a one SD increase in banks' exposure to trade uncertainty is associated with a probability of a new loan origination that is lower by approximately 0.5% (relative to an unconditional probability of a new loan origination of about 6.5% over our sample period).

First-moment effect. In Table 2, the estimated coefficients on the DID term ($Bank\ Exposure_b^{Tariffs} \times Post_t$) indicate that higher bank exposure to changes in trade policy is associated with statistically significantly higher loan growth and spreads. According to these estimates, banks more exposed to tariff-hit sectors are willing to supply more credit to firms in those sectors. Importantly, the second-moment effect has loan quantities and prices responding in opposite directions, suggesting reduced loan supply. In contrast, in Table 3 there is no evidence of a first-moment effect on the probability of new loan issuance or the volume-weighted share of new loans. In the next section, we analyze credit line utilizations to provide more direct corroborating evidence of these credit demand dynamics and to show that firms exposed to higher or lower trade uncertainty have similar loan demand during the trade war, whereas firms in tariff-hit sectors have higher loan demand than firms in other sectors.

Overall, our baseline results suggest that trade uncertainty is associated with a broad contraction

of high- and low-uncertainty borrowers, t-tests of equality of coefficients across sub-samples indicate that we fail to reject the null hypothesis of coefficient equality for both lending outcomes.

in credit supply across borrowers, highlighting the indiscriminate effect of uncertainty on bank lending behavior, which stands in contrast with the more discriminate effects of standard bank balance sheet shocks. Online Appendix A.I presents several robustness checks on our baseline results, including alternative fixed effects and estimation methods.

4.2 Parallel trends in lending outcomes and threats to identification

Parallel trends. A key identifying assumption behind the unbiased estimation of β_1 is that banks made similar lending decisions before the 2018–2019 period irrespective of their ex-ante exposure to sectors later affected by rising trade uncertainty. To test the validity of this assumption, we first explore the dynamic DID effects in our baseline regressions. Figure 2 plots the individual coefficients for the interaction term between the bank exposure measure and quarterly dummies over the sample period and their confidence intervals. The coefficients on the DID term are statistically insignificant in the 12 quarters before the trade war, suggesting a lack of anticipation effects and pre-shock lending adjustment by banks (in loan volume or spreads). In contrast, we observe a strong contraction in loan volumes (panel A) and a rise in spreads (panel B) during 2018–2019.[14]

Placebo tests. We also test the validity of the parallel trends assumption with a placebo test, which is meant to ensure that bank exposure to trade uncertainty does not capture the effects of bank unobservable characteristics—if it did, then we would find patterns similar to our baseline results in previous periods. As shown in panel A of Table A5, when we shift the sample period back by several years and compare lending outcomes during 2013–2014 versus 2015–2016, we find no relation between bank exposure to trade uncertainty and loan growth. The correlation with loan spreads is positive, the opposite of the tightening effect of uncertainty on loan spreads that we find. These results reduce potential concerns that our baseline results capture the effects of unobserved bank characteristics rather than those of trade uncertainty itself.

[14]We run an additional test to check for evidence that banks may have anticipated the trade war and started adjusting their lending exposures ahead of time. To this end, we drop loan observations from 2017 from our regression sample and run the regressions by comparing lending outcomes during 2015–2016 versus 2018–2019. The estimates are reported in panel B of Table A5 and show that the baseline results remain unchanged, suggesting that banks did not react in anticipation of the heightened uncertainty associated with the trade war.

Uncertainty vs. a bank balance sheet shock. Our baseline analysis suggests that the relative credit contraction at more exposed banks is linked to expectations of a wider distribution of loan returns. A potential concern may be that this contraction is also driven by an expected or realized bank balance sheet shock. To explore this issue, we exploit features of the Expected Default Frequency (EDF) model of credit risk assessment followed by many banks. According to the EDF, changes in borrowers' default risk can be driven by worsening asset quality (a first-moment effect) or higher asset volatility (a second-moment effect). Therefore, if there are no changes in loan delinquencies, then an increase in banks' forward-looking assessments of borrower creditworthiness can only be explained by higher return volatility, or uncertainty (Treacy and Carey, 1998).

In Table 4 we explore these ideas. First, we examine the link between banks' exposure to trade uncertainty and their probabilities of borrower default over a one-year horizon. In loan-level data, regression estimates suggest that banks with greater exposure to uncertainty assess their borrowers as having increased default risk during the trade war (with coefficient estimates significant at the 1% level, see columns 1–2). These positive coefficients suggest banks may be concerned over higher credit risk and future balance sheet losses. However, turning to aggregated bank balance sheet data, columns 3–5 show no evidence of a concurrent deterioration in loan performance nor of higher loan loss reserves at more exposed banks. Moreover, delinquency indicators aggregated from the loan-level data at the firm level indicate that firms in high-uncertainty sectors do not experience more past-due loans or charge-offs during 2018–2019 than other firms (columns 6-7).

Overall, the finding that exposed banks are more likely to downgrade the perceived creditworthiness of their borrowers without simultaneously experiencing worsening asset quality, provides additional support for the notion that the bank lending behaviors we uncover are driven by uncertainty (higher asset volatility) rather than a standard bank balance sheet shock.

Credit demand. To provide direct evidence on shifts in credit demand during the trade war, we examine firm-level credit utilization rates, defined as the ratio of credit utilized relative to credit committed. Changes in utilization rates on pre-committed corporate lines of credit are an important gauge of changes in credit demand because funds are available to firms without restrictions as long as covenant limits are not violated. We aggregate the loan-level data at the firm-quarter level and regress the average utilization rate on an indicator for firms in high-uncertainty sectors (that

is, those firms in sectors with a change in average uncertainty between 2016–2017 and 2018–2019 above the 75$^{\text{th}}$ percentile) interacted with the *Post* dummy variable. Regression estimates in Table 6 indicate that credit line utilization rates are similar for high and low-uncertainty firms during the trade war. Similar credit line usage by firm exposure to trade uncertainty increases our confidence that our core identified effects—of declining loan growth and rising spreads—represent supply-side lending behavior of exposed banks and are inconsistent with a demand-driven response from those banks. By contrast, credit line utilization rates at firms in tariff-hit sectors are statistically significantly higher than at other firms during 2018–2019, consistent with the findings in Alfaro et al. (2025), who document an increase in loan demand from bank-dependent tariff-hit importers hit by tariffs during the trade war.

4.3 Wait-and-see behavior: Additional lending terms

Loan maturities. Next, we assess whether exposed banks reduce the maturities of their loans, which could be a sign they are decreasing the "irreversibility" of loan commitments (alternatively, increasing the frequency with which they conduct financial audits for their borrowers and allow for the possibility of making loan modifications). In this case, the dependent variables are (a) maturity (median time-to-maturity is 2.5 years) and (b) a dummy variable for demandable loans. A demandable loan allows the lender to react swiftly to any concerns about firm performance and recall the loan. Once notified, the borrower must repay the principal and any associated interest. In these specifications, we follow Li et al. (2023) and include loan size (log of total loan commitment) and dummy variables for floating rate loans, secured loans, and loans with prepayment penalty as additional loan controls.

Table 5 reports the regression results. The estimates for the DID coefficient of interest suggest that more uncertainty-exposed banks shorten the maturity of loans more than other banks, although the effect is imprecisely estimated for the low-uncertainty firms (columns 1–2), and are more likely to grant demandable loans, which increase lenders' flexibility to recoup capital when borrowers show signs of stress (columns 3–4). Overall, these results corroborate Conjecture 1 and suggest that, as uncertainty rises, more exposed banks try to increase the flexibility of their lending by shortening the maturity of loan contracts and more frequently re-assessing the creditworthiness of their borrowers. The results do not reveal a systematic link between bank exposure to tariff-hit

sectors and loan maturities.

Collateral requirements. We complete the analysis of changes in bank lending terms in response to rising trade uncertainty by exploring whether exposed banks are more likely to tighten collateral requirements to hedge against potential loan losses. Thus, we repeat the baseline regressions with a dummy variable for secured loans, which comprise about three-quarters of loans in the sample, as the dependent variable. As seen in columns 5–6 of Table 5, we find that more exposed banks are more likely to tighten collateral requirements than other banks, which suggests that they require additional loan risk mitigants when uncertainty increases. Once again, there is no relation between bank exposure to tariff-hit sectors and collateral requirements.

4.4 Heterogeneous Effects across Banks due to Capital Constraints

To examine the differential effects of trade uncertainty on lending behavior that relates to bank capital constraints, we focus on a measure of high-quality capital, specifically the common equity to asset (simple leverage) ratio. We test the conjecture with a modified version of specification (1):

$$\begin{aligned} y_{b,i,s,t} = \sum_{\tau=1,2} \beta_\tau Bank\ Exposure_{b,s}^{Uncertainty} \times Post_t \times Bank\ Type_{b,\tau} + \\ + \beta_3 Bank\ Exposure_b^{Tariffs} \times Post_t + \beta_4 X_{b,t} + \beta_5 X_{b,t} \times Post_t + \gamma_{i,t} + \delta_{b,i} + e_{b,i,s,t}, \end{aligned} \tag{2}$$

where $\tau = 1$ indicates a *Low-Capital Bank*, $\tau = 2$ indicates a *High-Capital Bank*, and high-capital banks are those with a capital ratio above the 75^{th} percentile of the yearly cross-sectional distribution. Evidence of capital constraints supporting Conjecture 2 would arise if $\beta_1 > \beta_2$. Additional evidence for this channel could come from shifts in banks' asset allocations conditional on their exposure to trade uncertainty. If exposed banks anticipate capital constraints to become more binding, they may have lower risk tolerance and change allocations in favor of safer securities rather than making risky commercial loans, shrink their balance sheets, or a combination of strategies. To explore this possibility, we also examine changes in broad balance sheet components by degree of bank exposure to trade uncertainty in bank-level data.

Results. Table 7 provides the main tests for the capital constraints channel. Consistent with Conjecture 2, the estimates across specifications indicate that lower-capital banks reduce loan growth and increase loan spreads more than higher-capital banks. The results in columns 1–2 show that higher-capital banks do not reduce loan growth significantly, whereas lower-capital banks do. By contrast, exposed banks increase loan spreads, but more so if they have lower common equity buffers (columns 3–4). P-values of one-sided t-tests of coefficient equality across bank types suggest that the credit contraction is stronger for more constrained banks (at 5% significance level).

These results shed light on the role of capital in dampening the transmission of real shocks through the banking system. To gauge the importance of capital buffers as a mitigating factor against the tariffs of 2018–2019, we conduct a back-of-the-envelope exercise to gauge how much higher the impact of uncertainty would have been during the trade war if banks were capitalized at pre-GFC levels. For this purpose, we estimate a version of the model in column 1 in panel A using the capital ratio in levels. We compare the loan growth for a bank with median capital levels before the trade war (11.6% at end-2017) with a bank with the median capital level before the GFC (8.5% at end-2007) at median exposure to trade uncertainty (1.77). After the increase in trade uncertainty, the average loan growth of the bank with pre-GFC capital levels is almost 7 ppts lower than the bank capitalized at pre-trade war levels. This is a substantial difference—given median bank-firm loan growth of 0% over the sample period—and emphasizes the role of strong capital buffers in enhancing the resilience of banks to uncertainty shocks.

Portfolio re-balancing. In Table A6 we examine asset portfolio re-balancing in the bank-quarter panel, for all banks (panel A) and for banks with higher versus lower capital buffers (panel B), defined in the same way as in the analysis of bank capital constraints (Table 7). Regression results in panel A indicate that bank exposure to trade uncertainty does not have any effect on bank balance sheet growth (column 1). However, loans as a percentage of total assets fall, consistent with the results for commercial loans in the credit register data (column 2), and the share of securities in total assets at more exposed banks increase (column 3), whereas cash holdings remain unchanged (column 4). These results suggest that banks respond to an increase in trade uncertainty by shifting their asset-mix away from risky loans towards safer securities, and these asset re-allocations are relatively stronger for lower-capital banks (panel B).

4.5 Real effects for firms

Conjecture 3 posits that the credit supply impact of trade uncertainty will affect firms' real outcomes. To test for this conjecture, we gather firm balance sheet data in a firm-year panel over 2016–2019 and construct a measure of firm exposure to trade uncertainty through the firm's relationships with uncertainty-exposed banks. This is a continuous variable representing the average uncertainty exposure of a firm's lenders, weighted by the share of each lender in total firm's borrowing (at the end of 2014), defined as:

$$Firm\ Exposure_i^{Uncertainty} = \sum_b \omega_{ib,2014} \times Bank\ Exposure_b^{Uncertainty}, \tag{3}$$

where $\omega_{ib,2014}$ is firm i's beginning-of-sample loan share from each bank b, and $Bank\ Exposure_b^{Uncertainty}$ is bank b's total exposure to trade uncertainty (defined as the simple average across sectors of the bank-sector exposure from the baseline specifications). Then, we use a range of firm-level financial data and the following specification to test for real effects:

$$\begin{aligned} y_{i,s,c,t} = {} & \beta_1 Firm\ Exposure_i^{Uncertainty} \times Post_t + \beta_2 Firm\ Exposure_i^{Tariffs} \times Post_t \\ & + \beta_3 X_{i,t} + \beta_4 X_{i,t} \times Post_t + \gamma_i + \delta_{s,c,t} + e_{i,s,c,t}, \end{aligned} \tag{4}$$

and $y_{i,s,c,t}$ refers to total debt growth, total asset growth, or the investment ratio (capital expenditure divided by lagged total assets) for firm i in industry s, located in county c and in year t. A key control variable is the firm's exposure to tariffs through its relationships with banks exposed to tariff-hit sectors ($Firm\ Exposure_i^{Tariffs}$), which is computed in the same way as firm exposure to uncertainty through the firm's lenders. We also control for firm characteristics and risk attributes ($X_{i,t}$). Following the literature (see, e.g., Fazzari, Hubbard and Petersen, 1987; Leary and Roberts, 2014), we include firm size (log-assets), leverage (debt-to-asset ratio), liquidity (cash holdings), tangibility, return on assets, a dummy variable for firms with a speculative-grade rating, and real sales growth, a proxy for the demand and growth opportunities facing firms (Whited and Wu, 2006).

Specifications include firm fixed effects (γ_i) and industry×county×year fixed effects ($\delta_{s,c,t}$) to absorb time-varying shifts in macroeconomic conditions affecting all firms in a given industry and

county. In addition, the industry×year effects (which are spanned by the triple interacted fixed effects $\delta_{s,c,t}$) control for firms' direct exposure to trade uncertainty at the (3-digit NAICS) industry level and helps isolate the effect of firms' indirect exposure to trade uncertainty through their banks. Values for β_1 coefficient estimates that are negative and statistically significant would provide support for Conjecture 3. In addition to testing for the effect of trade uncertainty on firm outcomes, we interact the DID term of interest ($Firm\ Exposure_i^{Uncertainty} \times Post_t$) with a measure of bank dependence, namely a dummy variable that takes value one for firms with above-75$^{\text{th}}$ quartile share of bank debt (approximated with the sum of loan amounts from the banks in the Y-14Q sample). We anticipate stronger real effects for more bank-dependent firms to the extent that such firms are less able to secure financing in public debt markets.

Results. Real effects results for all firms and a sub-sample of low-uncertainty firms are presented in Table 8. The estimates in panel A are statistically significant at the 1% level and suggest that higher firm exposure to trade uncertainty through firms' lenders is associated with relatively slower growth in firms' debt and balance sheets, and with relatively lower investment rates. The estimates suggest that firms in borrowing relationships with more exposed banks are unable to substitute reduced credit from those banks with other sources of financing. The relative contraction in investment, in turn, has a significant effect on firms' ability to grow their assets. The coefficient estimates in columns 3–4 indicate that a one SD increase in firm exposure to trade uncertainty is associated with a reduction in the investment rate by between 4.8 and 5.3 ppts, representing close to one-fifth of a SD of the investment rate.

In panel B of Table 8, we test whether bank-dependent firms are more adversely affected. We define bank dependence as above-median share of bank debt in the firm's total debt. Regression estimates show significantly larger effects on total debt growth, asset growth, and investment rates at firms with higher bank dependence than at other firms during the trade war. Across specifications, p-values for one-sided t-tests of coefficient equality across firm types consistently fail to reject relatively stronger effects for more bank-reliant firms.

In all specifications of Table 8, the estimated coefficient for $Firm\ Exposure_i^{Tariffs} \times Post_t$ are positive and significant, suggesting that firms in a relationship with banks exposed to tariff-hit sectors are expanding more than other firms. This result indicates a positive first-moment effect

of trade policies and is the opposite of the contractionary second-moment effect from uncertainty. Taken together, the results in this section are consistent with Conjecture 3 and highlight that firms borrowing from exposed banks experience worse economic outcomes as trade uncertainty and tensions rise, which suggests that they cannot costlessly switch to alternative sources of finance. This effect is more pronounced for firms that are more reliant on banks.

5 Ruling Out Alternative Explanations

It is important to establish that our results are not driven by changes in macroeconomic conditions that may have occurred simultaneously with the rise in trade uncertainty during 2018–2019. Here, we entertain several alternative explanations for our results and offer evidence suggesting that our findings are not driven by these explanations.

Trade uncertainty versus uncertainty from other sources. A possible concern is that the trade uncertainty measure captures risk factors that are unrelated to international trade developments but co-move to generate spurious results. Panel B of Figure 1 suggests such a confounding effect is unlikely given the notable jump in trade uncertainty and not in other sectoral risks. Nevertheless, we consider a regression where we include, as an additional explanatory variable, a measure capturing bank exposure to other sources of uncertainty that are unrelated to trade. This measure is computed in the same way as the baseline exposure to trade uncertainty, with the only difference that it captures uncertainty from all sectors other than trade. Other sectors include economic policy and budget, environment, institutions and political processes, health care, security and defense, tax policy, and technology and infrastructure. The results are reported in panel A of Table A7, where the estimated coefficients on the DID terms for the non-trade exposure measure predict higher loan spreads, yet our baseline coefficients remain statistically significant at the 1% level and with the expected sign.

Exchange rate movements. Next, we explore whether our results are driven by exchange rate fluctuations, which may co-move with trade uncertainty, given that the value of the U.S. dollar affects both bank asset quality and trade activities. The Bank of International Settlements (BIS) broad U.S. dollar index appreciated by 4.7% between January 1, 2018 and December 31, 2019.

Exchange rate fluctuations affect banks and firms through several traditional mechanisms. When the dollar appreciates, banks may pull back from lending if they expect borrowers' repayment capacity to deteriorate, especially for unhedged foreign borrowers with dollar-denominated debts. A stronger dollar also reduces the purchasing power of foreign firms, which can make it harder for some U.S. firms to sell their goods abroad, impairing their growth prospects and profitability. In addition, several financial mechanisms can drive the link between the U.S. dollar and the provision of dollar credit. A stronger dollar is associated with tighter dollar credit conditions (Niepmann and Schmidt-Eisenlohr, 2023; Bruno and Shin, 2023), which implies that foreign exporters more reliant on dollar-funded bank credit may experience a decline in credit access, more expensive loans (Meisenzahl et al., 2021), and a slowdown in real activity. In turn, the growth prospects and creditworthiness of U.S. firms that rely on imported intermediate inputs, could suffer.

To address the possibility that fluctuations in the value of the U.S. dollar affect our results, we conduct two tests. First, we examine whether our main results survive after we control for bank exposure to these alternative mechanisms. To this end, we construct an additional exposure measure representing, for each bank, the end-2017 share of outstanding loans to firms in tradable-goods producing sectors, which arguably are more exposed to U.S. dollar fluctuations than firms in non-tradable goods sectors. We follow Desai et al. (2008) and classify construction, retailers, transportation, and recreation as non-tradable goods producing sectors. We then interact this exposure uncertainty measure with the U.S. dollar broad exchange rate index and include it in the regression with our baseline trade exposure interaction. As shown in Table A8, estimates for this specification reveal this additional control variable does not affect the statistical and economic significance of the estimated coefficient on our key DID term.

Second, we test whether banks curtail their credit supply differentially across credit lines (mainly used by firms as a source of liquidity insurance) versus term loans (mainly used for financing investment). This test allows us to rule out a "credit channel" of dollar movements by which a stronger dollar tightens liquidity conditions in the secondary market for syndicated credits (Niepmann and Schmidt-Eisenlohr, 2023). This channel predicts that our results should be stronger for term loans, which are more likely to be sold in the secondary market than are credit lines (Gatev and Strahan, 2009). When we estimate the baseline DID term separately for credit lines and term loans, we find that credit lines are still strongly affected by an increase in trade uncertainty, although the effects

appear lower than those for term loans (see Table A9). These results are therefore inconsistent with our baseline findings being driven by a credit channel of dollar movements.

Bank cyclicality. An alternative explanation for our findings could be that bank exposure to trade uncertainty captures the degree of bank cyclicality, that is, the sensitivity of a bank's lending portfolio to monetary and financial conditions. If this were the case, then the results would reflect a standard bank lending channel of monetary policy rather than the effects of trade uncertainty. To address this possibility, we measure the extent of loan book cyclicality, for each bank in our sample, as the long-run correlation of the growth rate of a banks' total loan commitments and that of the overall banking sector. Our main estimates are robust to controlling for this measure of bank cyclicality in interaction with the *Post* dummy: if anything, bank cyclicality operates in the opposite direction of the uncertainty exposure, with more cyclical banks increasing loan volumes (and leaving spreads unchanged) during the trade war (Table A10 panel A).

Commodity prices. Following the sharp and sustained oil price decline that started in mid-2014, U.S. banks with more concentrated exposures in the oil sector experienced losses and cut down lending, especially to firms in the oil sector (Bidder et al., 2021). One might worry that our results pick up the effects of bank exposure to the oil sector, in particular those of the protracted credit crunch that followed the decline in oil prices. To alleviate this concern, we drop oil companies from the sample (broadly identified as those in the 2-digit NAICS "Mining, quarrying, and oil and gas extraction" sector), which leaves the results unchanged (Table A10 panel B).

6 Conclusion

This paper shows that trade uncertainty affects U.S. banks' domestic credit supply along several dimensions. Exploiting the large and unanticipated spike in trade uncertainty during 2018–2019, coupled with comprehensive loan-level data for U.S. banks and firms, we document that banks with higher ex-ante exposure to sectors facing a greater increase in trade uncertainty pull back from lending, with negative real effects for bank-dependent firms. The results are supportive of "wait-and-see" behavior at banks that become more cautious in deploying capital to risky activities such as commercial lending, while increasing their holdings of relatively safer securities.

Our results highlight an important banking channel for the transmission of uncertainty to the real economy. The results also emphasize that bank credit contraction can be another implication of significant shifts in trade policies that contribute to ongoing economic uncertainty. Our analysis suggests that a full accounting of the economic effects of trade disputes—realized or potential—should take into account the endogenous contractionary responses of the financial sector. Feedback effects between the financial sector and economic activity that originate with real sector shocks, in particular as they relate to international trade, are a promising avenue for future research.

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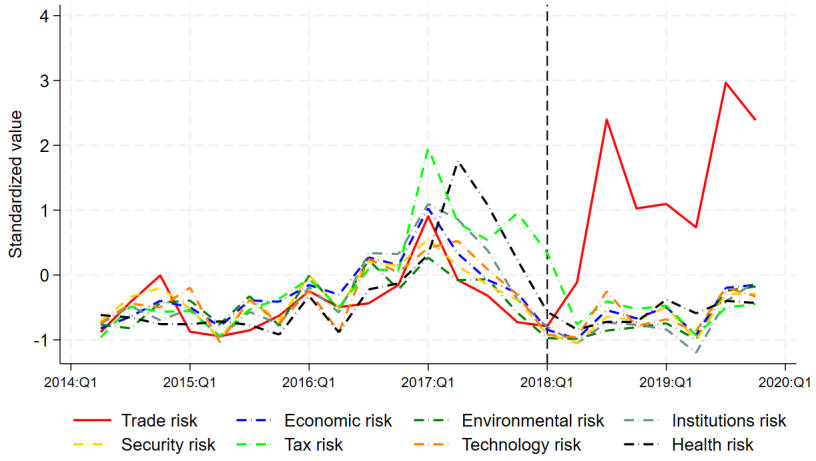
Figure 1. Trade and other uncertainty indexes

This figure depicts the evolution of the trade uncertainty index compared to other indexes of sectoral risk from Hassan et al. (2019, 2023, 2024b) (panel A) and the trade policy uncertainty index from Caldara et al. (2020). All indexes are based on text analysis of quarterly earnings call transcripts of listed firms and represent the frequency of terms concerning trade risk and uncertainty capturing discussions related to international trade and potential risks and uncertainty jointly (scaled by total text length). The Caldara et al. (2020) index focuses on the intensity of discussions related to the policy component of trade uncertainty (see Appendix A.I for more details). Time-series for all indexes are obtained from firm-level data by taking the average across firms and are standardized. Sources: Hassan et al. (2019, 2023, 2024b), https://sites.google.com/view/firmrisk, and Caldara et al. (2020).

A. Trade uncertainty vs. sectoral uncertainty



B. Trade uncertainty vs. trade policy uncertainty

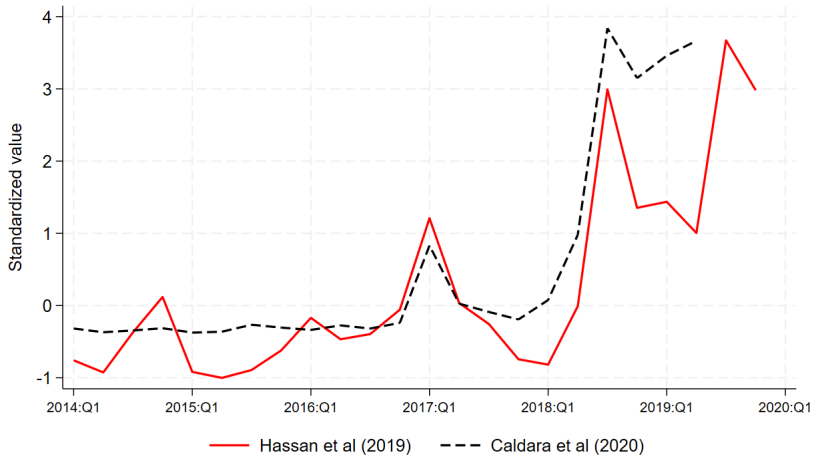
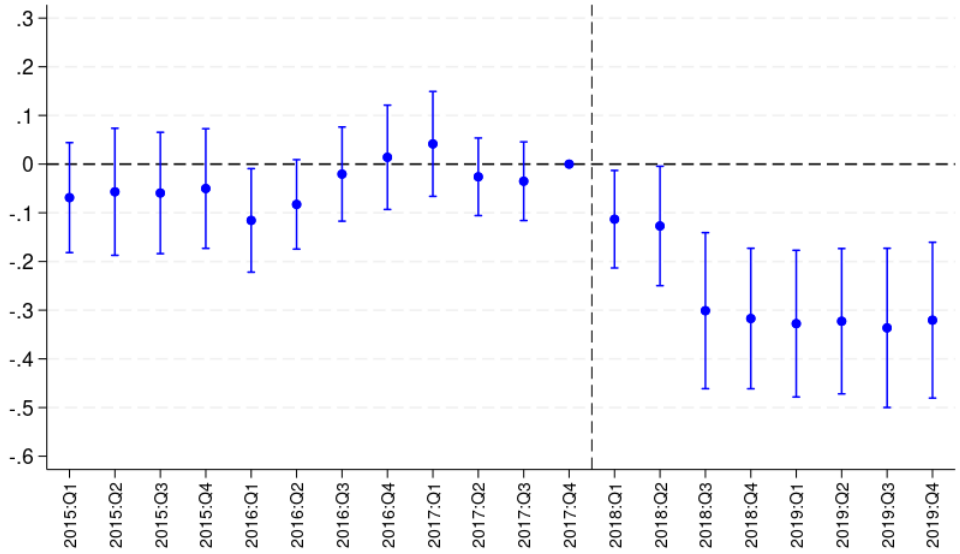


Figure 2. Dynamic DID coefficient chart for intensive-margin lending outcomes

This figure shows the effects of bank exposure to trade uncertainty on loan growth (panel A) and loan spreads (panel B) in the sub-sample of low-uncertainty firms during 2015:Q1–2019:Q4. The charts plot the estimated DID coefficients and the associated 95% confidence levels of the dynamic variant of the specifications in columns 2 (loan growth) and column 4 (for spreads) in Table 2 with interaction effects between bank exposure and quarterly dummies. Sources: FR Y-14Q, S&P Compustat, Flaaen and Pierce (2024), and Hassan et al. (2019, 2023, 2024b).

A. Loan growth



B. Loan spreads

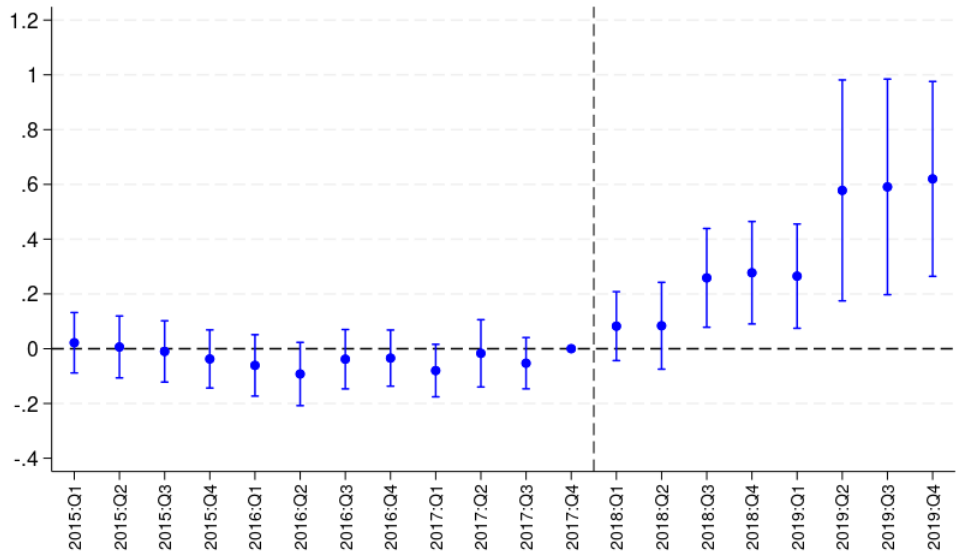


Table 1. Selected descriptive statistics

This table reports summary statistics in bank-quarter panel (panel A), firm-year (panel B), and loan-level regression sample (panel C). Measures of bank exposure to trade uncertainty, tariffs and tradable-goods producing sectors are described in Section 3.2. The regression sample at the loan level refers to U.S. banks with at least $50 billion in assets that participate in Dodd-Frank stress tests and report to the FR Y-14Q before the end of 2019; and domestic non-financial firms. Loan growth is computed as log(committed amount$_t$/committed amount$_{2016:Q4}$) at the bank-firm level. Firms' share of bank debt refers to the sum of loans from Y-14Q banks in the firm's total debt, averaged over 2016–2017. Sources: FR Y-14Q, S&P Compustat, Flaaen and Pierce (2024), and Hassan et al. (2019, 2023, 2024b).

	N	Mean	St. Dev.	P25	P50	P75
A. Bank characteristics						
Exposure to trade uncertainty /100	433	1.765	0.249	1.646	1.769	1.866
Exposure to tariff-hit sectors	433	0.330	0.098	0.270	0.324	0.381
Exposure to tradable-goods sectors	449	0.044	0.118	0.000	0.000	0.000
Exposure to non-trade uncertainty	449	-0.137	0.213	-0.291	-0.137	0.002
Size (log-assets)	433	19.431	1.061	18.686	19.150	19.828
Capital (common equity/assets)	433	0.114	0.019	0.101	0.114	0.129
1: Bank with higher capital ratio	433	0.203	0.403	0.000	0.000	0.000
Core deposits (share of liabilities)	433	0.644	0.166	0.562	0.699	0.760
Specialized (Paravisini et al., 2023)	427	0.140	0.099	0.096	0.107	0.134
Cyclicality	430	1.138	1.201	0.404	1.075	1.431
Loan loss reserve ratio	433	0.012	0.008	0.010	0.011	0.013
Non-performing loan ratio	433	0.013	0.010	0.008	0.011	0.015
Net charge-off ratio	433	0.007	0.012	0.003	0.004	0.006
Asset growth	433	0.033	0.102	0.005	0.029	0.049
Loan-to-asset ratio	433	0.513	0.205	0.360	0.613	0.679
Securities-to-asset ratio	433	0.025	0.008	0.018	0.023	0.032
Cash-to-asset ratio	433	0.086	0.086	0.032	0.060	0.094
B. Firm characteristics						
Exposure to trade uncertainty via banks /100	70802	1.569	0.498	1.495	1.804	1.850
Exposure to tariff-hit sectors via banks /1000	70802	2.793	0.987	2.270	2.921	3.393
Total asset growth	70791	0.086	0.571	-0.032	0.023	0.132
Total debt growth	70802	6.605	87.070	-15.635	0.000	19.921
Investment rate	66622	0.177	0.289	0.000	0.039	0.231
Size (log-assets)	70802	17.792	2.211	16.240	17.277	18.856
Leverage (debt-to-asset ratio)	70802	0.364	0.268	0.157	0.322	0.524
Liquidity (cash and mktb securities/assets)	70802	0.104	0.134	0.013	0.054	0.144
Tangibility (tangible assets/total assets)	70802	0.892	0.192	0.882	0.990	1.000
Return on assets	70802	0.150	0.209	0.055	0.112	0.188
Real sales growth	70802	0.089	0.363	-0.035	0.033	0.123
1: Firm is speculative-grade	70802	0.629	0.483	0.000	1.000	1.000
1: Firm with higher bank debt share (>P50)	70135	0.316	0.465	0.000	0.000	1.000
1: Firm in high-uncertainty sector (>P75)	70571	0.346	0.476	0.000	0.000	1.000
1: Firm in tariff-hit sector	70802	0.222	0.415	0.000	0.000	0.000
1: Firm has past-due loans	750236	0.011	0.104	0.000	0.000	0.000
1: Firm has charged-off loans	750236	0.004	0.064	0.000	0.000	0.000
Credit line utilization rate (firm-level) /100	651740	0.398	0.373	0.000	0.349	0.736
C. Loan characteristics						
Loan amount (USD million)	1088300	25.427	67.315	2.498	8.000	27.000
Loan growth	1088300	-0.255	0.981	-0.694	0.000	0.334
Loan spread (ppts)	646816	2.093	1.213	1.300	2.000	2.750
Probability of default	1019524	0.024	0.087	0.003	0.006	0.015
1: Loan is secured	1086820	0.775	0.417	1.000	1.000	1.000
1: Loan is credit line	984759	0.629	0.483	0.000	1.000	1.000
Time to maturity (years)	1088300	2.565	1.982	0.750	2.500	4.000
1: Loan is demandable	1088300	0.134	0.341	0.000	0.000	0.000
1: New loan	1088300	0.065	0.246	0.000	0.000	0.000

Table 2. Trade uncertainty and the intensive margin of bank lending

This table shows OLS estimates for a regression of intensive margin of lending outcomes—loan growth and spreads—on bank exposure to trade uncertainty. The data are at the loan-level and refer to outstanding loans to domestic non-financial firms during 2016:Q1–2019:Q4. Bank exposure to trade uncertainty is measured as the average of the difference in trade uncertainty across sectors (between 2016:Q1–2017:Q4 and 2018:Q1–2019:Q4), weighted by initial bank loans shares to those sectors (See Section 3.2). The dummy variable *Post* takes value of one for the period 2018:Q1-2019:Q4 and zero for the period 2016:Q1-2017:Q4. Bank controls include bank exposure to tariff-hit sectors, bank size (log-total assets), capital (common equity/total assets), deposits (core deposits/liabilities), and bank sectoral specialization, and enter in levels and interacted with *Post*. Standard errors are double clustered at the bank-quarter and firm level. Significance: *** 1%, **5%, and *10%.

Dependent variable:	(1)	(2)	(3)	(4)
	Loan growth		**Loan spread**	
	All firms	**Low-uncertainty firms**	**All firms**	**Low-uncertainty firms**
Bank exposure to trade uncertainty×Post	-0.199***	-0.217***	0.272***	0.314***
	(0.039)	(0.043)	(0.057)	(0.065)
Bank exposure to tariff-hit sectors×Post	0.428***	0.479***	0.318***	0.211*
	(0.102)	(0.113)	(0.115)	(0.119)
Observations	1,088,300	703,683	579,373	345,810
R-squared	0.326	0.345	0.853	0.834
Bank controls×Post	Y	Y	Y	Y
Bank FE	Y	Y	Y	Y
Firm×Quarter FE	Y	Y	Y	Y
Firm×Bank FE	Y	Y	Y	Y

Table 3. Trade uncertainty and the extensive margin of bank lending

This table shows OLS estimates for a regression of extensive margin of lending outcomes—probability of a new loan—on bank exposure to trade uncertainty. The dependent variable is a dummy variable that takes value one for new loan originations in loan-level data and zero otherwise (panel A) or the share of new loans (volume weighted) in data aggregated from the loan level to the bank-firm-quarter level (panel B). All specification details, sample period, and controls as in Table 2. Standard errors are double clustered at the bank-quarter and firm level. Significance: *** 1%, **5%, and *10%.

Dependent variable:	(1)	(2)	(3)	(4)
	Probability of a new loan		**Share of new loans (volume-weighted)**	
	All firms	**Low-uncertainty firms**	**All firms**	**Low-uncertainty firms**
Bank exposure to trade uncertainty×Post	-0.018***	-0.017**	-0.020***	-0.021***
	(0.006)	(0.007)	(0.006)	(0.007)
Bank exposure to tariff-hit sectors×Post	-0.005	-0.014	0.014	0.002
	(0.018)	(0.020)	(0.017)	(0.020)
Observations	1,088,300	703,683	343,898	245,054
R-squared	0.584	0.579	0.668	0.678
Bank controls	Y	Y	Y	Y
Firm×Quarter FE	Y	Y	Y	Y
Firm×Bank FE	Y	Y	Y	Y

Table 4. Trade uncertainty, banks' assessment of firm default risk, and loan losses

This table shows OLS estimates for a regression of banks' assessment of firm default risk and several metrics of asset quality on bank exposure to trade uncertainty. The dependent variable is the probability of default in loan-level data (columns 1–2); loan loss reserve ratio, nonperforming loan ratio, and net charge-off ratio in bank-quarter data (columns 3–5); and indicators for firms that have at least one past-due or charged-off loan in firm-quarter data, aggregated from the loan level (columns 6–7). Past-due loans are those loans on which interest and/or principal payments are past due at least 30 days. The sample period is 2016:Q1–2019:Q4. In columns 1–2, specification details and controls are as in Table 2, but the sample includes both single- and multi-lender firms to capture banks' assessment of borrower default risk across the entire loan portfolio. In columns 6–7, firm controls include size (log-assets), leverage (debt-to-asset ratio), liquidity (cash and marketable securities/assets), and return on assets. Standard errors are double clustered at the bank-quarter and firm level in columns 1–2, clustered at the bank level in columns 3–5, and clustered at the firm level in columns 6–7. Significance: *** 1%, **5%, and *10%.

Dependent variable:	(1) (2) **Probability of default**		(3) **Loan loss reserves**	(4) **Non-performing loans**	(5) **Net charge-offs**	(6) **With past-due loans**	(7) **With charged-off loans**
	A. Loan-level data		**B. Bank-level data**			**C. Firm-level data**	
	All firms	**Low-uncertainty firms**					
Bank exposure to trade uncertainty×Post	0.007**	0.011***	-0.025	0.410	-0.082		
	(0.003)	(0.003)	(0.099)	(0.247)	(0.114)		
Bank exposure to tariff-hit sectors×Post	0.021*	0.010	-0.348	0.359	-0.494		
	(0.011)	(0.008)	(0.265)	(0.600)	(0.409)		
Firm in high-uncertainty sector×Post						-0.025	-0.086*
						(0.072)	(0.045)
Firm in tariff-hit sector×Post						-0.083	0.006
						(0.079)	(0.050)
Observations	1,674,676	1,078,228	437	437	437	750,236	750,236
R-squared	0.011	0.012	0.990	0.949	0.968	0.401	0.599
Bank controls×Post	Y	Y	Y	Y	Y	-	-
Firm controls×Post	-	-	-	-	-	Y	Y
Bank FE	Y	Y	Y	Y	Y	-	-
Quarter FE	Y	Y	Y	Y	Y	-	-
State×Quarter FE	-	-	-	-	-	Y	Y
Firm FE	-	-	-	-	-	Y	Y

Table 5. Trade uncertainty, loan maturities, and collateral requirements

This table shows OLS estimates for a regression of loan maturities and collateral requirements on bank exposure to trade uncertainty. The dependent variable is the remaining time to maturity in years (columns 1–2), a dummy variable for demandable loans (columns 3–4), and a dummy variable for loans that are secured by collateral (columns 5-6). All specification details, sample period, and controls as in Table 2. In columns 1-4, loan controls include loan size (log of total loan commitment) and dummy variables for floating rate loans, secured loans, and loans with prepayment penalty. In columns 5-6, loan controls include loan size, maturity at origination (in years), and dummy variables for floating rate loans and loans with prepayment penalty. Standard errors are double clustered at the bank-quarter and firm level. Significance: *** 1%, **5%, and *10%.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	**Time to maturity**		**Loan is demandable**		**Loan is secured**	
	All firms	**Low-uncertainty firms**	**All firms**	**Low-uncertainty firms**	**All firms**	**Low-uncertainty firms**
Bank exposure to trade uncertainty×Post	-0.112**	-0.054	0.027**	0.026**	0.131***	0.142***
	(0.053)	(0.053)	(0.011)	(0.011)	(0.041)	(0.044)
Bank exposure to tariff-hit sectors×Post	-0.270	-0.301	-0.055	-0.073**	0.017	0.029
	(0.237)	(0.227)	(0.034)	(0.031)	(0.016)	(0.018)
Observations	1,086,174	702,420	1,089,913	705,070	1,086,887	702,954
R-squared	0.713	0.677	0.768	0.512	0.868	0.863
Bank controls×Post	Y	Y	Y	Y	Y	Y
Loan controls	Y	Y	Y	Y	Y	Y
Bank FE	Y	Y	Y	Y	Y	Y
Firm×Quarter FE	Y	Y	Y	Y	Y	Y
Firm×Bank FE	Y	Y	Y	Y	Y	Y

Table 6. Credit demand: Credit line utilization rates

This table shows OLS estimates for a regression of credit line utilization rates on a dummy variable for high-uncertainty firms in interaction with *Post*. The estimates are shown for firm-level data where the credit line utilization rates are averaged, for each firm, across its lender banks. High-uncertainty firm is a dummy variable for firms in sectors above the 75^{th} percentile of distribution of changes in average trade uncertainty between 2016–2017 and 2018–2019. Column 2 includes the following firm controls include size (log-assets), leverage (debt-to-asset ratio), liquidity (cash and marketable securities/assets), and return on assets. Standard errors are double clustered at the firm and quarter level. Significance: *** 1%, **5%, and *10%.

	(1)	(2)
Dependent variable:	**Credit line utilization rate**	
Firm in high-uncertainty sector×Post	0.0167	0.0022
	(0.3708)	(0.3719)
Firm in tariff-hit sector× Post		1.6862***
		(0.3352)
Observations	651,740	651,740
R-squared	0.8177	0.8177
Firm controls×Post	Y	Y
Firm FE	Y	Y
County×Quarter FE	Y	Y

Table 7. Trade uncertainty and lending: Role of bank capital constraints

This table shows OLS estimates for a regression of loan growth and spreads on bank exposure to trade uncertainty that allows heterogeneous effects by bank capital. The measure of capital is common equity divided by total assets (at end-2017). Higher capital banks have capital ratios above the 75th percentile in the yearly cross-section of banks. All specification details, sample period, and controls as in Table 2. Standard errors are double clustered at the bank-quarter and firm level. Significance: *** 1%, **5%, and *10%.

	(1)	(2)	(3)	(4)
Dependent variable:	**Loan growth**		**Loan spread**	
	All firms	**Low uncertainty firms**	**All firms**	**Low uncertainty firms**
Bank exposure to trade uncertainty×Post×Lower capital	-0.316***	-0.309***	0.346***	0.424***
	(0.048)	(0.054)	(0.085)	(0.102)
Bank exposure to trade uncertainty×Post×Higher capital	-0.019	-0.087	0.212***	0.216***
	(0.043)	(0.053)	(0.053)	(0.056)
Bank exposure to tariff-hit sectors×Post	0.339***	0.365***	0.306**	0.142
	(0.094)	(0.108)	(0.119)	(0.119)
p-value t-test: $H_a : \|1\| > \|2\|$	-	-	0.022	0.046
Observations	1,088,300	703,683	579,373	345,810
R-squared	0.326	0.345	0.853	0.834
Bank controls×Post	Y	Y	Y	Y
Bank FE	Y	Y	Y	Y
Firm×Quarter FE	Y	Y	Y	Y
Firm×Bank FE	Y	Y	Y	Y

Table 8. Real effects of trade uncertainty through bank lending

This table shows OLS estimates for a regression of firm-level total debt growth, investment rate, and asset growth on firm exposure to trade uncertainty through its lenders (panel A) and by level of firm dependence on bank debt (panel B). Firm exposure to trade uncertainty through its lenders is computed as the average exposure to trade uncertainty of the banks from which a given firm borrows, weighted by relative importance of each bank in the firms' total bank debt (sum of loans from FR Y-14Q banks) at end-2014. Higher bank debt share is defined as above-median average share of bank loans in the firm's total debt during 2016–2017. The investment rate is the ratio of capital expenditure divided by lagged total assets. The data are at the firm-year level over the period between 2016 and 2019. The dummy variable *Post* takes value one for the period 2018–2019 and zero for the period 2016–2017. Firm controls include firm exposure to tariffs-hit sectors through its lenders (computed in the same way as firm exposure to trade uncertainty), firm size (log-assets), leverage (debt-to-asset ratio), liquidity (cash and marketable securities/assets), tangibility (tangible assets as a share of total assets), return on assets, real sales growth, and a dummy variable taking value one for firms rated speculative-grade by their bank. Firm industry is 3-digit NAICS classification. Standard errors are clustered at the firm level. Significance: *** 1%, **5%, and *10%.

Dependent variable:	(1)	(2)	(3)	(4)	(5)	(6)
	Debt growth		**Investment rate**		**Asset growth**	
	All firms	**Low-uncertainty firms**	**All firms**	**Low-uncertainty firms**	**All firms**	**Low-uncertainty firms**
			A. Baseline			
Firm exposure to trade uncertainty×Post	-0.159***	-0.225***	-0.096***	-0.106***	-0.176***	-0.210***
	(0.040)	(0.050)	(0.012)	(0.015)	(0.026)	(0.033)
Firm exposure to tariffs×Post	0.008***	0.010***	0.003***	0.004***	0.008***	0.009***
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)
Observations	70,802	46,129	65,852	43,907	70,787	46,119
R-squared	0.557	0.545	0.673	0.680	0.622	0.627
			B. By bank dependence			
Firm exposure×Lower bank debt share (1)	-0.145***	-0.208***	-0.093***	-0.102***	-0.164***	-0.201***
	(0.040)	(0.050)	(0.012)	(0.015)	(0.026)	(0.033)
Firm exposure×Higher bank debt share (2)	-0.185***	-0.254***	-0.100***	-0.111***	-0.202***	-0.232***
	(0.040)	(0.051)	(0.012)	(0.015)	(0.027)	(0.035)
Firm exposure to tariffs×Post	0.008***	0.010***	0.003***	0.004***	0.008***	0.009***
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)
p-value t-test $H_a : \|1\| > \|2\|$	0.000	0.001	0.042	0.027	0.000	0.000
Observations	69,971	45,519	65,076	43,337	69,958	45,509
R-squared	0.555	0.543	0.673	0.680	0.620	0.625
Firm controls×Post	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y
Industry×County×Year FE	Y	Y	Y	Y	Y	Y

ONLINE APPENDIX

Trade Uncertainty and U.S. Bank Lending

Ricardo Correa, Julian di Giovanni, Linda S. Goldberg, Camelia Minoiu

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A-I Appendix: Robustness Checks

This section presents additional tests that validate the identification strategy and examine the robustness of our results to alternative methodological choices.

Variations in the choice of fixed effects. In Table A11 and Table A12 we check that the choice of fixed effects does not have affect our main results. First, we estimate the baseline specifications without any fixed effects or just with time fixed effects. As seen in panel A of Table A11, there are no significant changes to our main findings. Estimates in columns 2 and 4, which include time fixed effects, show that more exposed banks experience lower loan growth and higher loan spreads than other banks (coefficients significant at least at the 10% level). In panel B, we explore specifications that include the baseline controls and fixed effects, but remove the pair-wise bank×firm fixed effects. Once again, there are no significant impacts on the main estimates.

If firms have different types of loan relationships across banks (for instance, they take trade finance loans from one bank and other types of loans from another bank), then loan demand could be bank-specific and firm×quarter fixed would fail to absorb all variation in loan demand. In addition, loans collateralized by different types of assets should be considered separately because credit dynamics following monetary and financial shocks can vary significantly across these loan types (Ivashina et al., 2021). To address these issues, we estimate our baseline specifications including loan-type×quarter fixed effects (panel A) and the even more stringent firm×loan-type×quarter fixed effects (panel B), where loan-type refers to (i) trade finance loans, or it varies by collateral type, including (ii) loans secured by fixed assets and real estate, cash and marketable securities, or blanket liens (roughly capturing asset-based loans) and (iii) loans secured by accounts receivable and inventory (earnings-based loans). Our baseline results, reported in Table A12, remain unchanged.

Weighted least squares. Our results may be influenced by sectors for which trade uncertainty is computed with less precision because of the sparse coverage of public firms for which text analysis is performed to measure uncertainty. To account for this issue, we estimate our baseline specifications using weighted-least squares that accounts for variations in the precision of sectoral estimates of trade uncertainty. Weights are computed using the bank-specific average firm count of observations used to calculate the trade uncertainty exposure measures. The results in panel A of Table A13 show that applying this weighting does not materially affect our main findings.

Alternative measures of trade uncertainty. Our approach prompts the question of how the index of trade political risk and uncertainty from Hassan et al. (2019) compared with other prominent measures of trade policy uncertainty, such as that of Caldara et al. (2020). Thus, we check if our results are sensitive to the choice of constructing the baseline measure of bank exposure to trade policy uncertainty based on the Hassan et al. (2019) measures. The trade policy index of Caldara et al. (2020) is similar to that of Hassan et al. (2019) in that it uses similar linguistic libraries, including terms that refer to trade activities and trade policy, as well as uncertainty, risk, and potentiality. However, Caldara et al. (2020)'s index differs in two key dimensions. First, it uses news articles from global newspapers as a basis for the text analysis.[15] Second, it is more focused on measuring trade policy uncertainty, even though the Hassan et al. (2019) index uses policy-related keywords as well. As a result, the two indexes are highly correlated over the period of analysis (Figure 1), when trade uncertainty was largely driven by policies, and produce a similar sorting of firms and sectors into high versus low-uncertainty sectors. As seen in panel B of Table A13, the results hold up using the Caldara et al. (2020) index: the coefficients on bank exposure to trade uncertainty are negative though imprecisely estimated for loan growth (columns 1-2) and positive and statistically significant for loan spreads (columns 3-4).

[15] Caldara et al. (2020) additionally present a trade policy uncertainty index that uses transcripts from listed firms' earnings calls and show that this index is highly correlated in the time series with their main news-based index.

Figure A1. Changes in trade uncertainty versus tariffs

The figure depicts overalaid smoothed histograms of sector-level changes in trade uncertainty between 2016-2017 and 2018-2019 for sectors subject to tariffs and sectors that did not receive tariffs. The unit of measurement for "Change in trade uncertainty" is the frequency of mentions of synonyms for risk or uncertainty, divided by transcript length and multiplied by 1,000. For clarity, change in trade uncertainty is winsorized at the bottom 1% and top 5% of observations. The histograms use the Epanechnikov kernel with optimal bandwidth. Sources: FR Y-14Q, S&P Compustat, and Hassan et al. (2019, 2023, 2024b).

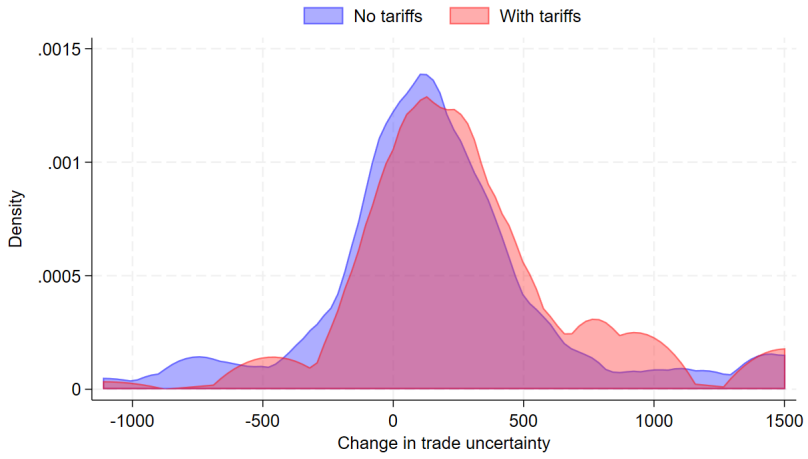

Figure A2. Investment rate and sales growth at high versus low-uncertainty firms

This figure shows the effects of firm exposure to trade uncertainty on real sales growth and the investment rate. The chart plots the estimated coefficients and the associated 95% confidence levels of a dynamic DID model (estimated in firm-year data during 2016–2019) that regresses the investment rate (panel A) or real sales growth (panel B), respectively, on a dummy variable for firms in high-uncertainty sectors (i.e., those sectors with a change in average uncertainty between 2016–2017 and 2018–2019 above the 75$^{\text{th}}$ percentile) interacted with yearly dummies, controlling for firm exposure to the tariffs (measured by a dummy variable taking value one for firms in tariff-hit sectors), in level and interacted with a *Post* dummy taking value one for the 2018–2019 period and zero for 2016–2017, lagged firm size (log-assets), leverage (debt/assets), liquidity (cash and marketable securities/assets), and firm and year fixed effects. Standard errors are clustered at the firm level. Sources: FR Y-14Q, S&P Compustat, Flaaen and Pierce (2024), and Hassan et al. (2019, 2023, 2024b).

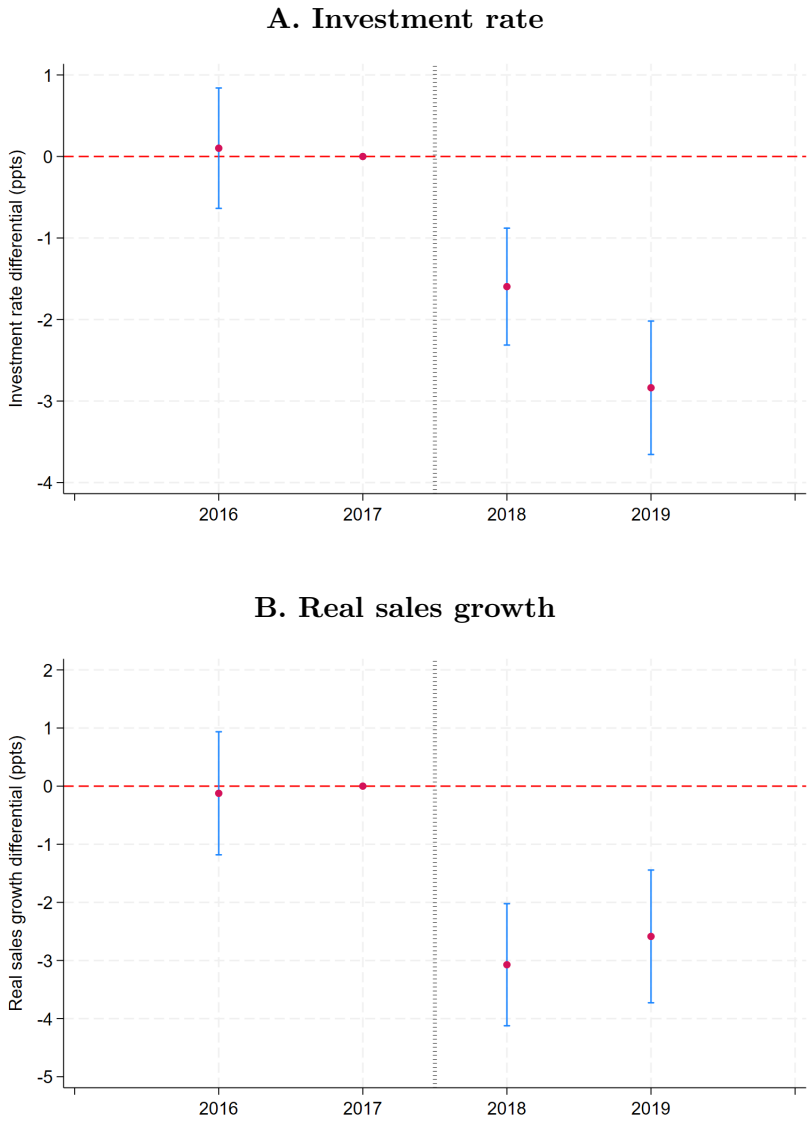

Table A1. Changes in trade uncertainty by sector

This table reports the sectors in the top 25th and bottom 25th percentiles of the distribution of changes in average trade uncertainty between 2016–2017 and 2018–2019. The unit of measurement for "Change in trade uncertainty" is the frequency of mentions of synonyms for risk or uncertainty, divided by transcript length and multiplied by 1,000. Tariff-hit is an indicator for the sectors that received tariffs during 2018–2019. The sector "Apparel manufacturing" (NAICS code 315) is omitted from the table due to extreme value for uncertainty driven by earnings transcript of one firm.

Sector code	A. Largest increases in trade uncertainty	Δ Trade uncertainty	Tariffs-hit
313	Textile Mills	5447.8	1
485	Transit and Ground Passenger Transportation	2420.6	0
482	Rail Transportation	1567.7	0
314	Textile Product Mills	1565.6	1
811	Repair and Maintenance	1503.8	0
532	Rental and Leasing Services	1268.3	0
483	Water Transportation	940.3	0
331	Primary Metal Mfg	925.5	1
333	Machinery Mfg	619.5	1
445	Food and Beverage Retailers	454.0	0
519	Web Search Portals, Libraries, Archives, Other Info Services	443.5	0
621	Ambulatory Health Care Services	427.2	0
112	Animal Production and Aquaculture	408.9	0
334	Computer and Electronic Product Mfg	401.3	1
	B. Largest decrease in trade uncertainty		
812	Personal and Laundry Services	-1113.7	0
488	Support Activities for Transportation	-792.4	0
493	Warehousing and Storage	-760.0	0
492	Couriers and Messengers	-685.4	0
335	Electrical Equipment, Appliance, and Component Mfg	-462.2	1
236	Construction of Buildings	-404.0	0
531	Real Estate	-180.4	0
623	Nursing and Residential Care Facilities	-126.4	0
423	Merchant Wholesalers, Durable Goods	-80.3	0
339	Miscellaneous Mfg	-72.4	1
322	Paper Mfg	-71.8	1
562	Waste Management and Remediation Services	-68.8	0
622	Hospitals	-64.0	0
332	Fabricated Metal Product Mfg	-51.8	1
312	Beverage and Tobacco Product Mfg	-41.4	1
722	Food Services and Drinking Places	-20.4	0

Table A2. Covariate balance: Bank exposure to trade uncertainty

This table reports OLS estimates from a regression of the baseline bank exposure to trade uncertainty on bank characteristics: size (log-total assets), capital (common equity/total assets), core deposit share (core deposits/liabilities), sectoral specialization (defined at the bank level as the share of sectors to which the bank has outsized loan exposures, following Paravisini et al. (2023)), and bank exposure to tariff-hit sectors. The data are at the bank-quarter level over 2016:Q1–2017:Q4. Standard errors are clustered at the bank level. *** 1%, **5%, and *10%.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	**Bank exposure to trade uncertainty**					
Size (log-assets)	0.082**					0.050
	(0.037)					(0.046)
Capital (equity/assets)		-0.046*				-0.020
		(0.025)				(0.033)
Core deposit share			-0.004			-0.001
			(0.003)			(0.004)
Sectoral specialization				0.531		0.113
				(0.397)		(0.366)
Exposure to tariff-hit sectors					1.070*	0.669
					(0.543)	(0.782)
Observations	58	58	58	58	58	58
R^2	0.116	0.115	0.090	0.044	0.181	0.254
Year FE	Y	Y	Y	Y	Y	Y

Table A3. Covariate balance: Firms in high versus low-uncertainty sectors

This table reports average characteristics (over the pre-period 2016–2017) for firms in high- versus low-uncertainty sectors. Sectors at the 3-digit NAICS level are classified as "high uncertainty" if they are above the 75th percentile of the distribution of change in trade uncertainty between 2016–2017 and 2018–2019. Higher bank debt share is defined as above-median share of bank loans in the firm's total debt during 2016–2017. Normalized differences between each pair of averages (the difference between the quartile average and the average of the other three quartiles, normalized by the square root of the sum of the corresponding variances) are reported in Column 3. Imbens and Rubin (2015) propose that two variables have "similar" means when the absolute normalized difference is less than 0.25.

	(1)	(2)	(3)
	High Δ uncertainty sector	**Low Δ uncertainty sector**	**Normalized difference (1)-(2)**
No. of firms	N=30882	N=58983	
Total assets (log)	17.091	17.161	0.091
Liquidity (cash/assets)	0.129	0.133	0.096
Tangibility (tangibles /assets)	0.901	0.893	-0.110
Leverage (debt/assets)	0.343	0.325	-0.208
Return on assets	0.146	0.167	0.292
Firm is speculative-grade	0.642	0.649	0.030
Firm is publicly listed	0.026	0.028	0.056
Firm with higher share of bank debt (>P50)	0.318	0.337	0.148
Firm exposure to tariffs via banks	0.287	0.284	-0.102
Real sales growth	0.113	0.123	0.056
Investment rate	0.202	0.198	-0.044
Asset growth	0.145	0.143	0.060
Debt growth	0.141	0.138	0.040

Table A4. Robustness to alternative measurement of bank specialization

This table shows OLS estimates for the baseline regression in Table 2 where the bank specialization control variable is computed as an average over 2014–2015 instead of the end of 2017. All specification details, sample period, and controls as in Table 2. Standard errors are double clustered at the bank-quarter and firm level. Significance: *** 1%, **5%, and *10%.

	(1)	(2)	(3)	(4)
Dependent variable:	**Loan growth**		**Loan spread**	
	All firms	**Low-uncertainty firms**	**All firms**	**Low-uncertainty firms**
Bank exposure to trade uncertainty × Post	-0.200***	-0.217***	0.278***	0.320***
	(0.039)	(0.043)	(0.058)	(0.066)
Bank exposure to tariff-hit sectors × Post	0.432***	0.480***	0.311***	0.204*
	(0.103)	(0.113)	(0.114)	(0.120)
Observations	1,086,079	702,130	578,140	344,971
R-squared	0.326	0.345	0.853	0.834
Bank controls×Post	Y	Y	Y	Y
Bank FE	Y	Y	Y	Y
Firm×Quarter FE	Y	Y	Y	Y
Firm×Bank FE	Y	Y	Y	Y

Table A5. Placebo tests and anticipation effects

This table shows OLS estimates for a regression of loan growth and spreads on bank exposure to trade uncertainty on sample periods that are modified to represent a placebo test (panel A) or address the potential for anticipation effects (panel B). In panel A, the sample period precedes the baseline regression sample by one year, such that the new sample period refers to 2013:Q1–2014:Q4 (pre) and 2015:Q1–2016:Q4 (post). In panel B, we drop all loan commitments in 2017 and move the pre-shock period back by one year, such that the new sample period refers to 2015:Q1-2016:Q4 (pre) and 2018:Q1–2019:Q4 (post). All specification details and controls as in Table 2. Standard errors are double clustered at the bank-quarter and firm level. Significance: *** 1%, **5%, and *10%.

	(1)	(2)	(3)	(4)
Dependent variable:	**Loan growth**		**Loan spread**	
	All firms	**Low uncertainty firms**	**All firms**	**Low uncertainty firms**
	A. Placebo: 2013-2014 vs 2015-2016			
Bank exposure to trade uncertainty×Post	0.014	0.016	-0.324**	-0.395***
	(0.029)	(0.032)	(0.126)	(0.131)
Bank exposure to tariff-hit sectors×Post	-0.145*	-0.173*	-1.481***	-1.154***
	(0.085)	(0.092)	(0.417)	(0.365)
Observations	1,016,582	664,883	532,951	332,848
R-squared	0.327	0.345	0.840	0.822
	B. Anticipation effects: Drop 2017			
Bank exposure to trade uncertainty×Post	-0.189***	-0.207***	0.337***	0.354***
	(0.053)	(0.059)	(0.066)	(0.077)
Bank exposure to tariff-hit sectors×Post	0.492***	0.618***	0.316**	0.185
	(0.138)	(0.154)	(0.146)	(0.154)
Observations	1,064,766	693,217	561,791	340,278
R-squared	0.336	0.355	0.847	0.830
Bank controls×Post	Y	Y	Y	Y
Firm×Quarter FE	Y	Y	Y	Y
Firm×Bank FE	Y	Y	Y	Y

Table A6. Bank portfolio rebalancing from C&I lending to other types of assets

This table shows OLS estimates for a regression of bank-level average asset growth, loan-to-asset ratio, securities-to-asset ratio, and cash-to-asset ratio on bank exposure to uncertainty. The data are at the bank-quarter level over the period between 2016:Q1 and 2019:Q4 for the banks in our baseline regression sample. Bank exposure to trade uncertainty is measured as the average of the difference in trade uncertainty across sectors (between 2016:Q1–2017:Q4 and 2018:Q1–2019:Q4), weighted by initial bank loans shares to those sectors (See Section 3.2). The dummy variable *Post* takes value of one for the period 2018:Q1-2019:Q4 and zero for the period 2016:Q1-2017:Q4. Standard errors are double clustered at the quarter and bank level. Significance: *** 1%, **5%, and *10%.

Dependent variable:	(1) **Asset Growth**	(2) **Loans % Assets**	(3) **Securities % Assets**	(4) **Cash % Assets**
			(A) Baseline	
Bank exposure to trade uncertainty×Post	0.064	-0.043***	0.004**	0.005
	(0.040)	(0.009)	(0.001)	(0.010)
Bank exposure to tariff-hit sectors×Post	0.059	0.032	-0.004	-0.014
	(0.093)	(0.027)	(0.004)	(0.029)
Observations	433	437	437	437
R^2	0.375	0.996	0.976	0.975
			(B) By bank capital: Common equity/assets	
Bank exposure to trade uncertainty×Post×Lower capital	0.068	-0.040***	0.005**	-0.001
	(0.054)	(0.012)	(0.002)	(0.009)
Bank exposure to trade uncertainty×Post×Higher capital	-0.014	-0.030	0.005**	0.008
	(0.057)	(0.022)	(0.002)	(0.015)
Bank exposure to tariff-hit sectors×Post	-0.082	0.029	-0.004	-0.025
	(0.086)	(0.032)	(0.005)	(0.030)
Observations	433	433	433	433
R^2	0.568	0.996	0.975	0.973
Bank controls×Post	Y	Y	Y	Y
Bank FE	Y	Y	Y	Y
Quarter FE	Y	Y	Y	Y

Table A7. Controlling for bank exposure to non-trade uncertainty

This table shows OLS estimates for a regression of loan growth and spreads on bank exposure to trade uncertainty in a horse-race with bank exposure to sources of sectoral uncertainty other than trade. Bank exposure to "non-trade uncertainty" is obtained in the same way as bank exposure to trade uncertainty, however instead of the trade uncertainty index we use the first principal component of all sectoral uncertainty indexes other than trade (economic policy and budget, environment, institutions and political processes, health care, security and defense, tax policy, and technology and infrastructure). All specification details, sample period, and controls as in Table 2. Standard errors are double clustered at the bank-quarter and firm level. Significance: *** 1%, **5%, and *10%.

	(1)	(2)	(3)	(4)
Dependent variable:	**Loan growth**		**Loan spread**	
	All firms	**Low uncertainty firms**	**All firms**	**Low uncertainty firms**
Bank exposure to trade uncertainty×Post	-0.226***	-0.244***	0.228***	0.266***
	(0.041)	(0.046)	(0.053)	(0.061)
Bank exposure to non-trade uncertainty×Post	0.002***	0.002***	0.003***	0.003***
	(0.001)	(0.001)	(0.001)	(0.001)
Bank exposure to tariff-hit sectors	0.756***	0.801***	0.959***	0.956***
	(0.167)	(0.183)	(0.242)	(0.250)
Observations	1,088,300	703,683	579,373	345,810
R-squared	0.326	0.345	0.853	0.834
Bank controls×Post	Y	Y	Y	Y
Firm×Quarter FE	Y	Y	Y	Y
Firm×Bank FE	Y	Y	Y	Y

Table A8. Control for exchange rate effects through exporting firms

This table shows OLS estimates for a regression of loan growth and spreads on bank exposure to trade uncertainty controlling for bank exposure to the tradable-goods producing sectors interacted with the USD broad index. We follow Desai et al. (2008) and classify non-tradable sectors to include construction, retailers, transportation, and recreation. (Utilities and financial firms are excluded from our baseline sample.) All specification details, sample period, and controls as in Table 2. Standard errors are double clustered at the bank-quarter and firm level. Significance: *** 1%, **5%, and *10%.

	(1)	(2)	(3)	(4)
Dependent variable:	**Loan growth**		**Loan spread**	
	All firms	**Low uncertainty firms**	**All firms**	**Low uncertainty firms**
Bank exposure to trade uncertainty×Post	-0.200***	-0.219***	0.276***	0.317***
	(0.039)	(0.043)	(0.057)	(0.065)
Bank exposure to tariff-hit sectors×Post	0.428***	0.479***	0.321***	0.214*
	(0.102)	(0.113)	(0.115)	(0.119)
Bank exposure to tradable-goods sectors×USD broad index	0.010*	0.017***	-0.031***	-0.025**
	(0.005)	(0.006)	(0.011)	(0.012)
Observations	1,088,300	703,683	579,373	345,810
R-squared	0.326	0.345	0.853	0.834
Bank controls×Post	Y	Y	Y	Y
Firm×Quarter FE	Y	Y	Y	Y
Firm×Bank FE	Y	Y	Y	Y

Table A9. Effects by loan type: Credit lines vs. Term loans

This table shows OLS estimates for a regression of loan growth and spreads on bank exposure to trade uncertainty breaking up the main DID coefficient by loan type: credit lines versus term loans. All specification details, sample period, and controls as in Table 2. Standard errors are double clustered at the bank-quarter and firm level. Significance: *** 1%, **5%, and *10%.

Dependent variable:	(1)	(2)	(3)	(4)
	Loan growth		**Loan spread**	
	All firms	**Low uncertainty firms**	**All firms**	**Low uncertainty firms**
Bank exposure to trade uncertainty×Post×Credit line	-0.102**	-0.121***	0.239***	0.278***
	(0.044)	(0.045)	(0.057)	(0.066)
Bank exposure to trade uncertainty×Post×Term loan	-0.277***	-0.253***	0.356***	0.395***
	(0.044)	(0.046)	(0.057)	(0.066)
Bank exposure to tariff-hit sectors×Post	0.496***	0.464***	0.411***	0.304**
	(0.117)	(0.123)	(0.115)	(0.119)
Observations	962,053	612,107	542,912	319,438
R-squared	0.348	0.370	0.874	0.859
Bank controls×Post	Y	Y	Y	Y
Firm×Quarter FE	Y	Y	Y	Y
Firm×Bank FE	Y	Y	Y	Y

Table A10. Control for bank cyclicality and oil price fluctuations

This table shows OLS estimates for a regression of loan growth and spreads on bank exposure to trade uncertainty controlling for bank cyclicality in level and interaction with *Post* (panel A) and dropping oil firms from the baseline sample (panel B). Bank cyclicality is a time-invariant bank-level variable representing the correlation between the bank's C&I loan growth and the growth rate of banking sector assets (the correlation is obtained by regressing each bank's C&I loan growth on banking sector asset growth for each bank in the dataset, over the period 1985:Q1–2021:Q2, using quarterly merger-adjusted Call Report data and assigning each bank holding company in the Y-14Q dataset its main commercial bank from the Call Report). Oil firms are defined as those in the 2-digit NAICS sector "Mining, quarrying, and oil and gas extraction." All specification details, sample period, and controls as in Table 2. Standard errors are double clustered at the bank-quarter and firm level. Significance: *** 1%, **5%, and *10%.

Dependent variable:	(1)	(2)	(3)	(4)
	Loan growth		**Loan spread**	
	All firms	**Low uncertainty firms**	**All firms**	**Low uncertainty firms**
		A. Control for bank cyclicality		
Bank exposure to trade uncertainty×Post	-0.154***	-0.183***	0.263***	0.314***
	(0.036)	(0.041)	(0.052)	(0.059)
Bank exposure to tariff-hit sectors×Post	0.481***	0.515***	0.305***	0.212*
	(0.102)	(0.112)	(0.111)	(0.117)
Bank cyclicality×Post	0.032***	0.023***	-0.011	0.000
	(0.006)	(0.006)	(0.023)	(0.024)
Observations	1,088,300	703,683	579,373	345,810
R-squared	0.326	0.345	0.853	0.834
		B. Drop oil firms		
Bank exposure to trade uncertainty×Post	-0.204***	-0.223***	0.250***	0.291***
	(0.041)	(0.046)	(0.057)	(0.067)
Bank exposure to tariff-hit sectors×Post	0.365***	0.387***	0.299**	0.187
	(0.104)	(0.116)	(0.117)	(0.125)
Observations	1,038,846	654,537	549,224	315,822
R-squared	0.322	0.339	0.854	0.832
Bank controls×Post	Y	Y	Y	Y
Bank FE	Y	Y	Y	Y
Firm×Quarter FE	Y	Y	Y	Y
Firm×Bank FE	Y	Y	Y	Y

Table A11. Baseline specifications with fewer or no FE

This table shows OLS estimates for a regression of loan growth and spreads on bank exposure to trade uncertainty with no fixed effects (panel A) or that removes the bank-firm pair fixed effects from the baseline specifications (panel B). All specification details, sample period, and controls as in Table 2. Standard errors are double clustered at the bank-quarter and firm level. Significance: *** 1%, **5%, and *10%.

	(1)	(2)	(3)	(4)
Dependent variable:	**Loan growth**		**Loan spread**	
	All firms	**Low uncertainty firms**	**All firms**	**Low uncertainty firms**
	A. Baseline with no fixed effects			
Bank exposure to trade uncertainty×Post	-0.080**	-0.146***	0.503***	0.511**
	(0.034)	(0.046)	(0.143)	(0.237)
Bank exposure to trade uncertainty	0.106***	0.128***	0.197*	-0.299*
	(0.028)	(0.035)	(0.102)	(0.173)
Post	0.069		-2.070**	
	(0.224)		(0.978)	
Bank exposure to tariff-hit sectors×Post	0.377***	0.480***	0.871	0.669
	(0.126)	(0.152)	(0.577)	(0.629)
Bank exposure to tariff-hit sectors	0.127	0.154	-3.340***	-2.849***
	(0.091)	(0.117)	(0.434)	(0.478)
Observations	1,797,501	1,161,034	1,042,706	629,458
R-squared	0.002	0.004	0.049	0.020
Bank controls×Post	Y	Y	Y	Y
Quarter FE	-	Y	-	Y
	B. Baseline with no pair FE			
Bank exposure to tariff-hit sectors×Post	0.539***	0.660***	0.583***	0.522***
	(0.111)	(0.123)	(0.145)	(0.149)
Bank exposure to trade uncertainty×Post	-0.235***	-0.298***	0.325***	0.353***
	(0.038)	(0.045)	(0.071)	(0.082)
Observations	1,092,063	706,339	582,058	347,710
R-squared	0.231	0.240	0.797	0.776
Bank controls×Post	Y	Y	Y	Y
Bank FE	Y	Y	Y	Y
Firm×Quarter FE	Y	Y	Y	Y

Table A12. Robustness to more granular loan-type fixed effects

This table shows OLS estimates for a regression of loan growth and spreads on bank exposure to trade uncertainty controlling for loantype×quarter fixed effects (panel A) and firm×loantype×quarter fixed effects (panel B). Loantype is given by (i) trade finance loans, (ii) loans secured by fixed assets and real estate, cash and marketable securities, or blanket liens (roughly capturing asset-based loans) and (iii) loans secured by accounts receivable and inventory (earnings-based loans). All specification details, sample period, and controls as in Table 2. Standard errors are double clustered at the bank-quarter and firm level. Significance: *** 1%, **5%, and *10%.

	(1)	(2)	(3)	(4)
Dependent variable:	**Loan growth**		**Loan spread**	
	All firms	**Low uncertainty firms**	**All firms**	**Low uncertainty firms**
	A. With Loan-Type×Quarter FE			
Bank exposure to trade uncertainty ×Post	-0.125***	-0.138***	0.240***	0.272***
	(0.037)	(0.041)	(0.056)	(0.064)
Bank exposure to tariff-hit sectors×Post	0.407***	0.470***	0.240*	0.153
	(0.097)	(0.107)	(0.127)	(0.131)
Observations	1,088,300	703,683	579,373	345,810
R-squared	0.350	0.366	0.854	0.836
Loan-type×Quarter FE	Y	Y	Y	Y
	B. With Firm×Loan-Type×Quarter FE			
Bank exposure to trade uncertainty ×Post	-0.183***	-0.196***	0.266***	0.310***
	(0.039)	(0.042)	(0.054)	(0.062)
Bank exposure to tariff-hit sectors×Post	0.367***	0.411***	0.305***	0.198
	(0.099)	(0.109)	(0.116)	(0.122)
Observations	1,087,287	702,955	578,687	345,343
R-squared	0.342	0.363	0.855	0.836
Bank controls×Post	Y	Y	Y	Y
Firm×Quarter FE	Y	Y	Y	Y
Firm×Bank FE	Y	Y	Y	Y
Firm×Loan-type×Quarter FE	Y	Y	Y	Y

Table A13. Baseline regression estimates with WLS and alternative trade uncertainty measure

This table shows Weighted Least Squares (WLS) estimates for a regression of loan growth and spreads on bank exposure to trade uncertainty (panel A) and estimates for the same regression using a measure of bank exposure to trade policy uncertainty from Caldara et al. (2020) (panel B). In panel A, analytical weights are given by the bank-specific average firm count on the basis of which we compute sectoral uncertainty and in turn bank exposure to uncertainty. The WLS estimator gives a greater weight to banks for which exposures to uncertainty are computed from sectors with more listed firms (for which trade uncertainty reports are available) and it gives a lower weight to banks whose exposure measure draws on less uncertainty information. In panel B, bank exposure to trade policy uncertainty is computed in the same way as the baseline measure of bank exposure to trade uncertainty, but using the uncertainty data from Caldara et al. (2020). All specification details, sample period, and controls as in Table 2. Standard errors are double clustered at the bank-quarter and firm level. Significance: *** 1%, **5%, and *10%.

	(1)	(2)	(3)	(4)
Dependent variable:	**Loan growth**		**Loan spread**	
	All firms	**Low uncertainty firms**	**All firms**	**Low uncertainty firms**
		A. Weighted Least Squares		
Bank exposure to trade uncertainty×Post	-0.259***	-0.274***	0.324***	0.371***
	(0.045)	(0.049)	(0.066)	(0.076)
Bank exposure to tariff-hit sectors×Post	0.541***	0.595***	0.293**	0.173
	(0.111)	(0.122)	(0.122)	(0.124)
Observations	1,088,300	703,683	579,373	345,810
R-squared	0.332	0.352	0.862	0.840
		B. Robustness to Caldara et al. (2020) measure		
Bank exposure to trade uncertainty×Post	-0.040	-0.050	0.096**	0.112**
	(0.028)	(0.032)	(0.049)	(0.052)
Bank exposure to tariff-hit sectors×Post	0.326**	0.381**	0.189	0.064
	(0.138)	(0.154)	(0.198)	(0.208)
Observations	1,088,300	703,683	579,373	345,810
R-squared	0.326	0.345	0.853	0.834
Bank controls×Post	Y	Y	Y	Y
Firm×Quarter FE	Y	Y	Y	Y
Firm×Bank FE	Y	Y	Y	Y