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Domestic Lending and the Pandemic:

How Does Banks' Exposure to Covid-19 Abroad

Affect Their Lending in the United States?

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Abstract:

We study how U.S. banks' exposure to the economic fallout due to governments' response to Covid-19 in foreign countries has affected their credit provision to borrowers in the United States. We combine a rarely accessed dataset on U.S. banks' cross-border exposure to borrowers in foreign countries with the most detailed regulatory ("credit registry") data that is available on their U.S.-based lending. We compare the change in the U.S. lending of banks that are more vs. less exposed to the pandemic abroad, during and after the onset of Covid-19 in 2020. We document strong spillover effects: U.S. banks with higher foreign exposures in badly "Covid-19-hit" regions cut their lending in the United States substantially more. This effect is particularly strong for longer-maturity loans and term loans and is robust to controlling for firms' pandemic exposure.

Keywords: Cross-border exposure, bank lending, bank capital, bank balance sheet liquidity

JEL codes: F34; F65; G15; G21

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[1] Judit Temesvary and Andrew Wei are both at the Board of Governors of the Federal Reserve System. We thank Ann Owen, Camelia Minoiu, and workshop participants at the Federal Reserve Board for helpful comments and suggestions. The views expressed are the authors' and should not be interpreted as representing the views of the Federal Open Market Committee, its principals, the Board of Governors of the Federal Reserve System, or any other person associated with the Federal Reserve System. Corresponding author: Judit Temesvary, judit.temesvary@frb.gov; 202-379-6229.

1. Introduction

The U.S. banking system maintains a substantial global reach: the largest U.S. banks hold as much as 30 percent of their assets in foreign countries. This international exposure brings numerous benefits, such as additional funding sources (Cetorelli and Goldberg, 2012), higher-yield investment opportunities (Temesvary, 2014) and shock absorption (Cetorelli and Goldberg, 2011), At the same time, global operations can also expose banks to additional risks (Frame, Mihov and Sanz, 2020; Karolyi, Sedunov and Taboada, 2018) and to spillovers from foreign countries (Correa, Sapriza and Zlate, 2011; Brauning and Ivashina, 2018, Hale, Kapan and Minoiu, 2020).

In this paper, we focus specifically on the spillovers that large U.S. banks experienced from being exposed to Covid-19-related losses in foreign regions and examine how such spillovers affected their corporate lending in the United States over 2020. Indeed, starting around the onset of the pandemic, governments in countries to which U.S. banks lend the most implemented strict measures to curb the spread of the disease, effectively closing down large segments of their economies and instituting stay-at-home orders (Hale et al, 2021; Figure A1) – translating into more bankruptcies (Table A1) and higher (risk of) corporate loan defaults (Hasan, Politsidis and Sharma, 2021). Subsequently, large U.S. banks saw notable stock price declines (Acharya, Engle and Steffen, 2021), cut their U.S. corporate loan originations substantially (Kapan and Minoiu, 2021), and tightened lending terms (Berger et al, 2021). Connecting these various pieces of evidence, our goal in this paper is to quantify how large U.S. banks' exposure to Covid-19-related losses in foreign countries affected their lending to U.S.-based firms.

Analyzing the combination of two rarely-accessed, highly granular bank regulatory datasets on lending and foreign activities, we find strong evidence that more "foreign Covid-19-exposed" banks cut their U.S.-based lending significantly more than less affected banks, during and after the onset of the pandemic. This effect is particularly strong for worse-capitalized banks and in longer-maturity and term lending. Our results are robust to including highly granular fixed effects and to adding detailed controls for borrowing firms' Covid-19 exposure in the United States (including the addition of state-level restriction measures, and delineating by firm size and industry Covid-19 sensitivity).

An important challenge to related papers' ability to study spillover effects into banks' choice to lend is that shocks (natural disasters, epidemics) often affect credit supply and demand simultaneously. Our unique identification strategy and data give us several advantages to successfully tackle this challenge. By studying a context where the source of the shock (abroad) is separate from the location of lending (U.S. domestic), we are uniquely positioned to identify credit supply effects. In other words, we rely on the geographic separation of the foreign "shock" (a bank's Covid-19 exposure abroad) and its domestic (U.S.) lending – allowing us to argue that the economic fallout from Covid-19 in foreign countries are highly unlikely to affect the borrowing decisions of firms in the United States.

In addition, our combination of several rarely accessed and highly granular databases enables us to construct detailed bank foreign exposure measures, and to measure their lending effects precisely. First, our access to detailed data (from the FFIEC 009 reports) on individual banks' country-level claims allows us to construct specific bank-level exposures to foreign pandemic restrictions. Our bank level measures capture the average Government Response Index (from Hale et al., 2021) of the countries a bank lends to, weighted by each bank's bilateral claims

per country.[2] Second, to measure corporate bank lending, we use the detailed Y-14 regulatory data (the U.S. equivalent of a "credit registry") on individual banks' loans to corporate clients in the United States. The high granularity of this data enables us to (1) study spillover effects both on loan volumes (the intensive margin) and the number of loans (the extensive margin), (2) include detailed controls for firms' and banks' balance sheet and financial health as well as fixed effects (at the bank*firm*maturity and bank*firm*credit rating levels), and (3) control for Covid-19-related restrictions' effects on credit demand for the state of a U.S. firm's headquarters.

Our results on the spillover from banks' foreign Covid-19 exposure into their U.S. corporate lending are economically significant. A one percentage point increase in a bank's exposure in countries with a greater Covid-19-related economic fallout reduces that bank's lending flows and the growth in its number of loans to firms in the United States by 6-7 percentage points. This is roughly equivalent to a 7.9-billion-dollar decline in loans. Furthermore, the effect of a one percentage point increase in foreign Covid-19 exposure is more than twice as large for a worse-capitalized bank (at the 10^{th} percentile of capitalization) relative to a well-capitalized bank (at the 90^{th} percentile). Our result that spillovers affected term lending (rather than credit lines) suggests that banks chose to continue to serve the cash flow needs of existing customers, but not to extend loans for new customers' longer-term investments.

Our results have important policy implications. Our findings convey the message that global "shocks" can have substantial consequences for local (domestic) credit conditions, suggesting that regulators can benefit from accounting for risks pertaining to a bank's global

[2] Our results are robust to using new Covid-19 cases and new Covid-19-related deaths as measures of foreign exposure.

operations. A second, and related, point is that ring-fencing actions may be useful in insulating global banks' domestic operations from foreign shocks.

The paper proceeds as follows. Section 2 further discusses our hypotheses and the contributions of our paper in the context of the related literature. Section 3 presents the econometric methodology and Section 4 details the data. In Section 5 presents the empirical results and Section 6 summarizes and concludes the paper.

2 Hypothesis development and literature review

We hypothesize that *U.S. banks' exposure to foreign regions that have stricter government-mandated restrictions in place to mitigate the spread of Covid-19 spills over into their U.S.-based lending (Hypothesis #1)*. This hypothesis consists of three sub-parts: (1) the link between government-imposed restrictions in a foreign country and losses to banks that hold claims there; (2) the spread of the effect of balance sheet losses from one region to another; and (3) consequent lending effects in the United States. First, we assert that a U.S. bank's borrowers in foreign countries with stricter economic restrictions in place suffer bankruptcies at a higher rate, translating into higher loan and investment losses for the bank (Bartik et al, 2020; Hasan, Politsidis and Sharma, 2021). We confirm the validity of this assertion by running auxiliary regressions in which we directly examine the empirical relationship between the country-level government *Stringency Index* and country-level measures of total and corporate bankruptcies (from the OECD); indeed we find a strong positive connection between the two (Table A1).[3]

[3] Banks may also suffer losses on their foreign claims as a result of large movements in the value of investments, including the stock market, due to the pandemic (Zhang, Hu and Ji, 2020; Acharya, Engle and Steffen, 2021).

Second, regarding spillovers through banks' balance sheet, earlier papers have documented national and international spillover effects from asset losses in one region to other areas (Kleimeier, Sander and Heuchemer, 2013), including from sovereign downgrades (Schertler and Moch, 2021), nuclear tests (Khwaia and Mian, 2008) or regional floods (Choudhary and Jain, 2017). Importantly, recent evidence points to Covid-19's negative effect on global syndicated lending via corporate defaults across regions (Hasan, Politsidis and Sharma, 2021). Third, our conjecture on spillover-related loan losses is motivated by emerging evidence that U.S. banks substantially cut their U.S. corporate loan originations (Kapan and Minoiu, 2021) and tightened lending terms (Berger et al, 2021) following the onset of the Covid-19 pandemic. More broadly, our hypothesized effects of banks' Covid-19 exposure is consistent with the literature on natural disasters (Cortes and Strahan, 2017; Berg and Schrader, 2016; Hosono et al., 2016) and, more specifically, with the literature on pandemics (Gong et al., 2020; Houle et al., 2015; Leoni, 2011; Zhang et al., 2020; Lagoarde-Sego and Leoni, 2013).[4]

We also hypothesize that *worse-capitalized banks (with lower net worth) see stronger lending effects from foreign Covid-19 exposure (Hypothesis #2)*. Not only do worse-capitalized banks have a lower "balance sheet buffer" to withstand asset losses without further cutting other types of assets, but they are also perceived as "riskier" by external funding markets – translating into higher borrowing costs to replace lost funding sources (Bernanke and Gertler, 1995; Bernanke, Gertler, and Gilchrist, 1999; Halvorsen and Jacobsen, 2016; Temesvary, Ongena and Owen, 2018).

[4] Although not our focus, exposure to the economic fallout of Covid-19 in foreign countries may affect the liability side of banks' balance sheet as well. Specifically, such exposure may reduce or even fully eliminate a bank's valuable external funding sources (such as foreign deposit or interbank funding), consistent with the effects documented in Cetorelli and Goldberg (2011). As for spillovers through the liability side of banks' balance sheets, banks' reduced access to funding-for-lending (either due to a negative balance sheet shock (Correa, Sapriza and Zlate, 2012) or tighter policy (Kashyap and Stein, 2000)) translates into lower credit provision. This is especially so at banks from which investors demand a higher external finance premium in return for providing funding-for-lending, because they are deemed riskier (including banks that are worse-capitalized, as in Temesvary, Ongena and Owen (2018).

Indeed, in the context of the Covid-19 pandemic, Li, Strahan and Zhang (2020)'s findings suggest that worse-capitalized banks were less able to accommodate increased liquidity demands from the crisis. Furthermore, Acharya, Engle and Steffen (2021) show that the Covid-19-related decline in bank stock prices was particularly strong at worse-capitalized banks.

As a corollary, we hypothesize that the *lending effects are stronger for longer-maturity lending*, motivated by earlier results that the transmission of shocks affect different loan maturities differentially (Black and Rosen, 2008; Temesvary, Ongena and Owen, 2018; Morais et al., 2019). Furthermore, we conjecture that *the spillover effects of foreign Covid-19 exposure are stronger into banks' term lending* – motivated by findings that banks have honored their credit commitments by extending credit lines to borrowers in need during the onset of the pandemic (Kapan and Minoiu, 2021).

3 Econometric methodology

Our main explanatory variable is bank *i*'s foreign Covid-19 exposure in quarter *t*, denoted by $X_{i,t}$. We take the weighted average of country-specific exposure proxies $x_{n,t}$ across all country *n*'s that bank *i* lends to at time *t*.

1. $X_{i,t} = \sum_{n=1}^{N} \beta_{i,n,t}\, x_{n,t}$

To construct the country-specific weights $\beta_{i,n,t}$, we use the fraction of bank *i*'s claims in country *n* (excluding the United States) in quarter *t-1* in bank *i*'s total bilateral claims in quarter *t-1*.

2. $\beta_{i,n,t} = \frac{Claims_{i,n,t-1}}{\sum_{n=1}^{N} Claims_{i,n,t-1}}$

Our benchmark estimation of the quarterly change in the natural logarithm of total lending volume (or the number of loans) between a bank and a firm, denoted by $\Delta \ln(Y)_{i,j,t}$, is as follows:

$$3.\quad \Delta\, ln(Y)_{i,j,t,g} = \alpha_1 + \sum_{k=1}^{2}[\alpha_{2,k}\, X_{i,t-k} + \alpha_{3,k}\, C_{i,t-k} + C_{i,t-k} \times \Big[\alpha_{4,k}\, X_{i,t-k} + \\ + \alpha_{5,k} \left(\begin{matrix} Firm \\ Controls \end{matrix}\right)_{j,t} + \alpha_{6,k} \left(\begin{matrix} Bank \\ Controls \end{matrix}\right)_{i,t} \Big] + \alpha_{7,k} \left(\begin{matrix} Firm \\ Controls \end{matrix}\right)_{j,t} + \\ + \alpha_{8,k} \left(\begin{matrix} Bank \\ Controls \end{matrix}\right)_{i,t}] + \left(\begin{matrix} Fixed \\ Effects \end{matrix}\right)_{i,j,g} + \varepsilon_{i,j,t,g}$$

where *i, j,* and *t* index banks, firms, and quarters respectively. Furthermore, *g* indexes either loan maturity or credit rating category. *Firm Controls* and *Bank Controls* are firm and bank-specific balance sheet control variables, respectively. Furthermore, *Fixed Effects* contains bank, bank*firm, bank*firm*maturity or bank*firm*credit rating fixed effects, depending on the specification. We interact each explanatory variable with bank capital ratio *C,* and we include two lags of all the right-hand-side variables. As per our first hypothesis, we expect greater foreign Covid-19 exposure to translate into lower U.S.-based lending: $\sum_{k=1}^{2} \alpha_{2,k} < 0$. Our second hypothesis suggests that this lending effect is larger for worse-capitalized banks: $\sum_{k=1}^{2} \alpha_{4,k} > 0$.

4 Data

4.1 Dependent variables: Changes in U.S.-based lending

We collect all data on banks' U.S.-based loan originations from the Federal Reserve's (FR) Y-14 database. This highly detailed regulatory database (the closest to a "credit registry" available for the United States) provides quarterly data on all corporate loans made by the largest U.S. bank

holding companies.[5] In the Y-14, U.S. banks report loan originations with commitments over 1 million dollars with quarterly frequency, covering about three-fourths of all U.S. commercial and industrial lending. Our sample covers 33 of the largest banks in the U.S, for which we have data on loans to 138,975 unique firms. During our sample period, less than 10 percent of firms borrowed from more than one bank in each quarter.

For our dependent variables, we focus on the dollar volume and number of U.S.-based loan originations from the Y-14 over 2020. We are interested in how a bank's foreign Covid-19 exposure affects the way in which the *intensity of its lending relationships evolves* over time. Therefore, to capture the *intensity* of lending relationships, we aggregate loan-level data from the Y-14 at the bank-firm-loan-maturity or bank-firm-credit rating level. To capture the *evolution* of these relationships, we use as our dependent variables the quarterly changes in the dollar volume and the number of loans, for the given bank-firm-maturity or bank-firm-credit rating bucket. On average, corporate lending declined in 2020 at a quarterly rate of nearly 1.5 percent within bank-firm relationships, for a given loan maturity/credit rating category (Table 1). Over the same period, the number of loans issued each quarter remained little changed.

4.2 Explanatory variables: Measures of foreign Covid-19 exposure

[5] The respondent panel is comprised U.S. BHCs, U.S. IHCs of foreign banking organizations (FBOs), and covered SLHCs with $100 billion or more in total consolidated assets, as based on: (i) the average of the firm's total consolidated assets in the four most recent quarters as reported quarterly on the firm's Consolidated Financial Statements for Holding Companies (FR Y-9C); or (ii) if the firm has not filed an FR Y-9C for each of the most recent four quarters, then the average of the firm's total consolidated assets in the most recent consecutive quarters as reported quarterly on the firm's FR Y-9Cs. Participation is mandatory. For further details, please refer to the reporting form at https://www.federalreserve.gov/apps/reportforms/reportdetail.aspx?sOoYJ+5BzDZGWnsSjRJKDwRxOb5Kb1hL.

Our primary proxy for a bank's foreign Covid-19 exposure is the government response *Stringency Index* from the Oxford COVID-19 Government Response Tracker database (Hale et al., 2021).[6] This index incorporates several sub-indices: Measures related to *Containment and closure* (School closing; Workplace closing; Cancellation of public events; Restrictions on gathering size; Closing of public transport; Stay-at-home requirements; Restrictions on internal movement; Restrictions on international travel) and *Health systems* (Public information campaign). As such, higher values of this measure indicate a stricter government response to the spread of Covid-19, corresponding to more restrictive economic actions. Therefore, this index, which shows increasing government intervention over time (Figure A1), captures interference that can translate into losses for the bank (in the form of defaults, forbearance, etc.). For instance, this measure captures the losses a bank might face if a corporate borrower abroad defaults on a loan because of a mandated lockdown. Indeed, in auxiliary regressions, we show that across our sample of foreign countries, higher values of the *Stringency Index* indeed translate into higher total and corporate bankruptcies (Table A1).

In addition to government response *Stringency*, we use further measures of foreign Covid-19 exposure in alternative specifications. First, we examine the number of *new Covid-19 cases* for the countries a bank holds claims in, as a measure of the bank's exposure to Covid-19's economic effects. Second, we look at the number of *new Covid-19-related deaths* as an exposure measure. All these measures approximate the economic effect the bank suffers from *foreign* Covid-19 exposure. Importantly, therefore, these measures are *independent* of the steps that the U.S. government has taken in response to the U.S. Covid-19 epidemic (which we include additional

[6] The historical series of the data, including the Stringency Index and its subcomponents, are available at: https://github.com/OxCGRT/covid-policy-tracker/raw/master/data/timeseries/OxCGRT_timeseries_all.xlsx

controls for). This separation of *foreign* exposure and *domestic* lending effects is a notable identification advantage of our estimation setup.

We utilize a rarely accessed regulatory database to measure the extent of individual banks' foreign activities. These data are derived from quarterly bank-level information on U.S. banks' cross-border and foreign affiliate claims from the Federal Financial Institutions Examination Council (FFIEC)'s 009 Data Report form.[7] This dataset includes claims which, in addition to loans, include bonds, stocks, and guarantees – enabling us to capture a bank's exposure via a wide set of foreign investments. Banks report on this supervisory form if they have 30 million USD or more in claims on residents of foreign countries.[8] To construct the bank and foreign country-specific weights $\beta_{i,j,t}$ in Equation (1), we use cross-border claims measured on both an ultimate risk basis and on an immediate counterparty risk basis.[9]

The banks in our sample have substantial holdings abroad: In the fourth quarter of 2019, right before the onset of the Covid-19 crisis, foreign claims made up 30 percent of the average bank's assets. In addition to the scale, the scope of U.S. banks' foreign exposure is also notable: the banks in our sample are well-diversified across foreign countries. Any one country sees an average of only 0.9 percent of a U.S. bank's cross-border portfolio and the average U.S. bank in our sample holds cross-border claims in as many as 93 countries, and only about one-fourth of our

[7] For more information on this regulatory reporting form, see https://www.ffiec.gov/forms009_009a.htm.
[8] Cross-border claims and foreign affiliate claims are reported separately for each foreign country-bank-time (i.e., year-quarter) combination. In additional specifications, for each bilateral bank-foreign country pair, we use cross-border claims data delineated by target sector of investment (financial sector and non-financial private sector).
[9] Lending calculated on an immediate counterparty basis captures the actual amount of claims the bank invests in a foreign country, while lending calculated on an ultimate risk basis is adjusted for transfer of risk exposure. This implies that the ultimate risk amount may differ from the actual (immediate counterparty) amount extended to the host country. The ultimate risk amounts reflect the claims for the repayment of which the given host country is responsible. For instance, if Country A issues guarantees for the loans that the U.S. banks made to Country B, then Country A's ultimate risk exposure would exceed the immediate counterparty claims in that country. Similarly, Country B's reported ultimate risk claims would be less than the immediate counterparty claims the bank acquired there.

observations come from banks that hold claims in 33 or fewer foreign countries.[10] As a result of this wide breadth of foreign holdings across countries, the weighted average foreign Covid-19 exposure that we construct by combining the FFIEC 009 data (for weights) with the *Government Stringency Index* (as shown in Equation (1)) varies substantially in the cross-section: with a mean of 57 and standard deviation of near 20, the index ranges from 23 (at the 10th percentile) to 69 (at the 90th percentile; Table 1).

We hypothesize that the U.S. corporate lending effect of a bank's foreign Covid-19 exposure is stronger for worse-capitalized banks. In our main specifications, we use banks' Tier1 capital ratio, which measures the scale of core capital relative to its risk-weighted assets. This key measure of regulatory capital remained high near 13 percent at banks in our sample, indicating that the largest U.S. banks were well capitalized on average even during the crisis.[11]

4.3 Bank and firm-specific control variables

In addition to the detailed fixed effects, we include in our specifications a set of variables that measure balance sheet and financial health at both the bank and firm levels. *Total Assets* capture the scale of operations.[12] Furthermore, *Return on Assets* is a direct and well-established measure

[10] While a breakdown by asset type is not available on a bilateral basis, we can use Call Reports data aggregated across all U.S. global banks to examine the composition of claims over time. In 2015, total loans and leases made up 33 percent of global U.S. banks' claims. Deposits with foreign banks made up 18 percent, and the share of repurchase agreements is 13 percent. The rest of foreign claims is made up of net due from foreign offices, Treasury and asset-backed securities and guarantees.

[11] In alternative specifications, we use the common equity Tier1 (CET1) capital ratio, which, at 12.4 percent of risk-weighted assets, also remained high at our sample of U.S. banks. Compared to the Tier1 capital ratio, the CET1 capital ratio excludes preferred shares and non-controlling interests from Tier1 capital.

[12] For borrowing firms, Total assets (a proxy of firm size) is also a proxy for international exposure, i.e. the extent to which they are exposed the effects of the economic fallout from foreign governments' pandemic-related restrictions. Hence, in some specifications, we delineate firms by size, examining those below and above the sample median asset size separately.

of profitability, and is hence a potentially important driver of a bank's ability to supply credit, and a firm's need for financing. Lastly, bank *Leverage Ratio* is a measure of a bank's capital relative to its total assets, and hence proxies the bank's ability to withstand economic shocks. At the firm level, this variable captures the extent of a bank's liabilities relative to its assets, and hence is a direct measure of corporate vulnerability to shocks. The average firm's liabilities in our sample amount to 61 percent of its assets. We collect bank-level control variables from a bank merger-adjusted version of the quarterly Y9-C data and firm-level control variables come from the Y-14 dataset. Table 1 contains detailed variable definitions and summary statistics.

In addition, in select specifications, we include the Covid-19 *Stringency Index* pertaining to the state in which the borrowing firm's headquarters is located (also collected from the Oxford COVID-19 Government Response Tracker database), to control for Covid-19-related restrictions' effects on firms' credit demand. Furthermore, we add a bank's share of foreign assets (as a proportion of total assets) in some specifications, to control for the possibility that banks with larger foreign operations are systematically more affected by foreign government restrictions.

5 Results

5.1 Benchmark specifications

In all our estimations, the dependent variables are the quarterly percent changes in the volume of new lending (the intensive margin) and the number of newly originated loans (the extensive margin), at the bank-firm level within a given maturity/credit rating bucket. Our primary explanatory variable is banks' foreign Covid-19 exposure, proxied by the banks' portfolio-

weighted exposure to the economic fallout from government restrictions related to Covid-19 in the foreign countries it lends to. As discussed in Section 2, we expect foreign Covid-19 exposure to reduce U.S.-based lending, and especially so for worse-capitalized banks.

In our benchmark specifications shown in Table 2, we measure foreign Covid-19 exposure as the cross-border exposure-weighted average of foreign government response *Stringency.* We examine changes in banks' U.S.-based lending flows (Columns 1-5, the intensive margin) and changes in the number of loans (Columns 6-10, the extensive margin) separately, on lending data that is pooled by *loan maturity*. Panel A shows the foreign Covid-19 exposure proxy weighted by a bank's bilateral cross-border lending to each country on an *ultimate risk* basis, and Panel B shows results using as weights a bank's bilateral cross-border claims calculated on an *immediate counterparty* basis.

Table 2 shows consistent evidence that foreign Covid-19 exposure has a negative effect on U.S.-based lending (first row), and especially so for worse-capitalized banks (second row) on the intensive margin (Columns 1-5), and, consistent with Kapan and Minoiu (2021), on the extensive margin as well (Columns 6-10). The significant negative lending effect prevails as we add increasingly stringent sets of fixed effects, including at the bank level (Columns 1 and 6), bank-firm level (Columns 2 and 7), and bank-firm-maturity level (Columns 3 and 8).[13] The lending effects are economically significant: Evaluated at the sample-average capital ratio, a one percentage point increase in foreign Covid-19 exposure (as measured via government response *Stringency*) reduces lending flows and the growth in the number of loans by 6-7 percentage points—roughly equivalent to a 7.9 billion dollar decline in loans.

[13] Robustness to the inclusion of maturity fixed effects ensures that our results are not driven by the confounding effects of a bank's potential reallocation of credit from longer-term to shorter-term lending.

Figure 1 plots the marginal effects on the intensive margin (left panel, for Column 3) and the extensive margin (right panel, for Column 8), to illustrate how worse capitalization amplifies the negative lending effects of foreign Covid-19 exposure. The effect of a one percentage point increase in foreign Covid-19 exposure is more than twice as large for a bank at the 10th percentile of capitalization relative to a well-capitalized bank at the 90th percentile.

We also delineate the sample into shorter-term (with maturity below one year) and longer-term (with maturity over one year) loans, as shown in Columns 4-5 and 9-10. The negative effect of foreign Covid-19 exposure operates through longer-term lending (with maturities over one year), which makes up the vast majority of our sample of loans (Columns 5 and 10). Foreign Covid-19 exposure has no significant effect on shorter-term loans (with maturities below one year, Columns 4 and 9) – consistent with the empirical regularity that such shorter-term loans are generally more volatile and driven by other, idiosyncratic factors.[14] Taken together, we do not find evidence that banks are reallocating funds from longer-term to shorter-term lending in response to their Covid-19 exposure abroad. Our results in Table 2 are robust to using the common equity Tier1 capital ratio as a measure of funding resilience (Table A2).

A possible concern related to our results is that banks might cut loans to borrowers if firms' borrowing ability deteriorates due to the U.S.-based effects of the pandemic. In fact, there is evidence of a wave of credit downgrades among corporates in the second quarter of 2020 (i.e. the "fallen angels" phenomenon). Alternatively, banks might reallocate credit to higher-rated borrowers. To address these confounding effects, in Table 3, we present results derived from lending data that is pooled across 11 distinct credit rating categories. Categorizing by credit rating

[14] Loans with less than one year in maturity make up only around 3.3 percent of our sample.

allows us to include fixed effects to explicitly control for credit quality on the demand side, and for (changes in) lender risk preference on the credit supply side.

In Table 3, we continue to find strong evidence that foreign Covid-19 exposure reduces U.S.-based lending (both at the intensive and extensive margins), and significantly more so for worse-capitalized banks – even when we hold the effect of credit quality constant by including bank*firm*credit rating fixed effects. The economic significance of the credit rating-delineated results is comparable to those seen in Table 2. At the average capital ratio, a one percentage point increase in foreign Covid-19 exposure reduces lending flows and the growth in the number of loans by 5-8 percentage points—roughly equal to a 7.9-billion-dollar decline in lending. The effect at the 10^{th} percentile of the Tier1 capital ratio is 2 to 4 times larger than the impact at the 90^{th} percentile. Our results are significant for both speculative-grade loans (BB or below, Columns 4 and 9) and investment-grade loans (above BB, Columns 5 and 10), and hold on the intensive margin (Columns 1-5) and the extensive margin (Columns 6-10) as well. These results are also robust to using the common equity Tier1 capital ratio to measure of funding resilience (Table A3).

Motivated by recent evidence that banks accommodated U.S. firms' unprecedented drawdowns of credit lines shortly after the onset of the Covid-19 pandemic (Kapan and Minoiu, 2021), in additional specifications, we examine whether the spillover effects of foreign Covid-19 exposure that we document differ for U.S. corporate *term loans* or *credit lines* (Table A4). We find conclusive evidence that our results are driven by term lending (Columns 1-5), and we find no spillover effects into credit lines (Columns 6-10). In other words, banks continued to provide the cash flow needs of existing customers but did not extend loans to new customers.

5.2 Alternative Covid-19 Measures

Our main hypothesis builds on the premise that the economic damage resulting from lockdowns is the primary spillover mechanism through which foreign Covid-19 exposure influences U.S.-based lending – which we capture via government *Stringency*. However, previous literature on pandemics suggests that exposure to the severity of the pandemic itself can result in spillover effects (Gong et al., 2020; Houle et al., 2015). Thus, we repeat our benchmark estimations using two alternative measures of Covid-19 exposure: *new Covid-19 cases* and *new Covid-19-related deaths* per capita in the foreign countries that a bank is exposed to. We show results corresponding to these alternative measures in Table 4, Columns 1-4 and Columns 5-8, respectively.

Table 4 shows the most complete specifications from Tables 2 and 3 (including year-quarter *and* bank*firm*maturity or bank*firm*credit rating fixed effects), for lending flows (Columns 1-2 and 5-6) and for the number of loans (Columns 3-4 and 7-8). We continue to find consistent evidence that high foreign Covid-19 exposure has a negative spillover effect into U.S.-based lending flows and the number of loans, and especially so for worse-capitalized banks. At the average capital ratio, a one percentage point increase in foreign Covid-19 exposure reduces growth in the volume and number of loans by about 2 to 4 percentage points when we use cases (roughly equal to a 3.7 billion dollar decline), and by about 4-5 percentage points when we use deaths (roughly equal to a 5.5 billion dollar decrease) to measure Covid-19 exposure. The impact at the 10^{th} percentile of the Tier1 capital ratio is 1 to 3 times larger than at the 90^{th} percentile.

5.3 Accounting for Covid-19's Effects on Borrowing Firms

The Covid-19 pandemic hit economies around the world nearly simultaneously – and, in addition to foreign governments responding to the pandemic with strict restrictions, many U.S. states also did so. There are two related concerns for our identification strategy: (1) that Covid-19-related economic restrictions imposed in the United States might reduce U.S. firms' demand for bank credit, and (2) that large, internationally active U.S. firms are directly affected by foreign Covid-19 restrictions.[15]

Specifically, the first concern is that restrictions by U.S. states also inflicted losses on U.S. firms operating within their jurisdictions, limiting those firms' credit demand and their ability to borrow from the large U.S. banks that we study. We address this concern in two ways. First, in Table 5 we run specifications in which we explicitly include government stringency indices calculated for the U.S. state of the borrowing firm's headquarters. Even after controlling for state-level economic restrictions in the United States, we continue to find strong and consistent evidence that more foreign Covid-19 exposed banks cut their lending more, and this is especially so for worse-capitalized banks. The results hold on the intensive (Columns 1-5) and the extensive (Columns 6-10) margins, and both when we control for maturities and for credit ratings. The variable capturing state-level economic restrictions (*Firm Stringency)* and its interaction with the capital ratio, come in insignificantly throughout (lines 3 and 4).

A second way we examine the potential confounding effect of firms' exposure to the pandemic in the United States is by separating firms in industries more affected by Covid-19 (such as hotel, retail, etc.) from those in less affected industries. In Table 6, we repeat the most complete specifications from Tables 2 and 3 (including bank*firm*maturity or bank*firm*credit rating fixed

[15] In the U.S. context, Bloom, Fletcher and Yeh (2021) provide survey evidence of the negative economic impact of Covid-19 on firms.

effects), for firms in Covid-19 sensitive industries (Columns 1, 3, 5 and 7) and insensitive industries (Columns 2, 4, 6 and 8), as defined by Kaplan, Moll and Violante (2020). We do so both on the intensive margin (Columns 1-4) and on the extensive margin (Columns 5-8). We find consistent and significant evidence that the spillover results are strong in lending to Covid-19-insensitive industries as well, alleviating concerns that our results on the decline in lending might be driven by a pandemic-induced reduction in credit demand.

The second concern relating to firms' exposure to the pandemic is that large, internationally active firms might be directly exposed to the same foreign government restrictions-related economic fallout, the effect of which we study on banks. To address this concern, in Table A5 we examine borrowers by firm size (Chodorow-Reich et al, 2020). We separate our sample into small firms (i.e. those below the median sample asset size) and large firms (above the median size). The results are consistently significant and strong across firm sizes – alleviating concerns that the effect on borrowing firms of our foreign "shock" might drive our results.

5.4 Accounting for the Scale of Banks' Foreign Operations

Lastly, we also consider the possibility that it was really the scale of a bank's international activities (and the various risks such global exposure brings), rather than its foreign exposure to Covid-19-related restrictions per se, that made a bank more vulnerable to balance sheet shocks during the pandemic – resulting in lower U.S. credit supply. This would the case, for instance, if the most globally active banks were somehow systematically more affected by the pandemic.

In Table 7, we include the share of foreign assets in a bank's total assets as an additional right-hand-side variable, effectively horseracing it with foreign Covid-19 exposure. We continue

to find strong and consistent evidence that higher foreign Covid-19 exposure translates into lower U.S. lending, both on the intensive (Columns 1-4) and extensive (Columns 5-8) margins – even when we include bank*firm*maturity (Columns 3 and 7) and bank*firm*credit rating (Columns 4 and 8) fixed effects.

5.5 Robustness Checks

In addition to the alternative specifications discussed earlier in this section, we conduct several robustness checks.

5.5.1 Using the Common Equity Tier1 Capital Ratio to Proxy Funding Resilience

In Table A2, we repeat the Table 2 specifications using the common equity Tier1 (CET1) capital ratio as a proxy of funding resilience. The results with this alternative capitalization measure are qualitatively highly consistent with the Table 2 findings. A one percentage point increase in foreign Covid-19 exposure (as measured via government response *Stringency*) reduces lending flows and growth in the number of loans by 2-3 percentage points (equal to a 3 billion-dollar decline in loans). The impact at the 10^{th} percentile of CET1 ratio is 2 to 5 times larger than the impact at the 90^{th} percentile of capitalization.

Similarly, Table A3 repeats the Table 3 specifications, using the CET1 capital ratio as a proxy of funding resilience. The results with this alternative capitalization measure are qualitatively highly consistent with the Table 3 findings.

5.5.2 Exposure to OECD vs non-OECD countries

Are the spillover effects of foreign Covid-19 exposure stronger from developed countries, or economically less developed regions? To answer this question on the role of the *source region* of exposure, we calculate two foreign exposure measures for each bank: one that captures its (foreign claims weighted-average) exposure to Covid-19 in OECD countries, and another one that captures its exposure in non-OECD countries. Table A6 shows the results for the most complete specifications from Tables 2 and 3 for OECD Covid-19 exposure (odd columns) and for non-OECD Covid-19 exposure (even columns).

We present convincing evidence that the spillover effects we document in our benchmark results reflect banks' Covid-19 exposure in *OECD* countries. A one percentage point increase in a bank's Covid-19 exposure via its claims in OECD countries decreases its lending and growth in the number of its loans in the United States by 2 to 5 percentage points. However, we find no evidence of spillover effects from a bank's Covid-19 exposure in *non-OECD* countries.

5.5.3 Exposure to foreign financial vs non-financial sectors

We explore how the spillover effects of a bank's foreign Covid-19 exposure into its U.S.-based lending depend on the *sector* of exposure in foreign countries. Afforded by the rich FFIEC 009 data, we do so by calculating two foreign exposure measures for each bank: one that captures its exposure to Covid-19 using weights based on the bank's bilateral cross-border claims on the *financial sector* in foreign countries, and another one that captures its exposure to Covid-19 based on claims on foreign *non-financial sectors*. Table A7 shows the results for the most complete

specifications from Tables 2 and 3 for financial sector-based Covid-19 exposure (odd columns), and for non-financial sector-based Covid-19 exposure (even columns).

We find that the spillover effects we document earlier reflect banks' Covid-19 exposure through both foreign financial and non-financial sectors: The spillover results displayed in Table A7 are consistently significant across the delineation of loans (by maturity or by credit rating) and the intensive and extensive margins. As an example of the economic magnitude of the results, a one percentage point increase in a bank's Covid-19 exposure via foreign financial sectors decreases the number of loans that the bank issues to U.S. corporate borrowers by 0.2 to 0.3 percentage points.

5.5.4 Loan interest rates and spreads and foreign Covid-19 exposure

In our main specifications, we focused on lending flows and the number of loans as measures of banks' credit supply in the United States. There is increasing evidence that pricing terms were also affected by banks' exposure to Covid-19 (Berger et al, 2021; Kapan and Minoiu, 2021) In alternative estimations, afforded by the rich Y-14 dataset, we also explore the relationship between banks' foreign Covid-19 exposure and the *levels and spreads of interest rates* that banks charge on their newly issued loans in the United States (Table A8, Columns 1-4 and Columns 5-8, respectively). If banks with foreign Covid-19 exposure tightened loan pricing terms, we should see positive coefficients on *Stringency,* and negative coefficients on the interaction terms would reflect stronger effect for worse-capitalized banks.

We do not find a consistent relationship between a bank's foreign Covid-19 exposure and the interest rate it charges on its new loans. However, in our more stringent specifications, we do

find evidence that a bank's greater foreign Covid-19 exposure translates into higher loan spreads, and this effect is larger for worse-capitalized banks (Table A8, Columns 7-8).

6 Conclusion

In this paper, we study how global U.S. banks' exposure to the economic fallout from Covid-19 around the world has affected their credit provision to borrowers in the United States. We do so by combining the most detailed regulatory ("credit registry") data that is available on global U.S. banks' U.S.-based lending with a rarely accessed dataset on U.S. banks' cross-border exposure to borrowers in foreign countries. We compare the change in the U.S. lending of banks that are more vs. less exposed to the pandemic abroad, during and after the onset of Covid-19. We find strong evidence that U.S. banks with higher exposures in foreign regions with stricter Covid-19-related restrictions cut their U.S. lending substantially more. This effect is particularly strong for worse-capitalized banks, and in longer-maturity and term lending. The results are robust to a wide of array of controls for borrowing firms' simultaneous Covid-19 exposure.

Our results have important policy implications. Our findings convey the message that global shocks have substantial consequences for "local" (domestic) credit conditions, suggesting that regulators can benefit from accounting for risks pertaining to a bank's global operations. A second, and related, point is that ring-fencing actions may be useful in insulating global banks' domestic operations from foreign shocks.

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Table 1. Variable Definitions and Summary Statistics.

VARIABLES	Definition	Source	N	mean	SD	p10	p25	p50	p75	p90
Dependent variables:										
Quarterly Change in the Log of Lending	Quarterly change in the natural log of total C&I lending over 1 million between a bank and firm in a quarter.	FR Y-14	428,255	-0.014	0.227	-0.0596	-0.0127	0	0	0.00336
Quarterly Change in the Log of the Number of Loans	Quarterly change in the natural log of total number of C&I loans over 1 million between a firm and bank in a quarter.	FR Y-14	428,255	-0.00324	0.139	0	0	0	0	0
Ln[Lending]	Natural log of total C&I lending over 1 million between a bank and firm in some quarter.	FR Y-14	604,647	15.78	1.543	14	14.47	15.42	16.96	18.1
Ln[Number of Loans]	Natural log of total number of C&I loans over 1 million between a firm and bank in a quarter.	FR Y-14	604,647	0.24	0.478	0	0	0	0.693	0.693
Foreign Covid-19 exposure measures:										
Government Stringency [UR Weighted]	An index of government response stringency from Hale et al. [2020], weighted by ultimate risk exposure.	Hale et al. (2021) and FFIEC 009	132	56.75	19.38	22.64	43.08	66.44	68.51	71.99
Government Stringency [IC Weighted]	An index of government response stringency from Hale et al. [2020], weighted by immediate counterparty exposure.	Hale et al. (2021) and FFIEC 009	132	57.02	19.48	22.67	43.66	66.53	68.62	72.04
Covid-19 Cases [UR Weighted]	New cases per 1000 individuals in each quarter, averaged across all countries a bank lends to, weighted by ultimate risk exposure.	Hale et al. (2021) and FFIEC 009	132	14	13.74	0.578	3.045	8.149	21.13	38.37
Covid-19 Cases [IC Weighted]	New cases per 1000 individuals in each quarter, averaged across all countries a bank lends to, weighted by immediate counterparty exposure.	Hale et al. (2021) and FFIEC 009	132	14.04	13.7	0.575	2.954	8.15	21.14	38
Covid-19 Deaths [UR Weighted]	New deaths per 1000 individuals in each quarter, averaged across all countries a bank lends to, weighted by ultimate risk exposure.	Hale et al. (2021) and FFIEC 009	132	0.25	0.156	0.0163	0.0868	0.258	0.371	0.434
Covid-19 Deaths [IC Weighted]	New deaths per 1000 individuals in each quarter, averaged across all countries a bank lends to, weighted by immediate counterparty exposure.	Hale et al. (2021) and FFIEC 009	132	0.251	0.156	0.0163	0.0856	0.26	0.374	0.432

Table 1 continued. Variable Definitions and Summary Statistics.

VARIABLES	Definition	Source	N	mean	SD	p10	p25	p50	p75	p90
Capitalization measures:										
Tier 1 Capital Ratio	Total Tier1 capital of a bank divided by total risk weighted assets.	FR Y9-C	819	12.83	4.718	10.13	11.01	12.37	13.95	16.66
CET1 Capital Ratio	Total common equity Tier1 capital of a bank divided by total risk weighted assets.	FR Y9-C	786	12.37	3.127	9.608	10.46	11.76	13.18	15.93
Control variables:										
Bank Leverage Ratio	Total Tier1 capital of a bank divided by consolidated assets.	FR Y9-C	819	9.596	1.818	7.799	8.493	9.312	10.28	11.64
Bank ROA	Net income divided by total consolidated assets.	FR Y9-C	819	0.198	0.446	0.0405	0.149	0.236	0.317	0.406
Ln[Bank Size]	Natural log of bank total assets.	FR Y9-C	819	16.74	1.447	15.35	15.66	16.39	17.34	18.94
Firm Leverage Ratio	Total liabilities of a firm divided by total assets.	FR Y-14	460,318	0.61	0.26	0.232	0.426	0.636	0.811	0.969
Firm ROA	Operating income of a firm divided by total assets.	FR Y-14	454,583	0.145	0.318	-0.0334	0.022	0.073	0.161	0.337
Ln[Firm Size]	Natural log of total assets.	FR Y-14	460,552	16.97	2.387	14.51	15.52	16.63	18.12	20.18

Table 2. Quarterly Change in Domestic Bank Lending across Firms and Credit Maturities for banks with different Tier1 Capital Ratios.

	Quarterly Change in the Log of Lending					Quarterly Change in the Log of the Number of Loans				
Included Maturities	All	All	All	≤ 1 year	> 1 year	All	All	All	≤ 1 year	> 1 year
VARIABLES	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Panel A: Ultimate Risk Weighted										
∑ Stringency {t-2 to t-1}	-0.191***	-0.193***	-0.184***	0.156	-0.200***	-0.229***	-0.237***	-0.235***	0.259	-0.247***
	[0.0296]	[0.0438]	[0.0439]	[0.506]	[0.0444]	[0.0236]	[0.0358]	[0.0360]	[0.402]	[0.0364]
∑ Stringency * Capital	0.0104***	0.0102***	0.00961***	-0.0159	0.0106***	0.0127***	0.0132***	0.0130***	-0.0133	0.0137***
{t-2 to t-1}	[0.00160]	[0.00239]	[0.00240]	[0.0252]	[0.00242]	[0.00127]	[0.00194]	[0.00194]	[0.0198]	[0.00197]
∑ Capital {t-2 to t-1}	-1.030***	-0.986***	-1.030***	2.742	-1.127***	-1.357***	-1.430***	-1.474***	3.133	-1.577***
	[0.217]	[0.328]	[0.330]	[4.070]	[0.329]	[0.174]	[0.268]	[0.270]	[3.337]	[0.267]
Observations	144,261	144,261	144,261	5,390	138,871	144,261	144,261	144,261	5,390	138,871
R-squared	0.002	0.483	0.528	0.641	0.516	0.003	0.443	0.473	0.562	0.468
Panel B: Immediate Counterparty Weighted										
∑ Stringency {t-2 to t-1}	-0.185***	-0.184***	-0.177***	0.209	-0.190***	-0.230***	-0.238***	-0.236***	0.194	-0.246***
	[0.0277]	[0.0410]	[0.0412]	[0.426]	[0.0417]	[0.0219]	[0.0332]	[0.0334]	[0.319]	[0.0337]
∑ Stringency * Capital	0.0103***	0.00996***	0.00947***	-0.0188	0.0103***	0.0129***	0.0134***	0.0133***	-0.0106	0.0139***
{t-2 to t-1}	[0.00154]	[0.00230]	[0.00232]	[0.0231]	[0.00235]	[0.00122]	[0.00185]	[0.00187]	[0.0167]	[0.00188]
∑ Capital {t-2 to t-1}	-0.945***	-0.894***	-0.956***	2.816	-1.037***	-1.300***	-1.367***	-1.417***	2.617	-1.514***
	[0.209]	[0.318]	[0.319]	[3.473]	[0.319]	[0.165]	[0.256]	[0.258]	[2.702]	[0.255]
Observations	144,261	144,261	144,261	5,390	138,871	144,261	144,261	144,261	5,390	138,871
R-squared	0.002	0.483	0.528	0.641	0.516	0.003	0.443	0.473	0.562	0.468
Year-Quarter FE	X	X	X	X	X	X	X	X	X	X
Bank FE	X					X				
Bank-Firm FE		X		X	X		X		X	X
Bank-Firm-Maturity FE			X					X		

Notes: In Columns 1-5, the dependent variable is quarterly change in the natural logarithm of U.S. banks' domestic lending across firms and loan maturities [i.e. loan with a maturity less than one year and loan with a maturity more than one year]. In Columns 6-10, the dependent variable is the quarterly change in the natural logarithm of the number of U.S. banks' domestic loans across firms and loan maturities. All specifications include the following controls at the bank and firm level for quarters t-2 and t-1: *Ln[Total Assets], Return on Asset,* and *Leverage Ratio* . Robust Standard errors (clustered at the bank-firm level) are in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Table 3. Quarterly Change in Domestic Bank Lending across Firms and Credit Ratings for banks with different Tier1 Capital Ratios.

	Quarterly Change in the Log of Lending					Quarterly Change in the Log of the Number of Loans				
Included Maturities	All	All	All	≤ BB	> BB	All	All	All	≤ BB	> BB
VARIABLES	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Panel A: Ultimate Risk Weighted										
∑ Stringency {t-2 to t-1}	-0.184***	-0.181***	-0.169***	-0.165**	-0.226***	-0.205***	-0.201***	-0.196***	-0.225***	-0.171**
	[0.0304]	[0.0494]	[0.0492]	[0.0712]	[0.0821]	[0.0235]	[0.0396]	[0.0396]	[0.0554]	[0.0688]
∑ Stringency * Capital	0.0102***	0.00970***	0.00897***	0.00959**	0.0114***	0.0117***	0.0115***	0.0112***	0.0129***	0.0100***
{t-2 to t-1}	[0.00166]	[0.00275]	[0.00273]	[0.00394]	[0.00437]	[0.00128]	[0.00217]	[0.00216]	[0.00303]	[0.00366]
∑ Capital {t-2 to t-1}	-1.048***	-1.071***	-0.898**	-0.956*	-1.242**	-1.186***	-1.205***	-1.122***	-1.244***	-1.094**
	[0.217]	[0.372]	[0.365]	[0.510]	[0.572]	[0.171]	[0.297]	[0.294]	[0.399]	[0.487]
Observations	143,596	143,596	143,596	103,033	40,563	143,596	143,596	143,596	103,033	40,563
R-squared	0.002	0.531	0.557	0.545	0.534	0.003	0.489	0.513	0.502	0.502
Panel B: Immediate Counterparty Weighted										
∑ Stringency {t-2 to t-1}	-0.174***	-0.167***	-0.157***	-0.156**	-0.206***	-0.205***	-0.203***	-0.197***	-0.230***	-0.170***
	[0.0288]	[0.0467]	[0.0464]	[0.0679]	[0.0758]	[0.0223]	[0.0373]	[0.0372]	[0.0523]	[0.0633]
∑ Stringency * Capital	0.00993***	0.00922***	0.00854***	0.00933**	0.0106***	0.0118***	0.0117***	0.0114***	0.0133***	0.0100***
{t-2 to t-1}	[0.00161]	[0.00265]	[0.00262]	[0.00383]	[0.00410]	[0.00125]	[0.00211]	[0.00209]	[0.00294]	[0.00344]
∑ Capital {t-2 to t-1}	-0.955***	-0.962***	-0.794**	-0.872*	-1.064**	-1.132***	-1.150***	-1.068***	-1.240***	-1.001**
	[0.210]	[0.361]	[0.354]	[0.500]	[0.536]	[0.165]	[0.285]	[0.283]	[0.386]	[0.459]
Observations	143,596	143,596	143,596	103,033	40,563	143,596	143,596	143,596	103,033	40,563
R-squared	0.002	0.531	0.557	0.545	0.534	0.003	0.49	0.513	0.503	0.502
Year-Quarter FE	X	X	X	X	X	X	X	X	X	X
Bank FE	X					X				
Bank-Firm FE		X		X	X		X		X	X
Bank-Firm-Credit Rating FE			X					X		

Notes: In Columns 1-5, the dependent variable is quarterly change in the natural logarithm of U.S. banks' domestic lending across firms and credit ratings [i.e. AAA, AA, A, BBB, BB, B, CCC, CC, C, D, Not Rated]. In Columns 6-10, the dependent variable is the quarterly change in the natural logarithm of the number of U.S. banks' domestic loans across firms and credit ratings. All specifications include the following controls at the bank and firm level for quarters t-2 and t-1: Ln[Total Assets], Return on Asset, and Leverage Ratio. Robust Standard errors (clustered at the bank-firm level) are in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Table 4. Quarterly Change in Domestic Bank Lending across Firms, Credit Maturities and Credit Ratings, for banks with different Tier1 Capital Ratios - using Cases and Deaths as Foreign Covid-19 Exposure Measure.

Foreign Covid-19 exposure measure:	*Cases*				*Deaths*			
Measure of U.S.-based lending:	Quarterly Change in Log of Lending Volume		Quarterly Change in Log of Number of Loans		Quarterly Change in Log of Lending Volume		Quarterly Change in Log of Number of Loans	
VARIABLES	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Panel A: Ultimate Risk Weighted								
∑ Exposure {t-2 to t-1}	-0.0356*	-0.0408*	-0.0429***	-0.0395***	-14.36***	-12.17**	-19.67***	-16.15***
	[0.0188]	[0.0211]	[0.0129]	[0.0143]	[4.279]	[4.786]	[3.291]	[3.620]
∑ Exposure * Capital	0.00189***	0.00174**	0.00165***	0.00143**	0.892***	0.761***	1.242***	1.033***
{t-2 to t-1}	[0.000720]	[0.000810]	[0.000527]	[0.000583]	[0.258]	[0.289]	[0.201]	[0.222]
∑ Capital {t-2 to t-1}	-0.721**	-0.511*	-0.992***	-0.568**	-0.203	-0.0957	-0.358**	-0.155
	[0.286]	[0.307]	[0.224]	[0.232]	[0.230]	[0.260]	[0.170]	[0.190]
Observations	144,261	143,596	144,261	143,596	144,261	143,596	144,261	143,596
R-squared	0.528	0.557	0.472	0.513	0.527	0.557	0.472	0.513
Panel B: Immediate Counterparty Weighted								
∑ Exposure {t-2 to t-1}	-0.0238	-0.0335	-0.0287**	-0.0312**	-8.248***	-8.131**	-11.27***	-10.37***
	[0.0185]	[0.0210]	[0.0125]	[0.0143]	[3.075]	[3.695]	[2.479]	[2.832]
∑ Exposure * Capital	0.00200***	0.00196**	0.00193***	0.00176***	0.535***	0.529**	0.755***	0.700***
{t-2 to t-1}	[0.000762]	[0.000875]	[0.000560]	[0.000631]	[0.191]	[0.230]	[0.155]	[0.178]
∑ Capital {t-2 to t-1}	-0.779**	-0.636*	-1.128***	-0.764***	-0.387	-0.335	-0.688***	-0.519**
	[0.324]	[0.363]	[0.255]	[0.278]	[0.275]	[0.315]	[0.216]	[0.243]
Observations	144,261	143,596	144,261	143,596	144,261	143,596	144,261	143,596
R-squared	0.527	0.557	0.472	0.513	0.527	0.557	0.472	0.513
Year-Quarter FE	X	X	X	X	X	X	X	X
Bank-Firm-Maturity FE	X		X		X		X	
Bank-Firm-Credit Rating FE		X		X		X		X

Notes: In Columns 1-2 and 5-6, the dependent variable is quarterly change in the natural logarithm of U.S. banks' domestic lending across firms. In Columns 3-4 and 7-8, the dependent variable is the quarterly change in the natural logarithm of the number of U.S. banks' domestic loans across firms and credit ratings. In Columns 1, 3, 5 and 7, the dependent variable is pooled across loan maturities [i.e. loan with a maturity less than one year and loan with a maturity more than one year], and in Columns 2, 4, 6 and 8 it is pooled across credit ratings [i.e. AAA, AA, A, BBB, BB, B, CCC, CC, C, D, Not Rated]. All specifications include the following controls at the bank and firm level for quarters t-2 and t-1: Ln[Total Assets], Return on Asset, and Leverage Ratio. All standard errors clustered at the bank-firm level. Robust Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Table 5. Quarterly Change in Domestic Bank Lending across Firms, Credit Maturities and Credit Ratings, for banks with different Tier1 Capital Ratios - Controlling for Firms' Covid-19 Exposure.

Measure of U.S.-based lending:	Quarterly Change in Log of Lending Volume				Quarterly Change in Log of Number of Loans			
Pooled across:	*Maturities*	*Maturities*	*Credit Ratings*	*Credit Ratings*	*Maturities*	*Maturities*	*Credit Ratings*	*Credit Ratings*
VARIABLES	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Panel A: Ultimate Risk Weighted								
∑ Stringency {t-2 to t-1}	-0.190***	-0.180***	-0.180***	-0.168***	-0.240***	-0.237***	-0.204***	-0.198***
	(0.04)	(0.04)	(0.05)	(0.05)	(0.04)	(0.04)	(0.04)	(0.04)
∑ Stringency * Capital	0.0100***	0.00942***	0.00967***	0.00893***	0.0133***	0.0131***	0.0116***	0.0113***
{t-2 to t-1}	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
∑ Firm Stringency {t-2 to t-1}	0.000583	0.00221	-0.00329	-0.00231	-0.00408	-0.00332	-0.00534	-0.00461
	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
∑ Firm Stringency * Capital	-6.83E-05	-0.000192	0.000196	0.000126	0.0003	0.000245	0.000369	0.000315
{t-2 to t-1}	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
∑ Capital {t-2 to t-1}	-0.961***	-0.985***	-1.129***	-0.942**	-1.499***	-1.533***	-1.286***	-1.194***
	(0.35)	(0.35)	(0.39)	(0.38)	(0.28)	(0.28)	(0.30)	(0.30)
Observations	144,018	144,018	143,351	143,351	144,018	144,018	143,351	143,351
R-squared	0.482	0.527	0.53	0.556	0.443	0.473	0.49	0.513
Panel B: Immediate Risk Weighted								
∑ Stringency {t-2 to t-1}	-0.181***	-0.174***	-0.166***	-0.155***	-0.240***	-0.237***	-0.204***	-0.199***
	(0.04)	(0.04)	(0.05)	(0.05)	(0.03)	(0.03)	(0.04)	(0.04)
∑ Stringency * Capital	0.00980***	0.00929***	0.00915***	0.00846***	0.0136***	0.0134***	0.0118***	0.0115***
{t-2 to t-1}	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
∑ Firm Stringency {t-2 to t-1}	0.00116	0.00279	-0.00286	-0.00191	-0.00335	-0.00261	-0.00478	-0.00407
	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
∑ Firm Stringency * Capital	-0.000112	-0.000235	0.000163	9.51E-05	0.000246	0.000191	0.000326	0.000274
{t-2 to t-1}	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
∑ Capital {t-2 to t-1}	-0.859**	-0.900***	-1.020***	-0.839**	-1.430***	-1.469***	-1.228***	-1.137***
	(0.34)	(0.34)	(0.38)	(0.37)	(0.27)	(0.27)	(0.29)	(0.29)
Observations	144,018	144,018	143,351	143,351	144,018	144,018	143,351	143,351
R-squared	0.482	0.527	0.53	0.556	0.443	0.473	0.49	0.513
Year-Quarter FE	X	X	X	X	X	X	X	X
Bank-Firm FE	X		X		X		X	
Bank-Firm-Maturity FE		X				X		
Bank-Firm-Credit Rating FE				X				X

Notes: Firm stringency is defined as the stringency index of the U.S. state of the borrowing firm's headquarters. In Columns 1-4, the dependent variable is quarterly change in the natural logarithm of U.S. banks' domestic lending across firms. In Columns 5-8, the dependent variable is the quarterly change in the natural logarithm of the number of U.S. banks' domestic loans across firms and credit ratings. In Columns 1, 2, 5 and 6, the dependent variable is pooled across loan maturities [i.e. loan with a maturity less than one year and loan with a maturity more than one year], and in Columns 3, 4, 7 and 8 it is pooled across credit ratings [i.e. AAA, AA, A, BBB, BB, B, CCC, CC, C, D, Not Rated]. All specifications include the following controls at the bank and firm level for quarters t-2 and t-1: Ln[Total Assets], Return on Asset, and Leverage Ratio. All standard errors clustered at the bank-firm level. Robust Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Table 6. Quarterly Change in Domestic Bank Lending across Firms, Credit Maturities and Credit Ratings, for banks with different Tier1 Capital Ratios - For borrowing firms in Covid-19-sensitive and insensitive industries.

Measure of U.S.-based lending:	Quarterly Change in Log of Lending Volume				Quarterly Change in Log of Number of Loans			
Industry Covid Sensitivity:	*Sensitive*	*Insensitive*	*Sensitive*	*Insensitive*	*Sensitive*	*Insensitive*	*Sensitive*	*Insensitive*
VARIABLES	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Panel A: Ultimate Risk Weighted								
∑ Stringency {t-2 to t-1}	-0.169***	-0.290***	-0.149**	-0.324***	-0.249***	-0.288***	-0.218***	-0.292***
	(0.06)	(0.09)	(0.06)	(0.11)	(0.05)	(0.08)	(0.05)	(0.10)
∑ Stringency * Capital	0.00825***	0.0172***	0.00748**	0.0186***	0.0137***	0.0161***	0.0119***	0.0168***
{t-2 to t-1}	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.01)
∑ Capital {t-2 to t-1}	-0.853**	-2.107***	-0.694	-2.112***	-1.593***	-1.880***	-1.344***	-1.660**
	(0.42)	(0.72)	(0.49)	(0.79)	(0.34)	(0.69)	(0.40)	(0.75)
Observations	88,990	45,032	85,504	48,598	88,990	45,032	85,504	48,598
R-squared	0.53	0.524	0.554	0.56	0.47	0.482	0.508	0.527
Panel B: Immediate Risk Weighted								
∑ Stringency {t-2 to t-1}	-0.157***	-0.305***	-0.127**	-0.325***	-0.244***	-0.294***	-0.206***	-0.295***
	(0.05)	(0.09)	(0.06)	(0.10)	(0.04)	(0.08)	(0.05)	(0.09)
∑ Stringency * Capital	0.00784***	0.0181***	0.00656*	0.0189***	0.0136***	0.0167***	0.0115***	0.0172***
{t-2 to t-1}	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.01)
∑ Capital {t-2 to t-1}	-0.758*	-2.111***	-0.558	-1.997**	-1.501***	-1.851***	-1.238***	-1.564**
	(0.40)	(0.70)	(0.47)	(0.78)	(0.32)	(0.68)	(0.38)	(0.72)
Observations	88,990	45,032	85,504	48,598	88,990	45,032	85,504	48,598
R-squared	0.53	0.524	0.554	0.56	0.47	0.482	0.508	0.528
Year-Quarter FE	X	X	X	X	X	X	X	X
Bank-Firm-Maturity FE	X	X			X	X		
Bank-Firm-Credit Rating FE			X	X			X	X

Notes: Odd columns are restricted to firms belonging to Covid-sensitive industries and even columns are restricted to firms belonging to Covid-insensitive industries. COVID-sensitive industries are defined based on Kaplan, Moll and Violante (2020), "The great lockdown and the big stimulus:Tracing the pandemic possibility frontier for the U.S.", NBER Working Paper No. 27794. In Columns 1-4, the dependent variable is quarterly change in the natural logarithm of U.S. banks' domestic lending across firms. In Columns 5-8, the dependent variable is the quarterly change in the natural logarithm of the number of U.S. banks' domestic loans across firms and credit ratings. In Columns 1, 2, 5 and 6, the dependent variable is pooled across loan maturities [i.e. loan with a maturity less than one year and loan with a maturity more than one year], and in Columns 3, 4, 7 and 8 it is pooled across credit ratings [i.e. AAA, AA, A, BBB, BB, B, CCC, CC, C, D, Not Rated]. All specifications include the following controls at the bank and firm level for quarters t-2 and t-1: Ln[Total Assets], Return on Asset, and Leverage Ratio. All standard errors clustered at the bank-firm level. Robust Standard errors in

Table 7. Quarterly Change in Domestic Bank Lending across Firms, Credit Maturities and Credit Ratings, for banks with different Tier1 Capital Ratios - Controlling for the Share of Banks' Foreign Assets.

Measure of U.S.-based lending:	Quarterly Change in Log of Lending Volume				Quarterly Change in Log of Number of Loans			
Pooled across:	*Maturities*	*Maturities*	*Credit Ratings*	*Credit Ratings*	*Maturities*	*Maturities*	*Credit Ratings*	*Credit Ratings*
VARIABLES	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Panel A: Ultimate Risk Weighted								
∑ Stringency {t-2 to t-1}	-0.216***	-0.203***	-0.178***	-0.160**	-0.283***	-0.281***	-0.229***	-0.220***
	(0.06)	(0.06)	(0.07)	(0.07)	(0.05)	(0.05)	(0.05)	(0.05)
∑ Stringency * Capital	0.0102**	0.00936**	0.00794	0.0067	0.0150***	0.0149***	0.0122***	0.0116***
{t-2 to t-1}	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
∑ Foreign Assets Share	3,285***	3,048***	2,932**	2,576*	3,968***	3,774***	2,961***	2,707**
{t-2 to t-1}	(1128.00)	(1130.00)	(1404.00)	(1363.00)	(885.70)	(889.20)	(1092.00)	(1079.00)
∑ Foreign Assets Share *	-228.6***	-216.2***	-207.6**	-191.9**	-249.6***	-237.1***	-188.5***	-174.9**
Capital {t-2 to t-1}	(77.51)	(77.65)	(98.31)	(95.58)	(58.59)	(58.68)	(71.96)	(71.24)
∑ Capital {t-2 to t-1}	-0.219	-0.263	-0.0259	0.134	-1.063**	-1.138**	-0.964*	-0.922*
	(0.63)	(0.63)	(0.78)	(0.76)	(0.46)	(0.46)	(0.55)	(0.55)
Observations	144,261	144,261	143,596	143,596	144,261	144,261	143,596	143,596
R-squared	0.483	0.528	0.531	0.557	0.444	0.474	0.49	0.513
Panel B: Immediate Risk Weighted								
∑ Stringency {t-2 to t-1}	-0.172***	-0.165***	-0.132**	-0.121**	-0.239***	-0.238***	-0.191***	-0.187***
	(0.05)	(0.05)	(0.06)	(0.06)	(0.04)	(0.04)	(0.04)	(0.04)
∑ Stringency * Capital	0.00743*	0.00704*	0.00471	0.00397	0.0124***	0.0125***	0.00971***	0.00945***
{t-2 to t-1}	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
∑ Foreign Assets Share	3,654***	3,363***	3,515**	3,062**	4,267***	4,049***	3,317***	2,998**
{t-2 to t-1}	(1244.00)	(1248.00)	(1576.00)	(1528.00)	(953.70)	(956.50)	(1185.00)	(1170.00)
∑ Foreign Assets Share *	-252.1***	-235.7***	-247.2**	-225.0**	-264.3***	-250.1***	-208.8***	-190.9**
Capital {t-2 to t-1}	-85.16	-85.41	-109.7	-106.4	-63.32	-63.39	-78.35	-77.43
∑ Capital {t-2 to t-1}	0.141	0.0402	0.405	0.498	-0.721*	-0.813*	-0.616	-0.61
	(0.63)	(0.63)	(0.78)	(0.76)	(0.43)	(0.43)	(0.52)	(0.52)
Observations	144,261	144,261	143,596	143,596	144,261	144,261	143,596	143,596
R-squared	0.483	0.528	0.531	0.557	0.444	0.474	0.49	0.513
Year-Quarter FE	X	X	X	X	X	X	X	X
Bank-Firm FE	X		X		X		X	
Bank-Firm-Maturity FE		X				X		
Bank-Firm-Credit Rating FE				X				X

Notes: : Foreign Assets Share is total foreign lending assets divided by total assets. In Columns 1-4, the dependent variable is quarterly change in the natural logarithm of U.S. banks' domestic lending across firms. In Columns 5-8, the dependent variable is the quarterly change in the natural logarithm of the number of U.S. banks' domestic loans across firms and credit ratings. In Columns 1, 2, 5 and 6, the dependent variable is pooled across loan maturities [i.e. loan with a maturity less than one year and loan with a maturity more than one year], and in Columns 3, 4, 7 and 8 it is pooled across credit ratings [i.e. AAA, AA, A, BBB, BB, B, CCC, CC, C, D, Not Rated]. All specifications include the following controls at the bank and firm level for quarters t-2 and t-1: Ln[Total Assets], Return on Asset, and Leverage Ratio. All standard errors clustered at the bank-firm level. Robust Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Figure 1. Marginal effect of Foreign Covid-19 Exposure on Quarterly Change in Domestic Bank Lending at different Tier1 Capital Ratios

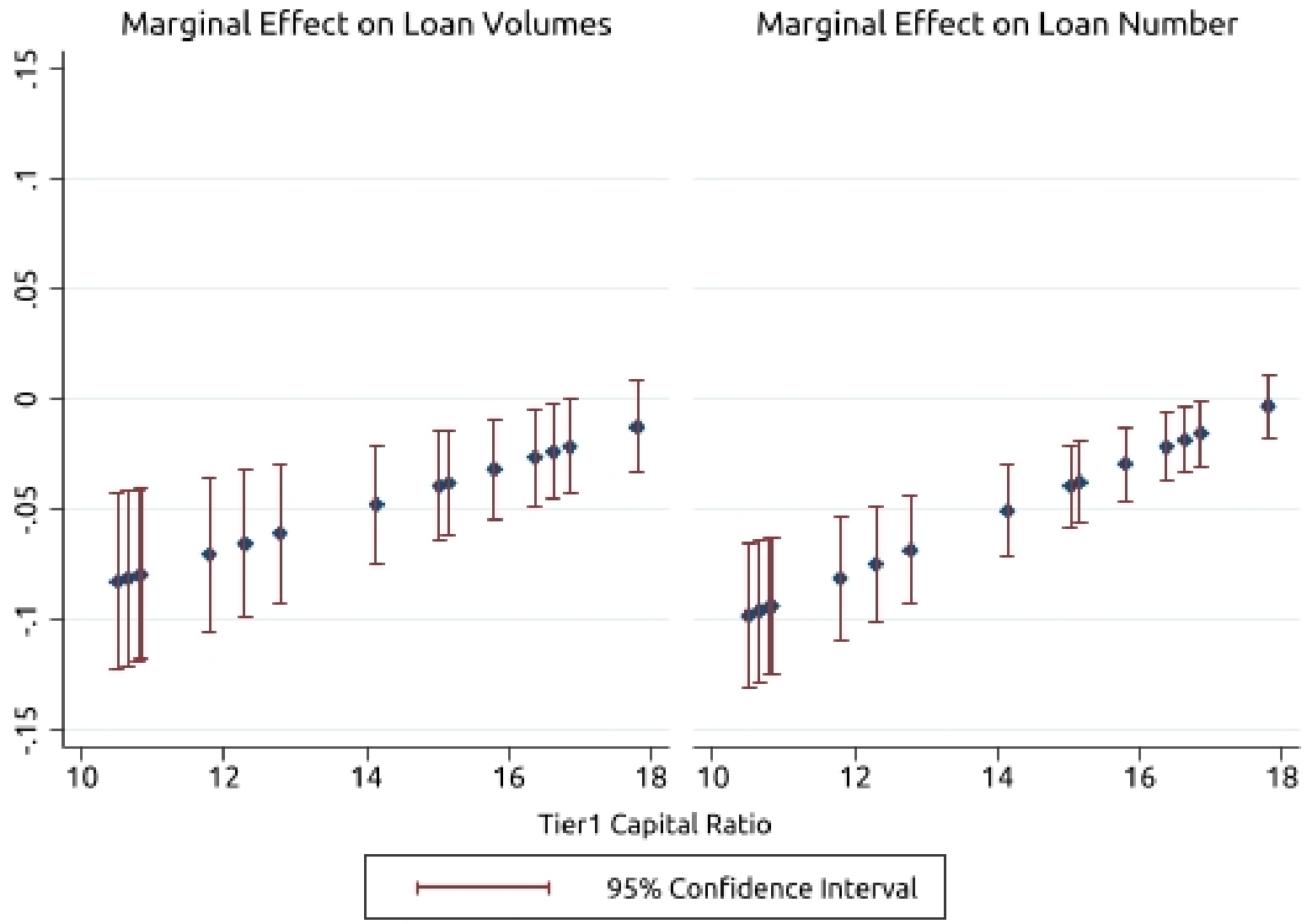

Table A1: Government Response Stringency and Bankruptcies in Foreign Countries

Dependent Variable:	Δ Total Bankruptcies	Δ Corporate Bankruptcies
	[1]	[2]
Stringency Index$_{t-1}$	0.513**	0.118*
	[0.213]	[0.0621]
Constant	-29.22**	-11.58***
	[11.06]	[3.249]
Observations	36	39
R-squared	0.145	0.089

Note: The table shows country-level regressions of the change in total bankruptcies (Column 1) and in corporate bankruptcies (Column 2) in response to the economic fallout resulting from sovereigns' actions to prevent the spread of Covid-19, as captured by the Government Stringency Index. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A2. Quarterly Change in Domestic Bank Lending across Firms and Credit Maturities for banks with different Common Equity Tier1 Capital Ratios.

	Quarterly Change in the Log of Lending					Quarterly Change in the Log of the Number of Loans				
Included Maturities	All	All	All	≤ 1 year	≥ 1 year	All	All	All	≤ 1 year	≥ 1 year
VARIABLES	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Panel A: Ultimate Risk Weighted										
∑ Stringency {t-2 to t-1}	-0.0996***	-0.102***	-0.0901***	-0.307	-0.0946***	-0.121***	-0.126***	-0.121***	0.0278	-0.126***
	[0.0230]	[0.0339]	[0.0335]	[0.576]	[0.0334]	[0.0159]	[0.0240]	[0.0241]	[0.262]	[0.0245]
∑ Stringency * Capital	0.00632***	0.00603***	0.00538***	0.00654	0.00585***	0.00865***	0.00890***	0.00864***	-0.00171	0.00899***
{t-2 to t-1}	[0.00140]	[0.00208]	[0.00207]	[0.0275]	[0.00210]	[0.000984]	[0.00148]	[0.00149]	[0.0134]	[0.00152]
∑ Capital {t-2 to t-1}	-0.186	-0.0619	-0.101	-0.74	-0.138	-0.0529	-0.0224	-0.0601	1.985	-0.111
	[0.155]	[0.240]	[0.238]	[4.671]	[0.233]	[0.107]	[0.167]	[0.168]	[2.305]	[0.167]
Observations	144,261	144,261	144,261	5,390	138,871	144,261	144,261	144,261	5,390	138,871
R-squared	0.001	0.482	0.527	0.641	0.516	0.003	0.442	0.472	0.562	0.467
Panel B: Immediate Counterparty Weighted										
∑ Stringency {t-2 to t-1}	-0.0832***	-0.0825***	-0.0730**	-0.281	-0.0735**	-0.112***	-0.116***	-0.113***	-0.0173	-0.115***
	[0.0215]	[0.0315]	[0.0312]	[0.503]	[0.0312]	[0.0144]	[0.0216]	[0.0217]	[0.207]	[0.0220]
∑ Stringency * Capital	0.00581***	0.00538***	0.00484**	0.00408	0.00513**	0.00862***	0.00885***	0.00863***	0.000161	0.00890***
{t-2 to t-1}	[0.00138]	[0.00205]	[0.00206]	[0.0234]	[0.00209]	[0.000958]	[0.00144]	[0.00145]	[0.0113]	[0.00149]
∑ Capital {t-2 to t-1}	-0.147	-0.0207	-0.0691	-0.723	-0.106	-0.0231	0.0077	-0.0339	1.795	-0.0882
	[0.155]	[0.240]	[0.238]	[4.444]	[0.234]	[0.106]	[0.166]	[0.168]	[2.037]	[0.166]
Observations	144,261	144,261	144,261	5,390	138,871	144,261	144,261	144,261	5,390	138,871
R-squared	0.001	0.482	0.527	0.641	0.516	0.003	0.442	0.472	0.562	0.467
Year-Quarter FE	X	X	X	X	X	X	X	X	X	X
Bank FE	X					X				
Bank-Firm FE		X		X	X		X		X	X
Bank-Firm-Maturity FE			X					X		

Notes: In Columns 1-5, the dependent variable is quarterly change in the natural logarithm of U.S. banks' domestic lending across firms and loan maturities [i.e. loan with a maturity less than one year and loan with a maturity more than one year]. In Columns 6-10, the dependent variable is the quarterly change in the natural logarithm of the number of U.S. banks' domestic loans across firms and loan maturities. All specifications include the following controls at the bank and firm level for quarters t-2 and t-1: Ln[Total Assets], Return on Asset, and Leverage Ratio. Robust Standard errors (clustered at the bank-firm level) are in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Table A3. Quarterly Change in Domestic Bank Lending across Firms and Credit Ratings for banks with different Common Equity Tier1 Capital Ratios.

	Quarterly Change in the Log of Lending					Quarterly Change in the Log of the Number of Loans				
Included Maturities	All	All	All	≤ BB	> BB	All	All	All	≤ BB	> BB
VARIABLES	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Panel A: Ultimate Risk Weighted										
∑ Stringency {t-2 to t-1}	-0.0789***	-0.0819**	-0.0873**	-0.0574	-0.154**	-0.103***	-0.102***	-0.105***	-0.118***	-0.0925
	[0.0236]	[0.0393]	[0.0391]	[0.0494]	[0.0782]	[0.0165]	[0.0281]	[0.0280]	[0.0375]	[0.0595]
∑ Stringency * Capital	0.00505***	0.00462*	0.00469**	0.00414	0.00815*	0.00753***	0.00749***	0.00757***	0.00916***	0.00674**
{t-2 to t-1}	[0.00144]	[0.00238]	[0.00236]	[0.00315]	[0.00436]	[0.00104]	[0.00175]	[0.00173]	[0.00241]	[0.00336]
∑ Capital {t-2 to t-1}	-0.236	-0.246	-0.246	-0.305	-0.448	-0.0741	-0.113	-0.117	-0.162	0.00546
	[0.151]	[0.268]	[0.264]	[0.351]	[0.475]	[0.106]	[0.187]	[0.185]	[0.244]	[0.337]
Observations	143,596	143,596	143,596	103,033	40,563	143,596	143,596	143,596	103,033	40,563
R-squared	0.002	0.53	0.556	0.545	0.533	0.002	0.489	0.513	0.502	0.501
Panel B: Immediate Counterparty Weighted										
∑ Stringency {t-2 to t-1}	-0.0635***	-0.0634*	-0.0684*	-0.0439	-0.118	-0.0954***	-0.0944***	-0.0971***	-0.112***	-0.0733
	[0.0220]	[0.0367]	[0.0365]	[0.0461]	[0.0746]	[0.0153]	[0.0260]	[0.0258]	[0.0331]	[0.0538]
∑ Stringency * Capital	0.00456***	0.00396*	0.00398*	0.00383	0.00641	0.00751***	0.00747***	0.00752***	0.00931***	0.00602*
{t-2 to t-1}	[0.00140]	[0.00231]	[0.00228]	[0.00312]	[0.00409]	[0.00104]	[0.00172]	[0.00170]	[0.00235]	[0.00308]
∑ Capital {t-2 to t-1}	-0.206	-0.21	-0.206	-0.295	-0.35	-0.0515	-0.0904	-0.0914	-0.18	0.084
	[0.151]	[0.269]	[0.265]	[0.357]	[0.474]	[0.106]	[0.188]	[0.186]	[0.246]	[0.330]
Observations	143,596	143,596	143,596	103,033	40,563	143,596	143,596	143,596	103,033	40,563
R-squared	0.002	0.53	0.556	0.545	0.533	0.002	0.489	0.513	0.502	0.501
Year-Quarter FE	X	X	X	X	X	X	X	X	X	X
Bank FE	X					X				
Bank-Firm FE		X		X	X		X		X	X
Bank-Firm-Credit Rating FE			X					X		

Notes: In Columns 1-5, the dependent variable is quarterly change in the natural logarithm of U.S. banks' domestic lending across firms and credit ratings [i.e. AAA, AA, A, BBB, BB, B, CCC, CC, C, D, Not Rated]. In Columns 6-10, the dependent variable is the quarterly change in the natural logarithm of the number of U.S. banks' domestic loans across firms and credit ratings. All specifications include the following controls at the bank and firm level for quarters t-2 and t-1: Ln[Total Assets], Return on Asset, and Leverage Ratio. Robust Standard errors (clustered at the bank-firm level) are in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Table A4. Quarterly Change in Domestic Bank Lending across Firms and Credit Maturities for banks with different Tier1 Capital Ratios.

Depemdent Variable	Quarterly Change in the Log of Lending					Quarterly Change in the Log of Lending				
Type of Credit:	*Term Loans*					*Credit Lines*				
Included Maturities	All	All	All	≤ 1 year	> 1 year	All	All	All	≤ 1 year	> 1 year
VARIABLES	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Panel A: Ultimate Risk Weighted										
∑ Stringency {t-2 to t-1}	-0.224***	-0.206**	-0.203**	7.738	-0.199**	-0.0570*	-0.044	-0.0402	-0.201	-0.0407
	(0.06)	(0.09)	(0.09)	(20.79)	(0.09)	(0.03)	(0.04)	(0.04)	(0.64)	(0.04)
∑ Stringency * Capital	0.0131***	0.0117**	0.0117**	-0.361	0.0112*	0.00311**	0.00165	0.0014	0.00978	0.00156
{t-2 to t-1}	(0.00)	(0.01)	(0.01)	(0.97)	(0.01)	(0.00)	(0.00)	(0.00)	(0.03)	(0.00)
∑ Capital {t-2 to t-1}	-1.631***	-1.681**	-1.670**	76.67	-1.696**	-0.309	-0.158	-0.124	0.765	-0.0858
	(0.43)	(0.69)	(0.69)	(196.80)	(0.69)	(0.22)	(0.32)	(0.32)	(2.99)	(0.32)
Observations	56,322	56,322	56,322	783	55,539	88,805	88,805	88,805	3,737	85,068
R-squared	0.01	0.57	0.59	0.56	0.60	0.00	0.48	0.49	0.65	0.49
Panel B: Immediate Counterparty Weighted										
∑ Stringency {t-2 to t-1}	-0.245***	-0.212**	-0.210**	3.97	-0.208**	-0.0515*	-0.0367	-0.0337	-0.182	-0.035
	(0.07)	(0.11)	(0.11)	(9.62)	(0.11)	(0.03)	(0.04)	(0.04)	(0.47)	(0.04)
∑ Stringency * Capital	0.0142***	0.0120*	0.0120*	-0.182	0.0117*	0.00286*	0.00135	0.00115	0.009	0.00133
{t-2 to t-1}	(0.00)	(0.01)	(0.01)	(0.47)	(0.01)	(0.00)	(0.00)	(0.00)	(0.02)	(0.00)
∑ Capital {t-2 to t-1}	-1.714***	-1.687**	-1.687**	53.92	-1.735**	-0.265	-0.113	-0.084	0.92	-0.0492
	(0.46)	(0.75)	(0.75)	(116.10)	(0.76)	(0.21)	(0.30)	(0.31)	(2.78)	(0.30)
Observations	56,322	56,322	56,322	783	55,539	88,805	88,805	88,805	3,737	85,068
R-squared	0.01	0.57	0.59	0.57	0.60	0.00	0.48	0.49	0.65	0.49
Year-Quarter FE	X	X	X	X	X	X	X	X	X	X
Bank FE	X					X				
Bank-Firm FE		X		X	X		X		X	X
Bank-Firm-Maturity FE			X					X		

Notes: In Columns 1-5, the dependent variable is quarterly change in the natural logarithm of U.S. banks' domestic term lending across firms and loan maturities [i.e. loan with a maturity less than one year and loan with a maturity more than one year]. In Columns 6-10, the dependent variable is the quarterly change in the natural logarithm of U.S. banks' domestic credit line commitments across firms and loan maturities. All specifications include the following controls at the bank and firm level for quarters t-2 and t-1: Ln[Total Assets], Return on Asset, and Leverage Ratio. Robust Standard errors [clustered at the bank-firm level) are in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Table A5. Quarterly Change in Domestic Bank Lending across Firms, Credit Maturities and Credit Ratings, for banks with different Tier1 Capital Ratios - For Small and Large borrowing firms.

Measure of U.S.-based lending:	Quarterly Change in Log of Lending Volume				Quarterly Change in Log of Number of Loans			
Firm Size:	*Small*	*Large*	*Small*	*Large*	*Small*	*Large*	*Small*	*Large*
VARIABLES	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Panel A: Ultimate Risk Weighted								
∑ Stringency {t-2 to t-1}	-0.431***	-0.122**	-0.303**	-0.125**	-0.437***	-0.203***	-0.433***	-0.160***
	-0.123	-0.0511	-0.131	-0.0597	-0.114	-0.0412	-0.119	-0.0463
∑ Stringency * Capital	0.0222***	0.00633**	0.0152**	0.00653**	0.0229***	0.0114***	0.0226***	0.00935***
{t-2 to t-1}	-0.00662	-0.00276	-0.00689	-0.00327	-0.00564	-0.00221	-0.00611	-0.00251
∑ Capital {t-2 to t-1}	-2.934***	-0.585	-1.896**	-0.597	-3.249***	-1.245***	-3.051***	-0.884**
	-0.914	-0.386	-0.938	-0.451	-0.798	-0.318	-0.805	-0.36
Observations	47,973	96,288	50,039	93,557	47,973	96,288	50,039	93,557
R-squared	0.472	0.544	0.497	0.572	0.464	0.484	0.492	0.527
Panel B: Immediate Risk Weighted								
∑ Stringency {t-2 to t-1}	-0.445***	-0.123***	-0.317**	-0.116**	-0.439***	-0.209***	-0.430***	-0.167***
	-0.124	-0.0473	-0.127	-0.0555	-0.112	-0.0376	-0.114	-0.0427
∑ Stringency * Capital	0.0243***	0.00655**	0.0168**	0.00625**	0.0246***	0.0119***	0.0235***	0.00983***
{t-2 to t-1}	-0.00719	-0.00263	-0.00712	-0.00309	-0.00602	-0.00209	-0.0064	-0.00238
∑ Capital {t-2 to t-1}	-3.005***	-0.565	-1.979**	-0.523	-3.244***	-1.220***	-2.987***	-0.867**
	-0.93	-0.375	-0.911	-0.439	-0.804	-0.305	-0.791	-0.347
Observations	47,973	96,288	50,039	93,557	47,973	96,288	50,039	93,557
R-squared	0.472	0.544	0.497	0.572	0.464	0.484	0.492	0.527
Year-Quarter FE	X	X	X	X	X	X	X	X
Bank-Firm-Maturity FE	X	X			X	X		
Bank-Firm-Credit Rating FE			X	X			X	X

Notes: : Large firms are firms with total assets above the sample median firm asset size. Small firms are firms with total assets below the median. In Columns 1-4, the dependent variable is quarterly change in the natural logarithm of U.S. banks' domestic lending across firms. In Columns 5-8, the dependent variable is the quarterly change in the natural logarithm of the number of U.S. banks' domestic loans across firms and credit ratings. In Columns 1, 2, 5 and 6, the dependent variable is pooled across loan maturities [i.e. loan with a maturity less than one year and loan with a maturity more than one year], and in Columns 3, 4, 7 and 8 it is pooled across credit ratings [i.e. AAA, AA, A, BBB, BB, B, CCC, CC, C, D, Not Rated]. All specifications include the following controls at the bank and firm level for quarters t-2 and t-1: Ln[Total Assets], Return on Asset, and Leverage Ratio. All standard errors clustered at the bank-firm level. Robust Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Table A6. Quarterly Change in Domestic Bank Lending across Firms, Credit Maturities and Credit Ratings, for banks with different Tier1 Capital Ratios - Exposure to OECD and non-OECD Countries.

	Quarterly Change in Log of Lending Volume				Quarterly Change in Log of Number of Loans			
Region of Foreign Exposure:	*OECD*	*Non-OECD*	*OECD*	*Non-OECD*	*OECD*	*Non-OECD*	*OECD*	*Non-OECD*
VARIABLES	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Panel A: Ultimate Risk Weighted								
∑ Stringency {t-2 to t-1}	-0.163***	0.00814	-0.158***	-0.0018	-0.216***	0.0234**	-0.187***	0.0174
	(0.04)	(0.01)	(0.05)	(0.02)	(0.03)	(0.01)	(0.04)	(0.01)
∑ Stringency * Capital	0.00910***	-0.000607	0.00880***	0.000142	0.0127***	-0.00184**	0.0112***	-0.00142
{t-2 to t-1}	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
∑ Capital {t-2 to t-1}	-1.072***	0.342	-0.969***	-0.00835	-1.482***	0.666	-1.135***	0.472
	(0.32)	(0.62)	(0.36)	(0.66)	(0.27)	(0.46)	(0.29)	(0.52)
Observations	144,261	140,495	143,596	138,984	144,261	140,495	143,596	138,984
R-squared	0.528	0.527	0.557	0.556	0.473	0.47	0.513	0.512
Panel B: Immediate Counterparty Weighted								
∑ Stringency {t-2 to t-1}	-0.162***	0.0039	-0.152***	0.00185	-0.223***	0.0205***	-0.193***	0.0190***
	(0.04)	(0.01)	(0.05)	(0.01)	(0.03)	(0.01)	(0.04)	(0.01)
∑ Stringency * Capital	0.00903***	-0.0000628	0.00847***	0.000122	0.0131***	-0.00127***	0.0115***	-0.00120**
{t-2 to t-1}	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
∑ Capital {t-2 to t-1}	-1.035***	0.117	-0.906***	0.0689	-1.449***	0.507*	-1.100***	0.569*
	(0.31)	(0.37)	(0.35)	(0.38)	(0.26)	(0.29)	(0.29)	(0.33)
Observations	144,261	140,495	143,596	138,984	144,261	140,495	143,596	138,984
R-squared	0.528	0.527	0.557	0.557	0.473	0.47	0.513	0.512
Year-Quarter FE	X	X	X	X	X	X	X	X
Bank-Firm-Maturity FE	X	X			X	X		
Bank-Firm-Credit Rating FE			X	X			X	X

Notes: In Columns 1-4, the dependent variable is quarterly change in the natural logarithm of U.S. banks' domestic lending across firms. In Columns 5-8, the dependent variable is the quarterly change in the natural logarithm of the number of U.S. banks' domestic loans across firms and credit ratings. In Columns 1, 2, 5 and 6, the dependent variable is pooled across loan maturities [i.e. loan with a maturity less than one year and loan with a maturity more than one year], and in Columns 3, 4, 7 and 8 it is pooled across credit ratings [i.e. AAA, AA, A, BBB, BB, B, CCC, CC, C, D, Not Rated]. All specifications include the following controls at the bank and firm level for quarters t-2 and t-1: Ln[Total Assets], Return on Asset, and Leverage Ratio. All standard errors clustered at the bank-firm level. Robust Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Table A7. Quarterly Change in Domestic Bank Lending for banks with different maturities, credit ratings, for banks with different Tier1 capital ratios: Exposure to foreign financial and non-financial sectors.

	Quarterly Change in Log Lending				Quarterly Change in the Log of the Number of Loans			
Sector of Foreign Exposure:	*Financial*	*Non-Financial*	*Financial*	*Non-Financial*	*Financial*	*Non-Financial*	*Financial*	*Non-Financial*
VARIABLES	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Panel A: Ultimate Risk Weighted								
∑ Stringency {t-2 to t-1}	-0.0173**	-0.0388***	-0.0105	-0.0312**	-0.0194***	-0.0593***	-0.0116*	-0.0449***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
∑ Stringency * Capital	0.00156***	0.00291***	0.00100*	0.00238**	0.00177***	0.00440***	0.00112**	0.00335***
{t-2 to t-1}	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
∑ Capital {t-2 to t-1}	-0.900***	-0.265	-0.546	-0.173	-1.260***	-0.562***	-0.786***	-0.296
	(0.35)	(0.23)	(0.36)	(0.26)	(0.27)	(0.17)	(0.28)	(0.19)
Observations	144,261	144,261	143,596	143,596	144,261	144,261	143,596	143,596
R-squared	0.527	0.527	0.557	0.557	0.472	0.472	0.512	0.513
Panel B: Immediate Counterparty Weighted								
∑ Stringency {t-2 to t-1}	-0.0126*	-0.0570***	-0.00835	-0.0545***	-0.0129**	-0.0759***	-0.00788	-0.0638***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
∑ Stringency * Capital	0.00113**	0.00413***	0.000775	0.00392***	0.00124***	0.00551***	0.000850**	0.00463***
{t-2 to t-1}	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
∑ Capital {t-2 to t-1}	-0.676**	-0.298	-0.441	-0.114	-1.057***	-0.611***	-0.747***	-0.29
	(0.32)	(0.23)	(0.35)	(0.27)	(0.24)	(0.17)	(0.27)	(0.20)
Observations	144,261	144,261	143,596	143,596	144,261	144,261	143,596	143,596
R-squared	0.527	0.528	0.557	0.557	0.472	0.474	0.512	0.513
Year-Quarter FE	X	X	X	X	X	X	X	X
Bank-Firm-Maturity FE	X	X			X	X		
Bank-Firm-Credit Rating FE			X	X			X	X

Notes: In Columns 1-4, the dependent variable is quarterly change in the natural logarithm of U.S. banks' domestic lending across firms. In Columns 5-8, the dependent variable is the quarterly change in the natural logarithm of the number of U.S. banks' domestic loans across firms and credit ratings. In Columns 1, 2, 5 and 6, the dependent variable is pooled across loan maturities [i.e. loan with a maturity less than one year and loan with a maturity more than one year], and in Columns 3, 4, 7 and 8 it is pooled across credit ratings [i.e. AAA, AA, A, BBB, BB, B, CCC, CC, C, D, Not Rated]. All specifications include the following controls at the bank and firm level for quarters t-2 and t-1: Ln[Total Assets], Return on Asset, and Leverage Ratio. All standard errors clustered at the bank-firm level. Robust Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Table A8. Quarterly Change in interest rates and rate spreads across Firms, Credit Maturities, and Credit Ratings, for banks with different Capital Ratios.

Dependent variable:	*Interest Rate*				*Spread*			
VARIABLES	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Panel A: Ultimate Risk Weighted								
∑ Stringency {t-2 to t-1}	-0.000468	-0.000265	0.000607	0.000597	-0.00531***	0.000849	0.00544***	0.00191*
	[0.00105]	[0.000742]	[0.00108]	[0.000786]	[0.00174]	[0.000974]	[0.00202]	[0.00103]
∑ Stringency * Capital {t-2 to t-1}	4.97E-05	0.000195***	1.77E-06	0.000148***	0.000265***	5.66E-05	-0.000467***	-0.000168**
	[5.79e-05]	[4.87e-05]	[5.88e-05]	[4.96e-05]	[0.000103]	[6.45e-05]	[0.000116]	[6.81e-05]
∑ Capital {t-2 to t-1}	0.00101	0.00311	0.00387	0.00732	-0.0296***	-0.00599	0.0392***	0.0252***
	[0.00803]	[0.00542]	[0.00785]	[0.00550]	[0.0104]	[0.00806]	[0.0113]	[0.00779]
Observations	105,066	105,066	113,061	113,061	62,288	62,288	71,786	71,786
R-squared	0.511	0.514	0.516	0.519	0.516	0.516	0.546	0.556
Panel B: Immediate Counterparty Weighted								
∑ Stringency {t-2 to t-1}	-0.00170*	-0.00108	-0.000872	-0.000356	-0.00637***	0.000168	0.00520***	0.00134
	[0.00102]	[0.000702]	[0.00104]	[0.000728]	[0.00169]	[0.000884]	[0.00193]	[0.000940]
∑ Stringency * Capital {t-2 to t-1}	0.000109*	0.000247***	7.36E-05	0.000210***	0.000313***	0.000106*	-0.000493***	-0.000130**
	[5.70e-05]	[4.93e-05]	[5.67e-05]	[4.88e-05]	[0.000102]	[6.18e-05]	[0.000113]	[6.58e-05]
∑ Capital {t-2 to t-1}	-0.00277	0.0039	-0.00101	0.00767	-0.0327***	-0.00759	0.0260**	0.0235***
	[0.00793]	[0.00549]	[0.00778]	[0.00555]	[0.0101]	[0.00814]	[0.0109]	[0.00786]
Observations	105,066	105,066	113,061	113,061	62,288	62,288	71,786	71,786
R-squared	0.511	0.514	0.516	0.518	0.516	0.516	0.547	0.556
Capital Ratio	Tier1	CET1	Tier1	CET1	Tier1	CET1	Tier1	CET1
Year-Quarter FE	X	X	X	X	X	X	X	X
Bank-Firm-Maturity FE	X	X			X	X		
Bank-Firm-Credit Rating FE			X	X			X	X

Notes: The dependent variable is the quarterly change in average interest rate or spread, for loans pooled across loan maturities [i.e. loan with a maturity less than one year and loan with a maturity more than one year] in Columns 1, 2, 5 and 6, or for loans pooled across credit ratings [i.e. AAA, AA, A, BBB, BB, B, CCC, CC, C, D, Not Rated] in Columns 3,4, 7 and 8. All specifications include the following controls at the bank and firm level for quarters t-2 and t-1: Ln[Total Assets], Return on Asset, and Leverage Ratio.All standard errors clustered at the bank-firm level. Robust Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Figure A1. The government response Stringency Index over time in countries that U.S. banks have the highest exposure to.