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Monetary policy spillovers under COVID-19: Evidence from lending by U.S. foreign bank subsidiaries

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Abstract
This paper uses Call Report data to examine the impact of home country monetary policy on foreign bank subsidiary lending in the United States during the COVID-19 pandemic. Examining a large sample of foreign bank subsidiaries and domestic U.S. banks, we find that foreign bank lending growth was positively associated with both lower home country policy rates and negative home country rates. Point estimates indicate that a one standard deviation decrease in home country policy rates was associated with a 3.5 percentage point increase in lending growth, while negative home country policy rates added an additional 3.0 percentage points on average. Disparities in sensitivity to home country rates also exist by bank size, as large banks exhibited more responsiveness to home country policy rate levels, but were less responsive to negative policy rates. Easier home country policy rates are also found to impact negatively on growth in capital ratios and bank income, in keeping with expanded foreign subsidiary activity. However, income responses to negative home country rates are mixed, in a manner suggesting balance sheet adjustment to changes in relative home and host country conditions. Overall, our findings confirm that the bank lending channel for global monetary policy spillovers was active during the pandemic crisis.

1. Introduction
The onset of the COVID-19 crisis in the spring of 2020 caused abrupt disruptions to the general financial system. Liquidity dried up, even in treasury and conventional commercial paper markets, and many nonbank institutions, including money markets and hedge funds, experienced deep disruptions. Countering this trend, the U.S. commercial banking system held up surprisingly well, as increased regulatory standards going into the crisis left banks on average entering the pandemic relatively well capitalized and placed to act as a source of stability. As demonstrated below, however, individual U.S. banks exhibited substantive variability in their lending practices over the pandemic period.

One potential source of variability across U.S. banks was the sensitivity of global banks, and U.S. foreign bank subsidiaries in particular, to external monetary policy shocks. Foreign bank lending has long been known to respond to cross-country...
interest differentials (e.g. Goldberg and Saunders, 1981). During the global financial crisis of 2008–2009, advanced economies abruptly eased home country policy, lowering potential returns on lending domestically. This induced banks from these source countries to increase their foreign lending activity, expanding credit supply in their subsidiaries and in some cases contributing to disruptive surges in capital inflows in those countries (e.g. Cetorelli and Goldberg, 2011; Cetorelli and Goldberg, 2012b; Berrospide et al., 2017).

This paper revisits the question of global monetary policy spillovers through the lens of multinational bank lending during the COVID-19 pandemic. Countries entered the pandemic in different economic situations, which resulted in their entering the crisis under disparate monetary policy stances. In particular, a number of traditional source country monetary regimes, including the euro area and Japan, entered the pandemic with policy rates below the zero bound. The COVID-19 crisis therefore also provides an initial opportunity to examine global monetary policy spillovers in the context of negative interest rates. Recent literature has highlighted that the reluctance of banks to pay negative rates on retail deposits may result in extra sensitivity to the zero bound in bank responses to home country policy rates (e.g. Altavilla et al., 2018; Bottero et al., 2020). We therefore also examine the possibility of a negative interest rate effect of home country policy rates on the activity of U.S. foreign bank subsidiaries over and above the linear impact of negative rates as a further reduction in policy rates.

In order to isolate the impact of home country monetary policy, we concentrate on bank lending activity in the United States. In particular, we use regulatory filings obtained from the Federal Financial Institutions Examination Council’s “Call Reports”, which provides detailed information on both balance sheet and income statement variables. Our data set includes both domestic U.S. banks and foreign bank subsidiaries. In particular, we exclude both foreign branches and agencies that are prominent components of a number of previous studies. We do so to mitigate the degree of regulatory disparities across our sample. As noted by a number of recent previous studies (e.g. Bussierè et al., 2021; Avdjiev et al., 2021), the overlap of disparities in home and host country monetary and regulatory policies likely affects branches and subsidiaries differently in complex ways. Of course, our methodology does not completely remove all foreign regulatory changes. However, by concentrating on a comparison of foreign subsidiaries and domestic banks alone, with the relatively well-measured U.S. regulatory data, our intent is to assemble the cleanest sample possible in which to examine the responses of foreign banks to disparate home country monetary policies against the benchmark of the activity of their domestic U.S. bank competitors.

Our specification conditions for bank characteristics going into the pandemic based on end 2019 data. We then examine the implications of both home country policy rates and any special sensitivity to negative rates over the most turbulent period of the pandemic, the first half of 2020. Our regression results demonstrate that home country monetary policy rates had the expected impact on foreign subsidiary lending during the pandemic crisis. Our point estimates suggest that a one standard deviation decrease in home country policy rates was associated with a 3.5 percentage point increase in total bank lending growth over the first half of 2020. Moreover, we also find that having negative rates encouraged lending growth over and above this simple policy rate effect. Our regression coefficient estimates indicate that even after conditioning for policy rate levels, banks with negative home country interest rates had 3 percentage points additional growth in lending on average.

We also examine differences across our sample by bank size. We divide our base sample into two sub-samples: Small and medium-sized banks and large banks. We find that large banks were more sensitive than their small and medium-sized counterparts to home country policy rates during the pandemic. Our regression coefficient estimates indicate that a one standard deviation decline in home country policy rates would only be associated with a 1.8 percentage point increase in lending growth among small and medium-sized banks, while it would be associated with a 6.2 percentage point increase among our large bank sub-sample.

In contrast, we find that small and medium-sized banks were more sensitive to negative home country policy rates. Our regression point estimates indicate that small banks from countries with negative home policy rates on average had 12 percentage points greater lending growth over the first half of 2020, while our estimated coefficient for the large banks in our sample was actually negative and only significant at a 10% confidence level. However, combined with the stronger policy rate coefficient estimates we obtained for large banks in our base specification, our results are better taken as indicative that large banks are less encouraged to expand lending through home country movements into negative policy rate territory than their small and medium counterparts.

Both of these results are in keeping with our understanding of the greater overall flexibility of large multinational banks. Large banks are likely more responsive to home country policy rates than small banks because they are better-placed to act as conduits for expanding U.S. lending in response to lower home country policy rates and contracting U.S. lending when home rates rise. Similarly, large banks are probably also more adept at shifting their funding sources away from deposits as policy rates breach the zero lower bound, and so need to respond in terms of moving internal firm capital abroad to the U.S. less than their small bank counterparts.

1 The prominence of the effective lower bound as a potential constraint for policy during the pandemic period, even for countries under negative policy rates, meant that this period was also one in which unconventional policy, such as asset purchases and forward guidance, were also prevalent. This paper concentrates on policy rates, including the special implications of rates falling below zero, and leaves consideration of such unconventional monetary policies for future work.

2 Evidence to date on the effects of the zero bound on bank profitability are mixed, as banks have found ways to charge depositors fees and used other non-interest income strategies to offset losses in interest income suffered under low or negative rates. See, for example, Lopez et al. (2020).

3 The second half of 2020 exhibited a number of noisy changes in bank balance sheets, particularly adjustments by U.S. banks to borrowers’ returning precautionary cash builds that took place at the onset of the pandemic that result in volatile movements in activity measures.
We also consider the implications of home rates for growth in the important component of small business and farm lending during the pandemic. Our results are more mixed here. While negative home country rates are found to have a significant positive impact on total small business and farm lending growth, when considered separately we obtain a large positive and significant impact on small business lending growth, but a negative and insignificant impact on small farm lending growth.

Finally we consider the implications of home policy rates for foreign subsidiary capital growth and income growth during the pandemic. As both policy rate levels and movement of policy rates across the zero bound were found to induce foreign bank subsidiaries to increase their activities in the United States. We would therefore expect lower and negative policy rates to be associated with decreased bank capital asset ratios and income. We confirm this outcome for bank capital ratios, but results for income ratios are mixed. Easier home country policy rates do encourage higher subsidiary income growth, but impacts of negative rates are close to zero. As we discuss below, these results are suggestive of the complicated funding and revenue options available to foreign bank subsidiaries.

Overall, our results confirm that the global spillovers to monetary policy through bank lending that were identified during the global financial crisis were also prevalent during the pandemic. Home country policy rates were negatively associated with lending activity of U.S. foreign bank subsidiaries during the turbulent early days of the COVID-19 pandemic, with easier monetary policies at home reducing subsidiary capital asset ratios and raising their income.

The remainder of the paper is structured as follows. Section 2 provides a review of the literature on global banks, monetary policy spillovers, and work to date concerning bank lending during the COVID-19 crisis. Section 3 provides details on our data set and describes our base specification. Section 4 reviews our base specification results. Section 5 examines heterogeneity in our results with samples split by bank size and for the special case of small business and farm lending growth. Section 6 examines the impact of home country monetary policy on bank capital asset ratios and income. Lastly Section 7 concludes.

2. Literature review

This paper is related to a number of themes in the existing literature. First, there is a large literature associated with global spillovers to bank lending, beginning with the seminal work by Peek and Rosengren (1997) showing that country shocks can lead to reduced lending activity abroad by foreign banks. In particular, bank lending has long been known to respond to interest differentials. For example, Goldberg and Saunders (1981) pool U.S. foreign bank subsidiaries, branches and agencies in a panel from 1972 through 1979 and demonstrate that foreign bank activity was dependent on interest differentials between home country and U.S. deposits and loans. Similarly, Cettorelli and Goldberg (2012a) demonstrate that international lending patterns across global banks are responsive to U.S. monetary policy shocks in a manner that result in global monetary policy spillovers. More recently, Buch et al. (2019) report on a 17 country study that identifies spillovers from major source countries, such as the euro area, Japan, the U.K. and the U.S. into bank lending outside of those jurisdictions, and Lee and Bowdler (2019) confirm the existence of spillovers for a cross-country panel of Asian global commercial banks.4

Our study is also related to the literature on counter-cyclical foreign bank lending. There has been some speculation that foreign bank lending in the United States during recessions has played a stabilizing role, by expanding lending while US banks, challenged by balance sheet losses related to the recession, retrench. However, more recent studies have shed doubt that foreign banks play an important counter-cyclical role. In particular, Rai et al. (2021) find mixed results for foreign subsidiaries and branches in lending during the 1990–1991, 2000, and 2007–2009 recessions, and conclude that domestic factors also dominate foreign bank lending patterns. Kleimeier et al. (2013) demonstrate that foreign bank deposits and lending exhibit different dynamics prior to the onset of a crisis, so that net and gross lending can differ substantially.

A number of studies observed disproportionate retrenchment by foreign banks during the global financial crisis. Acharya et al. (2017) show that foreign banks faced unique challenges in raising alternative dollar funding to their domestic US bank counterparts, who were able to adjust more easily through a variety of channels, most notably through raising additional deposits and interbank borrowing. Most confirm a home country channel whereby home country crises led banks to reduce credit extension more heavily (e.g. Dekle and Lee, 2015; Ongena et al., 2015). Albertazzi and Bottero (2014) demonstrate that foreign banks operating in Italy in the wake of the Lehman collapse restricted Italian lending more aggressively than their domestic counterparts. However, Haas and Horen (2013) demonstrate that banks with stronger host country ties exhibited relatively less retrenchment.

Differences in lending practices between foreign subsidiaries and host country banks also have been identified in the literature under normal circumstances. Houston et al. (2012) demonstrate that global banks respond to heavy regulation at home by transferring funds to less-regulated foreign subsidiaries where they are able to engage in more risk lending practices. Arshad and Arshad (2017) demonstrate that lending practices of foreign affiliates of global banks more deeply reflect their home country cultures than those in their host country. di Giovanni et al. (2018) demonstrate that firms pay a lower rate of interest when borrowing in foreign currency from domestic banks than foreign banks.

Our work is also related to the literature on how financial crises influence global monetary spillovers, and in particular the impact of the 2007–2009 global financial crisis on the lending channel for monetary policy spillovers. Cettorelli and Goldberg (2011) find that global bank dollar funding vulnerability affected lending responses to emerging market countries during the

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4 See Auer et al. (2019)
global financial crisis. Demirgüç-Kunt et al. (2017) examine loan-level data from 1995–2015 over 124 countries and find that lower interest rates does encourage greater cross-border lending in the syndicated loan market. Avdjiev et al. (2021) examine the interplay of home and host regulation and home and host monetary policy in the determination of global bank lending. They find that the impact of US monetary policy on foreign bank lending is influenced by prudential policies abroad. In particular, tighter US monetary policy results in greater sensitivity of the foreign lending to host country prudential policies, such as exposure limits and capital requirements. Similarly, Takáts and Temesvary (2019) control for demand conditions by evaluating (for example) dollar-denominated lending from the UK to Malaysia to isolate identified isolated monetary policy shocks from macro-prudential policy. They confirm that monetary policy tightening is associated with reduced supply of lending in that currency.

Our results are also related to the large literature on the impact of low and negative rates on banking activity. Borio and Gambacorta (2017) find that bank lending becomes less responsive to reductions in policy rates as they approach zero. Demiralp et al. (2019) demonstrate that negative rates are more challenging for small banks that are likely to be deposit dependent. Ulate (2021) finds that policy rate cuts under negative interest rates induce smaller lending responses than under low positive rates. However, as U.S. policy rates did not go negative over our sample period, our analysis below concentrates on the implications of negative home country policy rates for subsidiary lending activity.

Finally, a number of papers are emerging examining bank lending patterns under the COVID-19 virus. Hardy and Takáts (2020) examine a panel of international banks and demonstrate that global borrowing was more prevalent among countries stronger economic activity and lower financial vulnerability, while banks from countries with better-capitalized banking systems were more prevalent as lenders. Berger et al. (2021) examine how relationship banking progressed over the course of the pandemic; Li and Strahan (2020), Beauregard et al. (2020), and Lopez and Spiegel (2021) examine small business lending under the COVID-19 crisis, and the role played by the Paycheck Protection Program (PPP) program. Lopez and Spiegel (2021) and Anbil et al. (2021) demonstrate that the Federal Reserve Paycheck Protection Program Lending Facility was successful in encouraging banks to book a greater share of their lending through the PPP program. Hasan et al. (2021) find that syndicated loan pricing during the pandemic responded to COVID-19 exposure of both lenders and borrowers. Çolak and Öztekin (2021) condition for credit demand changes and conclude that credit supply declined more in countries more severely hit by the COVID crisis.

3. Methodology

3.1. Data and variable definitions

We use quarterly bank-level regulatory filings obtained from the Federal Financial Institutions Examination Council’s “Call Reports”, which provides detailed information on both balance sheet and income statement variables. All data is measured as quarter-end. Data to characterize bank conditions going into the pandemic are taken from end-2019Q4, while changes in bank characteristics over the course of the pandemic are measured from that date to end-2020Q2. As Call Report data is compulsory for regulated banks in the United States, including foreign bank subsidiaries, this data source has no issues concerning potential endogeneity in reporting patterns. Our sample is a cross-section of U.S. commercial banks. We separate reporting banks into three groups based on asset size in 2019Q4: small banks with assets below $10 billion, large banks with assets exceeding $100 billion, and a middle category between them. Our base specification contains 4,090 banks, of which 3,376 are classified as small banks, 584 are medium-size banks, and 130 classified as large banks. We designate as foreign all banks listed in the Federal Reserve Board Structure and Data for the U.S. Offices of Foreign Banking Organizations. All foreign banks in our sample are listed in Appendix Table 7.

Our dependent variables are primarily measures of growth in total loans and leases in the Call Report at the bank level. We label this variable LENDGRWTH. We also examine growth in small business and farm lending, which we refer to as BLGRWTH and FLGRWTH respectively, and two measures of changes in bank capital ratios; growth in total capital ratios and tier 1 risk-adjusted capital ratios, which we label TCAPGRWTH and T1RAGRWTH respectively. Finally we examine bank income growth over the period, both in terms of total income growth, NIGRWTH and its main components, net interest income growth (NIGRWTH) and net non-interest income growth NNGRWTH. As growth measures often exhibit extreme outliers over short time horizons (and indeed do in this data set), we winsorize all of the growth variables at the 5% level.

The variables of interest are POLRATE, a measure of foreign short-term policy rates, and NEGI, a dummy variable that takes value 1 if a bank’s home country policy rate is less than zero, and 0 otherwise. Because banks would be predicted to respond to real, rather than nominal, interest rate differentials, we adjust for home country inflation using the change in the CPI with the variable CPIGRWTH.

We examine growth in bank lending over this period while conditioning for differences in individual bank characteristics going into the crisis. Conditioning for disparities in bank characteristics is potentially important, as, for example, Cornett

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5 Even though reporting is compulsory, some banks do report with a lag and the size of recent Call Report data, such as that used in this study, can grow slowly over time.

6 By construction, this definition includes 6 banks that we classify as under the same monetary regime as the United States: U.S. territories, including Guam and Puerto Rico, as well as banks from the Cayman Islands, who run a currency board pegged to the U.S. dollar. Their home country policy rates are therefore set to equal those prevailing in the U.S.
et al. (2011) demonstrated that during the global financial crisis financial constraints inhibited credit expansion by banks. We follow the literature, such as Rice and Rose (2016) and Li and Strahan (2020), in the determination of Call Report conditioning variables to include in our specification. We include LOANCOM as a measure of outstanding loan commitments, which have been shown to play a major role in encouraging lending during the COVID crisis (e.g. Greenwald et al. (2020)). We also include COREDEP, which measures core deposits relative to total assets as a measure of a banks’ reliance on deposit funding. We include LIQASSET, which measures bank cash and security holdings as a share of total assets, as a measure of bank liquidity. We also include the total capital asset ratio TCAP, to capture bank capital positions. Finally, as a number of banks experienced exceptionally large changes in their funding composition over this period, we also include a variable CHGCOREDEP to condition for changes in the share of core deposit funding between 2019Q4 and 2020Q2.

Summary statistics for our variables of interest subsequent to winsorizing at the 5% level are shown in Table 1. Our data set exhibits a healthy degree of variability in our base specification dependent variable, growth in total loans and leases. On average, total loans and leases grew rapidly during the pandemic, with total values ranging from approximately −4 percentage points to positive 36 percentage points for both domestic and foreign banks.

Our methodology of pooling U.S. foreign branch subsidiaries with domestic U.S. banks has the advantage of harmonizing the regulatory regime under which these banks are operating as much as possible, thereby serving to isolate the effects of home country policy rate differentiation and negative policy rates. However, Table 1 also reveals the cost of such a strategy. Our sample has a relatively small number of foreign subsidiaries (46). Nevertheless, as shown in Appendix Table 7, these subsidiaries represent a number of important foreign financial institutions hailing from a wide variety of original jurisdictions.

The foreign subsidiaries also represent a wide variety of home country policy rates. See Fig. 1. Foreign subsidiaries in our sample are divided into 5 bins, each column representing population counts of spreads of 100 basis points in policy rates. The left column represents the 13 banks in our sample with rates ranging from −1.0 to 0.0, while the second column represents the 26 banks with policy rates ranging from 0.0 to 1.0. The U.S. policy target of 0.125 at this time would fall in this range. The remaining three columns represent 7 foreign subsidiaries with home country rates exceeding 1.0.

As shown in Fig. 2, these populations correspond to healthy variation in home country policy rates, vis-a-vis other foreign subsidiaries and the U.S. policy rate benchmark. The policy rates prevailing in the 13 foreign subsidiaries with negative home country rates averaged −0.37, while those for the 33 banks with 0 or positive policy rates averaged 0.58. As such, our sample includes foreign bank subsidiaries with home country policy rates both substantially above and below the policy rate prevailing in the United States.

3.2. Specification

Our base specification estimates our cross-section of banks using ordinary least squares:

\[
LENDGRWTH_i = c + \beta_1 POLRATE_i + \beta_2 NEGI_i + \beta X_i + USBANK_i + \epsilon_i
\]  

where POLRATE, and NEGI, are our variables of interest for bank \(i\), representing home country policy rates and a 0–1 dummy indicating whether or not the home country policy rate is negative. \(X_i\) denotes the set of conditioning variable discussed above, USBANK, is a 0–1 dummy identifying US banks, and \(\epsilon_i\) represents the regression residual, with standard errors clustered into domestic bank and foreign subsidiary sub-groups.

4. Results

Our results are shown in Table 2. Column 1 displays our base specification. It can be seen that both of our variables of interest enter significantly with their predicted signs, negative for POLRATE and positively for NEGI, the latter at more than a 1% confidence level. Our point estimates also indicate that these programs have had economically meaningful impacts on lending. Combined with the summary statistics in Table 1 they imply that a one standard deviation decrease in home country policy rates is associated with a 3.5 percentage point increase in growth in total loans and leases. Moreover, our positive point estimate for negative policy rates implies that banks from countries with negative policy rates experienced a 3.0 percentage point additional increase on average in lending over this period. Finally, we also obtain a positive and significant coefficient on CPIGRWTH, as expected, at a 5% confidence level, indicating that banks responded to real interest rate differentials in their lending under the COVID-19 crisis.

Among our conditioning variables, we obtain positive and significant results at a 1% confidence level for LOANCOM and negative and significant results at the 1% level for TCAP. In the case of LOANCOM, this is in keeping with expectations, as banks that entered 2020 with greater levels of unused loan commitments would all else equal have been called upon to provide more liquidity at the onset of the crisis as firms scrambled to lock in reserves of liquid assets. We have less certainty about what coefficient estimate should have been expected for TCAP. On one hand, firms with higher capital asset ratios would be better-placed during the pandemic to increase their lending activity. However, those very banks also were pursuing a less aggressive strategy going into the crisis, and it is unclear that they would be willing to extend these additional available funds.
We also obtain negative and significant coefficient estimates at a 5% confidence level for both \textit{COREDEP} and \textit{CHGCOREDEP}, indicating that deposit-intensive and banks with higher growth in their shares of core deposit funding had lower increases in their overall lending activity. These results also seem in keeping with more conservative behavior among these banks. \textit{LIQASSET} is insignificant, as is our dummy variable identifying large banks. However, our dummy variable for U.S. banks is positive and significant at a 10% confidence level. Our coefficient point estimate indicates that holding all else constant, U.S. banks had 3.0 percentage points higher lending growth over the COVID-19 period than their foreign subsidiary counterparts.

Columns 2 and 3 repeat our base specification with the variables of interest entered individually. This raises the absolute value of our estimated coefficients, as the estimate on \textit{POLRATE} falls from $-0.04$ to $-0.05$ while that on \textit{NEGI} doubles from $0.03$ to $0.06$. Overall though, the qualitative takeaway from the robustness checks is that both home country policy rates and negative policy rates play a role in the determination of bank foreign subsidiary lending behavior in the United States over this period.

Finally, to demonstrate that our results are not driven by our conditioning variables for individual bank characteristics, we drop them in columns 4 through 6. Column 4 includes both of our variables of interest, while columns 5 and 6 introduce them individually. It can be seen that our variables of interest continue to enter at a 1% confidence level with their predicted signs, although there is a modest amount of attenuation in our coefficient point estimates when the conditioning variables are excluded. Still, our conclusion is that our results are robust to the exclusion of our conditioning variables.

\begin{table}[h]
\centering
\caption{Summary statistics.}
\begin{tabular}{lcccc}
\hline
 & \multicolumn{2}{c}{Foreign subsidiaries} & \multicolumn{2}{c}{US banks} \\
 & mean & sd & min & max & mean & sd & min & max \\
\hline
LENDGRWTH & 0.07 & 0.09 & $-0.04$ & 0.36 & 0.10 & 0.10 & $-0.04$ & 0.36 \\
T1RACAP & $-0.06$ & 0.09 & $-0.34$ & 0.10 & $-0.05$ & 0.07 & $-0.75$ & 1.03 \\
POLRATE & 0.33 & 0.88 & $-0.75$ & 4.00 & 0.13 & 0.00 & 0.13 & 0.13 \\
NEGI & 0.28 & 0.46 & 0.00 & 1.00 & 0.00 & 0.00 & 0.00 & 0.00 \\
LGBANK & 0.41 & 0.50 & 0.00 & 1.00 & 0.03 & 0.16 & 0.00 & 1.00 \\
LOANCOM & 0.06 & 0.10 & 0.00 & 0.47 & 0.04 & 0.15 & 0.00 & 9.55 \\
COREDEP & 0.78 & 0.13 & 0.03 & 0.90 & 0.84 & 0.06 & 0.06 & 0.97 \\
LIQASSET & 0.16 & 0.22 & 0.01 & 0.98 & 0.09 & 0.09 & 0.00 & 0.94 \\
TCAP & 0.16 & 0.12 & 0.09 & 0.94 & 0.12 & 0.03 & 0.03 & 0.60 \\
CHGCOREDEP & 0.00 & 0.04 & $-0.11$ & 0.07 & $-0.00$ & 0.04 & $-0.62$ & 0.45 \\
CPIGRWTH & 0.29 & 1.29 & $-1.22$ & 5.20 & 0.36 & 0.00 & 0.36 & 0.36 \\
Observations & 46 & & & & 4044 & & & \\
\hline
\end{tabular}
\end{table}

See text for variable definitions.

\begin{figure}[ht]
\centering
\includegraphics[width=\textwidth]{figure1.png}
\caption{Populations of 100 basis point bins for foreign subsidiaries in sample. Left column represents population of banks with home country rates from $-1.0$ to 0.0, and so on. See text for details.}
\end{figure}
5. Robustness checks

5.1. Sample split by bank size

As large global banks are quite unique in their overall business model to more standard deposit-taking banks, we investigate the robustness of our results to separating our sample by size. We split the sample into a sub-group of small and...
medium-sized banks, with less than $10 billion in total assets, and a subset of large banks with total assets exceeding or equal to $10 billion. As before, we first run our specification with both variables of interest, and then repeat one at a time with each variable of interest entered individually.

Our results are shown in Table 3. Columns 1 through 3 run our base specification for the small and medium-sized sub-sample, while columns 4 through 6 examines the large bank sub-sample. Our small and medium-sized sub-sample contains the bulk of our total sample, comprising 3,960 observations of our 4,090 full sample specification. It is therefore no surprise that our results for small and medium-sized banks are qualitatively similar to those in our full sample. Both POLRATE and NEGI continue to enter with their expected negative and positive coefficient estimates respectively, here at a 5% significance level for both variables. There is some attenuation in the POLRATE variable, but our point estimate on the NEGI variable is much larger. Among small and medium-sized banks, our point estimate suggests that banks with negative home country policy rates exhibited 12 percentage points higher growth in lending than those from countries with positive policy rates.

However, we obtain qualitatively different results for our large bank sub-sample in columns 4 through 6. This sample is far smaller, with only 130 observations in total. In our base specification with both variables of interest included, we continue to obtain a negative and statistically significant coefficient estimate on POLRATE. Indeed, the magnitude of the point estimate is larger than that for our full sample. However, our NEGI variable enters significantly as well, albeit at only a 10% confidence level, with the incorrect negative sign. Entering these variables one at a time in columns 5 and 6, they fail to enter significantly at all.

We therefore conclude that our home country policy effect is more prevalent for the small and medium-sized banks in our sample than it is for large banks. This result is intuitive for both variables: In the case of the home country policy rate, we would expect larger foreign bank subsidiaries to be better-placed to expand or contract their lending portfolio rapidly in response to prevailing interest differentials. The discrepancy in the performance of the NEGI variable is also intuitive. Smaller banks are likely to be more dependent on wholesale deposit funding, where the zero-lower bound on interest rates is most biting, and have less capacity for adjustment in funding sources as the costs of relative sources of funding changes. As a result, they have been shown to experience greater reductions in net interest income under negative policy rates (e.g. Lopez et al., 2020).

One last notable discrepancy we find by bank size concerns the performance of our USBANK dummy variable. This variable is positive and significant for our small and medium-sized banks in our base specification, but completely insignificant in our large bank sub-sample. This result is also intuitive, as we would expect more homogeneity in the conditions faced by large domestic banks and foreign bank subsidiaries relative to their smaller counterparts.

5.2. Small business and farm lending growth

The onset of the COVID-19 pandemic in the U.S. in the early weeks of 2020 and the accompanying quarantines and work-from-home orders severely affected the viability of many small businesses, especially those in the retail and service sectors. Small businesses play an integral role in the U.S. economy and particularly the labor market, and were the focus of a number of government initiatives aimed at maintaining employment. Most notable of these was the Paycheck Protection Program (PPP), which was launched to help firms retain their employees and cover other ongoing expenses. In this sub-section, we examine how U.S. foreign bank subsidiaries compared to their domestic counterparts in lending to small businesses and farms during the pandemic, as well as the roles played in those outcomes by the home country monetary policies of foreign subsidiaries.

We again use our base specification, but add a variable containing a proxy for bank participation in the PPP program, which we term PPPR. This term measures the share of bank small business and farm lending that was placed under the PPP program. This program provided guarantees on small business loans. For banks, interest rates were low, but fees collected from the Small Business Administration for servicing the loans ended up leaving participation in the PPP program a profitable decision for many banks, particularly on loans considered risky.

Our results are shown in Table 4. Columns 1 through 3 report the results for growth in small business lending. In our base specification with both variables of interest included, POLRATE comes in with its expected negative coefficient estimate, albeit at only a 10% confidence level. Moreover, our NEGI variable comes in with the incorrect negative sign, again at only a 10% confidence level. When entered on their own, POLRATE continues to enter with its predicted negative sign, but only at a 10% confidence level, and NEGI is now statistically insignificant. Our proxy for participation in the PPP program is very insignificant.

Results for small farm loan growth in columns 4 through 6 provide a similar message. We obtain the expected negative coefficient on the POLRATE variable, in this case at a 5% confidence level, but the NEGI variable enters with statistical significance with an incorrect negative sign. The PPPR variable again enters insignificantly. We therefore cannot make any strong

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7 Our results with one of the variables of interest for small and medium-sized banks are more mixed, and the USBANK variable continues to enter positively and significantly with the POLRATE variable dropped (Column 3), but becomes insignificant when the NEGI variable is dropped.

8 As discussed in Lopez and Spiegel (2021), all loans recorded as "small business and farm loans" in the Call Report do not represent what would be commonly considered lending to small businesses. The Call Report defines small business loans as all business loans of $1 million or less and small farm loans as farm loans of $500,000 or less. It has been documented that these thresholds are potentially noisy indicators of lending to small businesses, as large businesses also take out loans of these small magnitudes.
Table 3
Banks separated by size.

| VARIABLES                  | (1)     | (2)     | (3)     | (4)     | (5)     | (6)     |
|---------------------------|---------|---------|---------|---------|---------|---------|
| POLRATE                   | −0.02***| −0.05*  | −0.07***| 0.01    |         |         |
|                           | (0.05)  | (0.05)  | (0.00)  | (0.34)  |         |         |
| NEGI                      | 0.12**  | 0.13*** | −0.07*  | −0.02   |         |         |
|                           | (0.02)  | (0.02)  | (0.05)  | (0.18)  |         |         |
| LOANCOM                   | 0.03***  | 0.05*** | 0.08    | 0.08    | 0.08    | 0.08    |
|                           | (0.01)  | (0.01)  | (0.36)  | (0.42)  | (0.41)  |         |
| COREDEP                   | −0.09**  | −0.09**  | −0.09**  | 0.17**  | 0.17**  | 0.17*   |
|                           | (0.01)  | (0.03)  | (0.05)  | (0.03)  | (0.05)  |         |
| LIQASSET                  | 0.07***  | 0.07***  | 0.12    | −0.14   | −0.14   | −0.14   |
|                           | (0.01)  | (0.01)  | (0.31)  | (0.30)  | (0.30)  |         |
| Observations              | 3,960   | 3,960   | 3,960   | 130     | 130     | 130     |
| R-squared                 | 0.09    | 0.09    | 0.09    | 0.19    | 0.19    | 0.19    |

Note: Ordinary least squares estimation of impact of home country policy rates on growth in total loans and leases from 2019Q4 through 2020Q2. Samples split into small and medium-sized banks (assets < $10b) and large banks (assets ≥ $10b). Models 1 through 3 estimate small and medium-sized bank sub-sample, while columns 4 through 6 report results for large bank sub-sample. Standard errors clustered into domestic and foreign subsidiary subgroups. See text for variable definitions. P values in parenthesis *** p < 0.01; ** p < 0.05; * p < 0.1.

Table 4
Small business and farm lending growth.

|                      | (1)  | (2)  | (3)  | (4)  | (5)  | (6)  |
|----------------------|------|------|------|------|------|------|
| POLRATE              | −0.09*| −0.07*| −0.11**| −0.04**|     |      |
|                      | (0.07)| (0.10)| (0.01)| (0.02)|     |      |
| NEGI                 | −0.08**| −0.01| −0.21***| −0.17**|     |      |
|                      | (0.01)| (0.45)| (0.01)| (0.02)|     |      |
| LGBANK               | 0.14| 0.14| 0.02| 0.02| 0.02| 0.02|
|                      | (0.11)| (0.14)| (0.29)| (0.22)| (0.34)|     |
| LOANCOM              | 0.05| 0.05| 0.04| −0.03*| −0.03**| −0.03*|
|                      | (0.11)| (0.14)| (0.05)| (0.05)| (0.06)|     |
| COREDEP              | −0.33**| −0.33**| −0.33**| 0.08*| 0.08*| 0.08*|
|                      | (0.03)| (0.04)| (0.06)| (0.06)| (0.02)|     |
| LIQASSET             | −0.01| −0.01| −0.01| 0.02*| 0.02**| 0.02**|
|                      | (0.75)| (0.76)| (0.06)| (0.05)| (0.07)|     |
| TCAP                 | −0.94**| −0.94**| −0.95**| −0.06| −0.06| −0.07|
|                      | (0.03)| (0.04)| (0.33)| (0.25)| (0.19)|     |
| CHGCOREDEP           | −1.36**| −1.36**| −1.36**| 0.02**| 0.02*| 0.02***|
|                      | (0.02)| (0.02)| (0.02)| (0.02)| (0.07)| (0.00)|
| CPIGRWTH             | −0.04**| −0.05**| −0.08***| 0.06*| 0.04***| −0.00|
|                      | (0.05)| (0.04)| (0.01)| (0.01)| (0.14)|     |
| USBANK               | −0.09*| −0.07| −0.05| −0.07*| −0.00| −0.00|
|                      | (0.09)| (0.11)| (0.12)| (0.05)| (0.11)|     |
| PPRR                 | 0.01| 0.01| 0.01| −0.00| −0.00| −0.00|
|                      | (0.13)| (0.13)| (0.12)| (0.16)| (0.13)|     |
| Constant             | 0.83***| 0.80***| 0.79**| −0.01| −0.08| −0.03|
|                      | (0.01)| (0.01)| (0.05)| (0.12)| (0.23)|     |
| Observations         | 3,840| 3,840| 3,840| 3,363| 3,363| 3,363|
| R-squared             | 0.05| 0.05| 0.05| 0.00| 0.00| 0.00|

Note: Ordinary least squares estimation of impact of home country policy rates on growth in small business and farm lending from 2019Q4 through 2020Q2. Models 1 through 3 estimate small business lending growth and columns 4 through 6 report results for small farm lending growth. Standard errors clustered into domestic and foreign subsidiary subgroups. See text for variable definitions. P values in parenthesis *** p < 0.01; ** p < 0.05; * p < 0.1.
conclusions about the influence of home policy rates or rates below the zero bound on growth in small business and farm lending.

6. Bank capital ratios and income

6.1 Bank capital asset ratios

We have already seen that low policy rate levels acted to stimulate lending among foreign bank subsidiaries, and that this effect was amplified if home policy rates were below the zero bound. We would therefore also expect to find that lower and negative policy rates would be associated with a reduction in bank capital asset ratios. We evaluate this question using two alternative measures of bank capital adequacy, TCAP, which measures the total capital ratio, and T1RACAP, which measures the risk-adjusted capital asset ratio. As before, our dependent variable is the growth in these variables from 2019Q4 to 2020Q2.

Our results are shown in Table 5. The first three columns report our base regression estimation results with growth in TCAP as the dependent variable. As expected, we obtain a positive and statistically significant coefficient on POLRATE and a negative and significant coefficient estimate on NEGI. Thus, consistent with our expectations, easier home country monetary policy is associated with increased bank activity and deterioration in foreign bank subsidiary balance sheets. However, these estimated movements in bank capital asset ratios are not large. Our point estimates indicate that a one standard deviation decrease in POLRATE is associated with only an 88 basis point deterioration in total bank capital ratios. We do get a larger estimate for negative policy rates. A negative home country policy rate is estimated to add another 3 percentage points to the decline in the total capital asset ratio. As before, repeating our specification with the variables of interest included one at a time yields similar results, with modestly larger point estimates.

The latter three columns repeat our base specification using the risk-adjusted tier 1 capital ratio. In particular, as loans extended under the Paycheck Protection Program were guaranteed by the U.S. Treasury, they were assigned a 0 risk weight in risk-adjusted capital ratio measures by regulatory authorities. Indeed, Lopez and Spiegel (2021) demonstrate that while extended under the Paycheck Protection Program were guaranteed by the U.S. Treasury, they were assigned a 0 risk weight to the decline in the total capital asset ratio. As before, repeating our specification with the variables of interest included one at a time yields similar results, with modestly larger point estimates.

However, particularly for larger global banks, it is unlikely that a large portion of lending activity was influenced by this program, as small business lending comprises a relatively small portion of overall foreign bank subsidiary lending packages. Indeed, our results for POLRATE indicate that easier home country monetary policies are associated with even greater dete-

| TABLE 5 | Capital asset ratio growth. |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| VARIABLES       | (1) TCAP         | (2) TCAP         | (3) TCAP         | (4) T1RACAP      | (5) T1RACAP      | (6) T1RACAP      |
| POLRATE         | 0.01*** (0.01)   | 0.02*** (0.01)   | 0.07** (0.04)    | 0.07** (0.05)    | 0.07** (0.05)    | 0.07** (0.05)    |
| NEGI            | 0.00*** (0.00)   | 0.00*** (0.00)   | 0.00*** (0.36)   | 0.00*** (0.08)   | 0.00*** (0.08)   | 0.00*** (0.08)   |
| LGBANK          | 0.04 (0.07)      | 0.04* (0.07)     | 0.35** (0.05)    | 0.35** (0.05)    | 0.35** (0.05)    | 0.35** (0.05)    |
| LOANCORE         | 0.02 (0.02)      | 0.02 (0.02)      | 0.03 (0.04)      | 0.03** (0.04)    | 0.03** (0.04)    | 0.03** (0.04)    |
| COREDEP         | 0.02 (0.14)      | 0.02 (0.13)      | 0.02 (0.02)      | 0.02 (0.02)      | 0.02 (0.02)      | 0.02 (0.02)      |
| LIQASSET        | 0.00*** (0.01)   | 0.00*** (0.10)   | 0.19* (0.06)     | 0.19* (0.06)     | 0.19* (0.06)     | 0.19* (0.06)     |
| TCAP            | 0.02 (0.61)      | 0.02 (0.63)      | 0.02 (0.05)      | 0.02 (0.05)      | 0.02 (0.05)      | 0.02 (0.05)      |
| CHGCOREDEP      | 0.19** (0.05)    | 0.19** (0.05)    | 0.19** (0.05)    | 0.19** (0.05)    | 0.19** (0.05)    | 0.19** (0.05)    |
| CPIGRWTH        | 0.00 (0.12)      | 0.00 (0.34)      | 0.00 (0.03)      | 0.00 (0.03)      | 0.00 (0.03)      | 0.00 (0.03)      |
| USBANK          | 0.02** (0.02)    | 0.01** (0.04)    | 0.00*** (0.00)   | 0.00*** (0.03)   | 0.00*** (0.03)   | 0.00*** (0.03)   |
| Constant        | 0.05*** (0.01)   | 0.06*** (0.00)   | 0.05*** (0.01)   | 0.05*** (0.03)   | 0.05*** (0.03)   | 0.05*** (0.03)   |
| Observations    | 4,109            | 4,109            | 4,109            | 4,109            | 4,109            | 4,109            |
| R-squared       | 0.03             | 0.03             | 0.03             | 0.03             | 0.03             | 0.03             |

Note: Ordinary least squares estimation of impact of home country policy rates on growth in capital ratios from 2019Q4 through 2020Q2. Models 1 through 3 estimate total capital ratio growth, while columns 4 through 6 report results for tier-1 risk-adjusted capital ratio growth. Standard errors clustered into domestic and foreign subsidiary subgroups. See text for variable definitions. P values in parenthesis *** p < 0.01; ** p < 0.05; * p < 0.1.
rioration among risk-adjusted capital ratios. Our point estimates indicate that a one standard deviation decrease in home country policy rates is associated with a 6.1 percentage point decline in growth in foreign bank subsidiary tier 1 risk-adjusted capital ratios.

The results for negative home country policy rates are weaker. In our base specification, with both variables of interest entered simultaneously, our coefficient estimate for \( \text{NEGI} \) is insignificant and close to zero. Entered on its own (column 6), we find that negative home country policy rates are associated with 5 percentage points lower growth in risk-adjusted capital asset ratios on average.

6.2. Bank income

The increased lending activity associated with easier home country monetary policy would also be expected to result in increased bank income over the period. We evaluate this effect in Table 6.

Columns 1 through 3 repeat our base specification with growth in net income as a dependent variable. Our results are consistent with the hypothesis that easier monetary policy was associated with increased foreign bank subsidiary lending activity, and hence income, over this period. \( \text{POLRATE} \) enters negatively with significance at a 5% confidence level, indicating that easier home country monetary policy was associated with increased foreign bank subsidiary income. Our point estimate indicates that a one standard deviation decrease in home country policy rates was associated with a 5.3 percentage point increase in net income growth over the first half of 2020. We obtain more mixed results for the \( \text{NEGI} \) variable, as the variable enters with a very small coefficient point estimate with both \( \text{POLRATE} \) and \( \text{NEGI} \) included together, but on its own with a point estimate that indicates that a negative home country policy rate was associated with 5 percentage points higher income growth on average over the first half of 2020.

Columns 4 and 5 substitute growth in the primary components of net income, net interest income and net non-interest income respectively. Interestingly, these components behave very differently, both from each other and within each for our two indicators of home country monetary policy.

For net interest income, \( \text{POLRATE} \) enters negatively, with statistical significance at a 10% confidence level. Our coefficient point estimate suggests that a one standard deviation decrease in home country policy rates is associated with a 4.4 percentage point increase in growth in net interest income. However, we also obtain a negative coefficient point estimate on \( \text{NEGI} \), which enters significantly at a 5% confidence level, and indicates that after accounting for differences in interest rate levels, foreign subsidiaries with negative home country policy rates experienced on average one percentage point lower growth in net interest income.

### Table 6

Income growth.

| VARIABLES     | (1) INC | (2) INC | (3) INC | (4) NIINC | (5) NNIINC |
|---------------|--------|--------|--------|-----------|-----------|
| POLRATE       | -0.06** | -0.06** | -0.05* | 0.04**    |           |
| \( \text{NEGI} \) | 0.00* | 0.05** | -0.01** | 0.08***   |           |
| \( \text{LGBANK} \) | -0.05** | -0.05** | -0.05* | -0.06**   | 0.04      |
| \( \text{LOANCOM} \) | 0.01 | 0.01 | 0.01 | 0.02** | 0.00      |
| \( \text{COREDEP} \) | -0.08* | -0.08* | -0.08* | -0.15*** | 0.16*     |
| \( \text{LIQASSET} \) | -0.09** | -0.09** | -0.09** | -0.16** | -0.08**   |
| \( \text{TCAP} \) | -0.16* | -0.16* | -0.16* | -0.35     | -0.07     |
| \( \text{CHGCOREDEP} \) | -0.26*** | -0.26*** | -0.26*** | -0.34*** | 0.13*     |
| \( \text{CPIGRWTH} \) | 0.02** | 0.02** | 0.00   | 0.01      | 0.01***   |
| \( \text{US_BANK} \) | 0.05** | 0.05** | 0.07** | 0.02      | -0.03*    |
| \( \text{Constant} \) | 0.03** | 0.04** | 0.01   | 0.22      | -0.16*    |
| Observations  | 4,109  | 4,109  | 4,109  | 4,109     | 4,108     |
| R-squared     | 0.04   | 0.04   | 0.04   | 0.06      | 0.01      |

Note: Ordinary least squares estimation of impact of home country policy rates on growth in income from 2019Q4 through 2020Q2. Models 1 through 3 estimate impact on growth in net income, while column 4 estimates impact on growth in net interest income and column 5 reports estimates of impact on net non-interest income. Standard errors clustered into domestic and foreign subsidiary subgroups. See text for variable definitions. P values in parenthesis *** \( p < 0.01 \); ** \( p < 0.05 \); * \( p < 0.1 \).
In contrast, we obtain opposite signed coefficients for net non-interest income. POLRATE enters positively and with statistical significance at a 5% confidence level, while NEGI also enters positively and significantly at a 1% confidence level. Our point estimates indicate that a one standard deviation decrease in home country policy rates are associated with a 3.5 percentage point increase in non-interest income, while negative home country rates holding all else constant are associated with an 8 percentage point increase in non-interest income.

These mixed results appear to reflect the complicated funding and revenue options available to foreign bank subsidiaries in the United States. Disparities between interest and non-interest income performances under negative rates have been documented in the literature (e.g. Lopez et al., 2020), as banks have often responded to losses on interest income in the United States by increasing non-interest income through fees on deposits and other service vehicles. This seems consistent with the negative point estimate on NEGI for interest income growth, and the positive one on non-interest income growth.

However, by definition, foreign bank subsidiaries in the United States raise funds domestically, and indeed have been shown to rely on domestic deposits at rates comparable to their domestic competitors (Goulding and Nolle (2012)). As such, one might be surprised to see this effect displayed in the data. This might explain the conflicting picture obtained for the income components for policy rate changes. There, we obtain results that would be more akin to the expected response of domestic banks, as lower home country policy rates, if interpreted more generally as a positive shock to internal capital, would be expected to increase lending activity and therefore interest income, likely at the expense of non-interest income.

7. Conclusion

This paper examines global monetary policy spillovers through a comparison of the lending practices of U.S. foreign bank subsidiaries and their domestic counterparts during the first half of 2020. Our results confirm that the lending channel was a feature of this period, as foreign subsidiaries responded to both home country policy rate levels and rates below the zero bound by increasing their lending activity in the United States. Our results were strongest for small and medium-sized banks. Large foreign subsidiaries were less sensitive to home country monetary policy conditions. As easier home monetary policy conditions encouraged increased U.S. activity, banks also exited the pandemic period with lower capital ratios.

The implications of this expansion on bank income, however, was more mixed. Easier policy rates were found to expand net income, but the estimated impact of negative rates on net income was close to zero. Moreover, the impact of negative rates on interest and non-interest income were positive and negative respectively. This latter finding seems to mirror findings in the literature demonstrating that banks moved out of less-profitable traditional banking activity in response to negative rates to rely more heavily on other revenue vehicles and fees.

However, the overall message of the paper is that the bank lending channel for global monetary policy spillovers that was identified during the global financial crisis appears to have also influenced credit dynamics during the pandemic. An important caveat, however, is that much was held constant in our analysis. In particular, we do not account for the impacts of home country regulatory policy or implicit government guarantees on lending embedded in pandemic policy responses. These differed widely across the home countries in our sample.

Appendix A

Tables 7 and 8

| Bank Name                        | Parent Country | Policy Rate |
|---------------------------------|----------------|-------------|
| City National Bank              | Canada         | .25         |
| Delta Bank and Trust Company    | Cayman Islands | .1          |
| BMO Harris Bank                 | Canada         | .25         |
| Bank Leumi USA                  | Israel         | .1          |
| Banco do Brasil Americas        | Brazil         | 2.25        |
| Flagstar Bank                   | Cayman Islands | .1          |
| MUFG Union Bank                 | Japan          | -.068       |
| Deutsche Bank USA               | Germany        | -.5         |
| Mizuho Bank USA                 | Japan          | -.068       |
| Habib American Bank             | Switzerland    | -.75        |
| Oriental Bank                   | Puerto Rico    | .125        |
| Deutsche Bank Trust Co. Delaware| Germany        | -.5         |
| Israel Discount Bank of New York| Israel         | .1          |
| BankPacific                     | Guam           | .125        |
| Woori America Bank              | South Korea    | .5          |
| HSBC Bank USA                   | United Kingdom | .1          |
| TD Bank                         | Canada         | .25         |
Table 8
Positive and negative policy rate foreign bank statistics.

| Bank Name                      | Parent Country | Policy Rate |
|-------------------------------|----------------|-------------|
| FirstBank Puerto Rico         | Puerto Rico    | .125        |
| KEB Hana Bank USA             | South Korea    | .5          |
| BBVA USA                      | Spain          | -.5         |
| Bank of Guam                  | Guam           | .125        |
| Santander Bank                | Spain          | -.5         |
| BAC Florida Bank              | Brazil         | 2.25        |
| State Bank of India - California | India      | 4           |
| Bank of the West              | France         | -.5         |
| City National Bank of Florida | Chile          | .5          |
| Safra National Bank of New York | Gibraltar | .1          |
| Sumitomo Mitsui Trust Bank USA | Japan       | -.068       |
| Manufacturers Bank            | Japan          | -.068       |
| Banco Popular de Puerto Rico  | Puerto Rico    | .125        |
| CTBC Bank Corp. USA           | Taiwan         | 1.125       |
| Industrial and Commercial Bank of China | China | 2.25 |
| Shinhan Bank America          | South Korea    | .5          |
| Canadian Imperial Bank of Commerce U.S. | Canada | .25 |
| ANZ in Guam                   | Australia      | .25         |
| Desjardins Bank               | Canada         | 2.5         |
| TD Bank USA                   | Canada         | 2.5         |
| Natbank                       | Canada         | 2.5         |
| EverTrust Bank                | Taiwan         | 1.125       |
| First Commercial Bank USA     | Taiwan         | 1.125       |
| Popular Bank                  | Puerto Rico    | .125        |
| BMW Bank of North America     | Germany        | -.5         |
| Barclays Bank Delaware        | United Kingdom | .1         |
| UBS Bank USA                  | Switzerland    | -.75        |
| Toyota Financial Savings Bank | Japan          | -.068       |
| RBC Bank Georgia              | Canada         | .25         |

Note: Dependent variable: Growth in small business and farm lending from 2019Q4 through 2020Q2. Instrumental variables estimation. See text for variable definitions and column specifications. *** p < 0.01; ** p < 0.05; * p < 0.1.
