

# Motivating Banks to Lend?

## Credit Spillover Effects of the Main Street Lending Program\*

Camelia Minoiu<sup>†</sup>    Rebecca Zarutskie<sup>‡</sup>    Andrei Zlate<sup>§</sup>

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### Abstract

We study the effects of the Main Street Lending Program (MSLP)—an emergency lending program aimed at supporting the flow of credit to small and mid-sized firms in response to the COVID-19 pandemic—on bank lending. Consistent with the incentives created by the program, we find that participating banks are traditional lenders with larger loan portfolios and have greater potential funding constraints (lower capital buffers and deposit funding shares). Using a combination of survey and loan-level data from two credit registers, we document that the MSLP had positive spillover effects on banks’ willingness to lend more generally outside the program to both large and small firms. Participating banks tightened their lending standards and terms on C&I loans relatively less and were more likely to originate and renew C&I loans than non-participating banks following the introduction of the program. These findings suggest that, despite the modest take-up, the MSLP served to increase banks’ risk tolerance, supporting the flow of credit during the pandemic.

**Keywords:** Main Street Lending Program, Federal Reserve, bank lending, COVID-19 pandemic, emergency lending facilities

**JEL Codes:** G21, E52, E58, E63

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<sup>†</sup>Federal Reserve Board, [camelia.minoiu@frb.gov](mailto:camelia.minoiu@frb.gov).

<sup>‡</sup>Federal Reserve Board, [rebecca.e.zarutskie@frb.gov](mailto:rebecca.e.zarutskie@frb.gov).

<sup>§</sup>Federal Reserve Board, [andrei.zlate@frb.gov](mailto:andrei.zlate@frb.gov).

The Federal Reserve took unprecedented actions in response to the financial market and economic upheaval that occurred in March 2020 following the emergence of the COVID-19 pandemic. Amongst other policy actions, the Federal Reserve, jointly with the U.S. Treasury, established a number of emergency lending facilities under section 13(3) of the Federal Reserve Act to further support the flow of credit to the economy.<sup>1</sup>

In this paper we focus on the Main Street Lending Program (MSLP), an innovative public policy program aimed at supporting the flow of bank credit to small and medium-sized businesses affected by the pandemic. We ask what incentives banks have to participate in the program and we empirically examine banks' behavior with respect to the MSLP, focusing on spillovers to lending standards and the flow of business credit more generally. While the MSLP supported the flow of credit to businesses via loans offered through the program, overall take-up was limited. Nevertheless, the MSLP may have influenced bank lending behavior more generally, by serving as a backstop—a facility aimed at providing financing where it was otherwise not available—and assuring lenders that they would have access to funding program as economic conditions evolved. Two weeks before the program started approving loans, Jerome Powell, Chair of the Federal Reserve, stated that “the facility might be used relatively little and mainly serve as a backstop, assuring lenders that they will have access to funding and giving them the confidence to make loans to households and businesses.”<sup>2</sup> Therefore, it is possible that the program's function of a backstop to the bank loan market may have boosted banks' general levels of risk tolerance and increased their

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<sup>1</sup>The Federal Reserve deployed a wide range of [liquidity and lending facilities](#) at the onset of the pandemic. Some facilities were reprised from the toolkit of unconventional monetary policies born in the wake of the 2007–2008 financial crisis. These include the Commercial Paper Funding Facility (CPFF), the Primary Dealer Credit Facility (PDCF), and the Money Market Mutual Fund Liquidity Facility (MMLF). The Fed also made temporary dollar liquidity arrangements with other central banks. A number of new facilities were added. Two facilities were established to support the flow of credit in the corporate bond market—the Primary Market Corporate Credit Facility (PMCCF) and the Secondary Market Corporate Credit Facility (SMCCF). One facility was established to support municipal bond markets—the Municipal Lending Facility (MLF). The Paycheck Protection Program Liquidity Facility (PPPLF) was established to facilitate the origination of loans under the SBA's PPP. Finally, the MSLP, studied in this paper, was established to support bank lending to small and medium-sized firms not generally served by the corporate bond market.

<sup>2</sup>Source: The “[Coronavirus and CARES Act](#)” Testimony before the Committee on Financial Services, U.S. House of Representatives, Washington, D.C., delivered on June 30, 2020.

willingness to extend credit. Additionally, the introduction of the MSLP may have increased the willingness of banks to lend if participation in the MSLP served to free up funding for other lending activities or if banks viewed the option to originate loans through MSLP or the presence of future Federal Reserve support for bank lending as a way of easing future balance sheet constraints that might arise from current lending decisions.

In assessing the effects of the MSLP, we bring together a variety of data sources, including (a) data on the individual lenders and borrowers originating and receiving MSLP loans, (b) survey microdata on banks' lending standards and the terms for commercial and industrial (C&I) loans and on individual bank experiences with the MSLP, (c) supervisory loan-level data including information on loan terms such as spreads, maturities, and collateral, to both large and small firms, (d) bank balance sheet data, and (e) geographic data on pandemic intensity and labor market conditions. Taken together, these data allow us to form a comprehensive view of the relation between banks' participation in the MSLP and bank characteristics as well as banks' subsequent lending policies and behavior.

We first examine which banks participate in the program. Consistent with the incentives embedded in the MSLP's design, we find that traditional lenders—banks with larger loan portfolios— and banks more likely to face funding constraints—those with lower capital buffers and lower shares of core deposits—are more likely to register for the MSLP. While only about one in two registered lenders originate loans under the program, the same characteristics also generally predict whether banks lend under the program.

We then examine whether the introduction of the MSLP served more generally to encourage banks to lend. Specifically, we study changes in lending standards, loan volumes, and loan terms for approved loans, for participating banks following the introduction of the program. We find that MSLP lenders tightened lending standards and terms on new C&I loans by less than non-lenders, were more likely to originate and renew C&I loans, and provided relatively better terms on approved loans (including lower spreads, longer maturities, and lower collateral requirements). MSLP-participating banks also granted relatively

more small business loans, especially to ex-ante safer borrowers, which were current on their debt payments and had higher credit scores. We present evidence that these results are not driven neither by borrower credit demand—for which we control with granular firm- or firm-cluster $\times$ time fixed effects (in the spirit of [Khwaja and Mian \(2008\)](#))—or by unobserved bank characteristics between banks that participate in the MSLP and those that do not.

The result that the MSLP contributed to ease financing conditions at participating banks—or at least mitigated against further tightening—echoes previous findings that Fed programs’ announcements helped improve the functioning of financial markets. For instance, studies have shown that the introduction of several Fed facilities as a backstop to the private corporate and municipal bond markets, led to a significant retracing of stress conditions experienced early in the pandemic, and generally eased conditions in these markets despite low take-up ([Bordo and Duca, 2021](#); [Gilchrist, Wei, Yue and Zakrajšek, 2020](#); [Kargar, Lester, Lindsay, Liu, Weill and Zúñiga, 2020](#)). The MSLP’s positive spillover effects are consistent with the notion that the MSLP may have reduced banks’ effective levels risk aversion, increasing their willingness to lend despite high levels of uncertainty about credit risk and the economic outlook. It is also consistent with the presence of the MSLP and expectation of lending support encouraging banks that might face future balance sheet constraints to feel more confident lending knowing that there would likely be support if economic conditions were to deteriorate further. Similar positive effects of Fed facilities and communications on market participants’ confidence and attitudes towards risk-taking have been documented for the equity market ([Cox, Greenwald and Ludvigson, 2020](#)).

Of the \$600 billion in available funds to purchase MSLP loans, only \$16.5 billion were used by the SPV to purchase loans before the program expired at 2020 year end. Why was overall take-up in the program so limited, both in terms of registration for the program and actual loan-granting? We find that banks that chose not to register were either able to meet borrower needs outside the program (including through the SBA’s PPP) or found key MSLP terms unattractive to register, such as uncertainty in the loss-sharing agreement with the

MSLP. Registered banks that did not grant any MSLP loans reported being hampered from doing so by loan terms that were deemed unattractive to borrowers and reduced demand for MSLP loans. These factors include the tight restrictions on firm leverage, the complex certifications and covenants, and the steep amortization schedule within the five-year maturity of MSLP loans. Indeed, the leverage and risk constraints set by the MSLP terms were more binding for MSLP borrowers than for non-MSLP borrowers, suggesting that the restrictive borrower terms may have constrained the actual take-up. [As a result, we] We find that MSLP borrowers were on average riskier than eligible non-MSLP borrowers, as reflected in banks' worse internal ratings for these borrowers, as well as worse financials, such as higher leverage, lower interest coverage ratios, smaller cash buffers, and lower profitability. Despite the overall modest take-up of the MSLP, our results nevertheless show that the MSLP supported the flow of credit during the pandemic through lending outside the program.

**Literature Review.** Our analysis contributes to a large literature on the effectiveness of fiscal and central bank emergency relief measures during the COVID-19 pandemic. To date, two novel public interventions have been at the center of this literature: SBA's PPP, the large-scale grant-making credit support program for small businesses, particularly affected by the pandemic (Chodorow-Reich, Darmouni, Luck and Plosser, 2020) and the Fed's Corporate Credit Facilities, especially the secondary market facility (SMCCF).<sup>3</sup> The early evidence points to relatively poor targeting of the PPP program, with harder hit regions receiving fewer loans, but studies broadly agree that the PPP has had positive employment effects (Bartik, Cullen, Glaeser, Luca, Stanton and Sunderam (2020b); Cole (2020); Granja, Makridis, Yannelis and Zwick (2020); Hubbard and Strain (2020)). Analyses of the Fed's corporate bond market facilities generally find positive effects on prices and liquidity (Boyarchenko, Kovner and Shachar (2020); Kargar, Lester, Lindsay, Liu, Weill and Zúñiga (2020); Hadlock and Pierce (2010); Gilchrist, Wei, Yue and Zakrajšek (2020); Nozawa and Qiu (2020); Vissing-Jorgensen (2020)). These facilities also had spillovers to other asset

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<sup>3</sup>European countries were more likely to implement credit guarantee schemes, with important effects for constrained firms (see, for instance, Core and De Marco (2020)).

classes or markets. For instance, [Darmouni and Siani \(2020\)](#) find that the SMCFF’s announcement reduced bank lending, as large firms took advantage of the low borrowing costs in the bond market to pay down expensive bank debt, [Falato, Goldstein and Hortaçsu \(2020\)](#) show that the same facility stimulated primary market bond issuance, and [Haddad, Moreira and Muir \(2020\)](#) find dampening effects of the facility on riskier firms’ bond spreads despite not being directly targeted by the policy. We add to this literature novel evidence that a direct business credit program boosted participating banks’ willingness to extend loans outside the program, despite a modest take-up of the program itself.

Our paper also adds to the large literature on the effectiveness of central bank lending programs and unconventional monetary policies that have become a central part of the monetary policy toolkit since the 2007-2008 financial crisis ([Borio and Zabai, 2018](#)). For the U.S., this literature has focused on the effectiveness of balance sheet expansion policies and forward guidance in restoring liquidity and normalizing conditions across financial markets ([Kuttner, 2018](#)). In other advanced economies, the experience has also included negative interest rate policies or bank lending programs aimed at sustaining low bank funding costs and the flow of credit ([Dell’Ariccia, Rabanal and Sandri, 2018](#)). Studies of Long-Term Refinancing Operations in the euro area, for instance, identify positive, albeit heterogeneous, effects across countries in the supply of loans to small bank-dependent firms (see, e.g., [Carpinelli and Crosignani \(2018\)](#), [Andrade, Cahn, Fraise and Mésonnier \(2019\)](#), and [Jasova, Mendicino and Supera \(2018\)](#)). [Churm, Joyce, Kapetanios and Theodoridis \(2018\)](#) find that the Bank of England’s Funding for Lending scheme had positive effects on aggregate credit provision and growth. Our paper examines a novel program by which the Fed, with the backing of the U.S. Treasury, lends through the banking system to firms facing a temporary funding shortage caused by the pandemic.

The remainder of the paper proceeds as follows. Section 1 describes the MSLP. Section 2 lays out the main mechanisms and hypotheses we test empirically. Section 3 outlines our data sources. Sections 4 and 5 present empirical results on the characteristics of participating

banks and the program’s spillovers to banks’ C&I lending decisions more generally. Section 6 studies the MSLP borrowers and discusses the eligibility requirements that likely constrained program take-up. Section 7 concludes.

## 1 Institutional Background

The MSLP is a unique laboratory for studying the effectiveness of government interventions in the private credit market owing to a number of key features. One such feature is the program’s reliance on banks to screen and originate loans, a substantial portion of which can then be sold to a special purpose vehicle (SPV) maintained by the Fed.<sup>4</sup> This differentiates it from other emergency lending facilities, which instead purchase assets via an SPV that acquires those assets in publicly-traded markets or directly from borrowers. As such, a crucial aspect of understanding the credit spillover effects of the MSLP lies in understanding banks’ incentives to participate in the program. The MSLP also differs from government loan-guarantee programs or a grant-making program such as the Small Business Administration’s Paycheck Protection Program (PPP) through the full-recourse (i.e., non-forgivable) nature of MSLP loans and the risk-sharing arrangement between participating lenders and the SPV, by which lenders are required to retain a 5% risk exposure to the borrower.

The MSLP’s intended goal was to facilitate the extension of new credit to small and mid-sized firms that were financially sound before the COVID-19 outbreak but whose business suffered during the crisis, helping them maintain operations and payroll until conditions normalize. The MSLP targeted the middle portion of the firm size distribution, comprising small and mid-sized bank-dependent firms that are often too large to qualify for PPP loans but are not large enough to issue bonds or syndicated loans, and thus could not benefit from the Fed’s corporate credit facilities. The firms targeted by the program make up an important part of the economy as they employ more than 50 million people ([English and](#)

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<sup>4</sup>The SPV is funded jointly by the U.S. Treasury and the Fed, where Treasury funding serves as credit protection for the Fed.

[Liang, 2020](#)) or about 30% of the aggregate labor force. At the same time, the MSLP tried to ensure some overlap in eligibility across the PPP and the Fed’s corporate credit facilities to avoid large gaps in government’s support for credit access.

The program included three facilities for U.S. businesses and two facilities for nonprofit organizations: the Main Street New Loan Facility (MSNLF), the Main Street Priority Loan Facility (MSPLF), and the Main Street Expanded Loan Facility (MSELF), the Nonprofit Organization New Loan Facility (NONLF), and the Nonprofit Organization Expanded Loan Facility (NOELF). For-profit businesses must have at most 15,000 employees in the 12 months before the origination of a Main Street loan or at most \$5 billion in revenues in 2019. The nonprofit’s maximum endowment in 2019 must be less than \$3 billion and its non-donation revenues must be at least 60% of expenses between 2017 and 2019. All MSLP facilities work in the same way: through an SPV they purchase 95% participations in loans to eligible borrowers from the banks, which retain the remaining 5%. In addition, eligible loans must have an adjustable interest rate of LIBOR plus 300 basis points (bps), five-year maturity, deferral periods for principal and interest payments, and an allowance for early repayments without penalty. However, the facilities differ in terms of eligible loan size, limits on borrower leverage, and conditions for loan security and seniority relative to a borrower’s other debt.<sup>5</sup> We focus on the three lending facilities focused on for-profit businesses.

The MSLP was designed to encourage the extension of new credit to firms affected by the pandemic by removing most of the banks’ balance sheet exposure to the loans extended under the program. The banks’ retention rate of only 5% is thus intended to open up balance sheet capacity for other profitable lending opportunities. At the same time, the program aims to limit the potential credit losses to the SPV through requirements on borrowers’ leverage and financial creditworthiness, and seniority status of MSLP loans. For example, loan amounts within each facility are limited to levels that would bring a borrower’s leverage (measured

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<sup>5</sup>The MSNLF and MSPLF purchase participations in smaller new loans, which can range from \$100,000 to \$35 million for the MSNLF and to \$50 million for the MSPLF. The MSELF purchases participations in the incremental portions of preexisting loans that the lender and borrower agree to expand, with the incremental portions ranging from \$10 million to \$300 million. Detailed term sheets are available [here](#).



by the debt-to-EBITDA ratio) up to either 4 (in the MSNLF) or 6 (in the MSPLF and MSELF). The MSLP additionally aims to motivate banks to lend by providing origination and servicing fees.

The MSLP opened registration to lenders on June 15, 2020 and began accepting loan submissions on July 6, 2020; our data cover program activities as of January 11, 2021. The program expired on December 31, 2020, and the last date for processing submitted loans was January 8, 2021.

## 2 Hypothesis Development

Our hypotheses center on two questions. First, we ask which banks participated on the program, either through registration or actual loan-granting. Second, we ask how the program likely affected participating banks' willingness to grant business loans outside the program.

We start by developing hypotheses on the drivers of bank participation drawing from the program's unique characteristics. Unlike the grant-making PPP, the MSLP requires banks to essentially securitize the loans originated under the program after retaining a small stake and transfer the balance (of 95%) to the Fed's SPV. Therefore, we hypothesize that banks more likely to face financing constraints, for example in the form of lower capital or higher funding costs, are also more likely to participate in the program. In addition, the minimum loan size requirement of the MSLP (initially \$250,000 and later brought down to \$100,000) and the fixed costs of understanding and registering for the program may make larger banks and banks for which business lending is a larger share of their business more likely to invest in participating. Therefore, our first hypothesis is:

**Hypothesis 1 (H1)** *Banks are more likely to participate in the MSLP if they are larger, have higher shares of loans in total assets and particularly of C&I loans in total loans, or are more likely to be balance sheet constrained as reflected in lower capital ratios and fewer core deposits relative to total liabilities.*

Next we inquire whether MSLP participation has affected banks' broader lending decisions and behavior. In light of the risk-sharing feature of the MSLP, the removal of a large portion of credit risk from the banks' balance sheet should boost lending capacity and the willingness to take risk for a given level of capital. Thus, we expect that participating banks may have eased C&I lending standards and terms—or tightened them less—than non-participating banks. This effect should be present for banks that effectively underwrite MSLP loans, but may occur even for banks that registered but did not underwrite loans. Registration alone could increase banks' willingness to extend C&I loans if banks view the option to originate MSLP loans in the future as a way of easing future balance sheet constraints that might arise from current lending decisions.

Another mechanism by which program participation may boost C&I lending is by reducing banks' levels of risk aversion. [Cox, Greenwald and Ludvigson \(2020\)](#) argue that the large fluctuations in asset prices at the start of the COVID-19 pandemic were driven by shifts in risk aversion, or beliefs, and that the Fed's facilities played a big role in these fluctuations: policy announcements in March and April 2020 regarding the Fed's unprecedented steps to support the economy led to significant gains in broad market indices. This evidence suggests that central bank communications during the early weeks of the pandemic influenced markets mainly by altering risk tolerance. At banks, fluctuations in risk aversion amid economic uncertainty were partly responsible for the unprecedented tightening of lending standards in the first half of 2020. According to the Senior Loan Officer Opinion Survey (SLOOS)—a survey that gauges changes in lending standards and terms—close to 70% of surveyed banks reported a rise in risk aversion as one of the three leading reasons for tightening lending standards in the second quarter of 2020. In light of these potential mechanisms, our second hypothesis is:

**Hypothesis 2 (H2)** *Bank participation in the MSLP program, through registration and lending, may boost C&I loan supply (outside the program) through relatively easier standards and terms.*

### 3 Data

In assessing the effects of the MSLP on the flow of credit to businesses, we bring together data from a wide range of sources. We gather (a) public data on bank and firm participation in the MSLP, (b) survey data on banks’ lending standards and terms for C&I loans, and on individual banks’ experiences with the MSLP, (c) supervisory loan-level data on bank lending outcomes and terms, for both large and small firms, (d) and detailed bank balance sheet data, geographic data on pandemic intensity, and labor market conditions. Taken together, these data offer a comprehensive view of the relation between banks’ participation in the MSLP and bank characteristics and banks’ subsequent lending policies and behavior. We describe each data source in detail below.

**Public Data on Program Participation.** The lists of lenders and borrowers participating in the MSLP come from the Federal Reserve Bank of Boston MSLP public [webpage](#) and the Federal Reserve’s periodic report to Congress on the MSLP [webpage](#). We obtain the list of registered banks as of November 24, 2020 from the Federal Reserve Bank of Boston’s website. We match the registered banks with Call Report data (RSSD ID) based on lender identity and location information. We are able to match 411 banks by name, 169 banks by location, and 21 remaining MSLP banks manually, for a total of 601 matched banks.<sup>6</sup> We obtain the list of MSLP loan-making banks and individual loan characteristics (size, MSLP facility, borrower identity and state) from the public loan-level disclosures in the Federal Reserve’s periodic report to Congress, available on the Federal Reserve Main Street [webpage](#), which contain banks’ Call Report identifier RSSD ID. We use the latest data release of January 11, 2021.

**Survey Data on C&I Lending Standards and Terms and Bank Experiences with the MSLP.** We employ confidential microdata with bank-level responses to the quar-

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<sup>6</sup>Specifically, we carry out a string match between the public list of registered MSLP lenders and Call Report RSSD ID using lenders’ name and city-state location. We use the R package “fedmatch,” which matches on string variables based on degree of similarity in string composition, using conditional probabilities that similar variables belong to the same entity (Cohen, Friedrichs, Gupta, Hayes, Lee, Marsh, Mislant, Shaton and Sicilian, 2018). We manually cross-check matches.

terly SLOOS editions of April, July, and October 2020, which inquired about changes in the standards and terms on, and demand for, bank loans over Q1, Q2, and Q3 of 2020. In a placebo test we employ data from the surveys conducted during 2019. These data enable us to examine the potential spillovers from MSLP participation to banks' broader business credit policies. We use banks' answers to survey questions about changes in lending standards and various terms for C&I loans and credit lines, including maximum loans size, maturity, spreads, covenants, and collateral requirements. The survey also asks banks to assess changes in loan demand each quarter, which enables us to control for bank-level credit demand. To understand the key factors that may have limited program take-up, we examine also microdata with bank-level responses to the September MSLP SLOOS. Banks were asked to rate a list of possible reasons why they did not participate either by registering or granting loans, as "not important," "somewhat important," or "very important." (For details, see Appendix [A.1](#)).

#### **Supervisory Loan-level Data (U.S. Credit Register for Large Business Loans).**

We use loan-level data from the FR Y-14 H.1 schedule "Corporate Loan Data Schedule," which contains quarterly information on all C&I loans with commitment amounts exceeding \$1 million. These data are reported by 32 bank holding companies (BHCs) for 2020, and cover approximately three-quarters of the total U.S. C&I loans. The credit register contains information on individual loan originations and renewals each quarter at the bank-firm level, as well as loan terms such as spreads, maturity, and collateral. For each reporting BHC we determine if its main commercial bank participated in the MSLP using public registration and lending data. The credit register includes firm balance sheet information (as reported by banks), so we additionally use it to compare MSLP borrowers with other firms in terms of financial characteristics (size, debt level and composition, cash holdings, profitability, and credit risk rating) as well as bank lending terms.<sup>7</sup>

#### **Supervisory Segment-level Data (U.S. Credit Register for Small Business**

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<sup>7</sup>To carry out this borrower-level analysis, we match on string (using borrower name and state) individual MSLP borrowers identified in the public MSLP loan-level data with bank borrowers in the Y-14 data set.

**Loans**). We use loan portfolio segment-level data from the FR Y-14 A.9 schedule “US Small Business,” which contains quarterly information on C&I loans with commitment amounts below \$1 million. This schedule contains all the small business loans that are “scored” or “delinquency managed” for which a commercial internal risk rating is not used or that uses a different scale than other corporate loans. Corporate and SME credit card loans are excluded. A loan portfolio segment is defined according to borrower risk and loan terms. The segments refer to borrower FICO score (above or below 620) and delinquency status (current, delinquent for 30–59 days, 60–89 days, 90–119 days, or 120+ days); as well as loan type (credit line, term loan, unclassified/other), collateral (secured, unsecured), maturity (above/below three years). In total, there are 180 segments. The data are reported by 22 BHCs in 2020, and complement the large-loan credit register data for a more comprehensive look at changes in C&I loan balances to borrowers of different size. For each bank-loan segment, we observe the number and dollar value of loans outstanding at quarter-end. Furthermore, in a placebo test we use data for 2020:Q3 on the dollar value of balances for federally-guaranteed loan accounts, where the guarantee percentage is 100%, and which refer to loans principally made through the PPP. Similar to the large-loan credit register, for each reporting BHC we determine if its main commercial bank participated in the MSLP using public registration and lending data.

**Confidential Survey Data on Bank Experiences with the MSLP.** To understand the key factors that may have limited program take-up, we examine microdata with bank-level responses to the September MSLP SLOOS. Banks were asked to rate a list of possible reasons why they did not participate either by registering or granting loans, as “not important,” “somewhat important,” or “very important.” These reasons included the program’s terms not being sufficiently attractive to the bank or to the potential borrowers; banks being able to meet borrower credit demand outside the program; the registration process being too burdensome; or the potential borrowers being too severely impacted by the pandemic crisis. In addition, the banks that rated “key MSLP loan terms not attractive enough to

the lender” or “borrowers not qualifying or interested in MSLP loans” as important for not participating, also ranked the MSLP terms that were unattractive to either the bank or the borrower.

**Bank Characteristics and Exposure to Economic Conditions.** Bank balance sheet data come from the Call Report and include size (total assets), business model variables (share of loans in total assets, share of C&I loans in total loans, share of small C&I loans to SMEs—loans with original amounts smaller than \$100,000—in total loans, and share of PPP loan balances in total loans). We also use banks’ common equity Tier 1 (CET1) capital ratio and the ratio of core deposits to total liabilities as our key measures of banks’ current or potential funding constraints. All variables are measured at end-2020:Q2.

We also construct bank-level measures of exposure to local economic conditions (such as credit demand) based on the notion that banks more exposed to the viral outbreak and a rise in unemployment might face different changes in local loan demand and might have differential risk attitudes given the credit risks they face in their local markets. These measures weight banks’ own deposit shares in a given geography (county for pandemic intensity and state for labor market conditions) by the cumulative COVID-19 infections and unemployment variables in those locations, respectively. We obtain each bank’s share of deposits by location (county or state) as of June 2019 from the [FDIC Summary of Deposits](#). We capture the surge in COVID-19 cases with the cumulative number of COVID-19 infections per capita during March–November 2020, the number of initial unemployment insurance (UI) claims per capita during March–November 2020, and the change in the unemployment rate during March–September 2020. County-level data on COVID-19 cases come from the Center for Systems Science and Engineering at Johns Hopkins University and state-level data on labor market conditions come from the U.S. Department of Labor and Bureau of Labor Statistics.

## 4 Key Statistics on Bank MSLP Participation

In this section we provide key statistics on banks’ participation in the MSLP. Banks’ registration and lending activities in the MSLP are summarized in Table 1 and Figure 1. As shown in Table 1, column 1, out of 5,242 commercial banks in the Call Report, 614, or 11.7% of banks, were registered for the MSLP as of November 24, 2020; of these, about half, or 304 banks, had granted MSLP loans according to public data as of January 11, 2021. The difference of 310 banks were registered but did not grant loans, and the remaining 4,628 banks in the Call Report were not registered.

Table 1: MSLP participation status by bank size

	(1) All banks	(2) < \$1 bn	(3) > \$1 bn	(4) \$1-10 bn	(5) \$10-50 bn	(6) > \$50 bn
Total no. of banks	5242	4191	893	748	98	47
Registered	614	274	336	251	55	30
Registered and lending	304	128	174	119	34	21
Registered and not lending	310	146	162	132	21	9
Not registered	4628	3917	557	497	43	17
% Registered	11.7%	6.5%	37.6%	33.6%	56.1%	63.8%
% Registered and lending	5.8%	3.1%	19.5%	15.9%	34.7%	44.7%
% Registered and not lending	5.9%	3.5%	18.1%	17.6%	21.4%	19.1%
% Not registered	88.3%	93.5%	62.4%	66.4%	43.9%	36.2%
% Lending (out of registered)	49.5%	46.7%	51.8%	47.4%	61.8%	70.0%

This table shows MSLP participation statistics for banks. Size groups are based on total assets at end-2020:Q2. Source: Call Report, Federal Reserve Bank of Boston (for registration, as of November 24, 2020) and Federal Reserve Main Street [webpage](#) (for lending, as of January 11, 2021).

Table 1, columns 2 to 6, and Figure 1 show the percentage of banks that were registered and lending under the MSLP, registered and not lending, and non-registered banks, by bank size category. Notably, the fraction of registered banks increases with bank size, from 6.5% of banks in the smallest size group with assets below \$1 billion to 63.8% of banks in the largest size group with assets above \$50 billion. The fraction of registered but non-lending banks similarly increases with size. The fraction of MSLP lenders in the number of registered banks increases monotonically with bank size, with lending activity increasingly prevalent

for banks in the larger size groups (Table 1).

Figure 1: **MSLP participation status by bank size**



This figure shows the distribution of banks in the Call Report by MSLP participation status and size. Source: Call Report, Federal Reserve Bank of Boston (for registration, as of November 24, 2020) and Federal Reserve Main Street [webpage](#) (for lending, as of January 11, 2021).

Table 2 compares a variety of bank characteristics by registration and lending status. A key takeaway from these tabulations is that MSLP-participating banks are systematically different from non-participating banks. Registered banks tend to be larger, to have larger loan portfolios, and within those portfolios, to be more specialized in C&I lending. In other words, they are “traditional lenders.” MSLP banks also have lower regulatory capital ratios and are bigger participants in the PPP program, potentially reflecting their familiarity working with public agencies. These patterns persist when comparing lenders vs. non-lenders, but the differences are less often significant when we compare registered and non-registered banks. We discuss the implications of these findings for empirical identification in the next section.



Table 2: Bank characteristics by MSLP participation status

	(1)	(2)	(3)
	<b>MSLP Registered</b>	<b>Not Registered</b>	<b>p-value</b>
	<i>N=601</i>	<i>N=4641</i>	
Total assets (USD bn)	24.93	1.31	0.000
Loans/Assets	73%	62%	0.000
C&I Loans/Loans	28%	17%	0.000
CET1 ratio	13%	17%	0.000
Core Deposits/Assets	47%	49%	0.000
Loan Loss Reserves/Loans	1.4%	1.5%	0.871
PPP loans/Loans	15%	8%	0.000
SME Loans(<100K)/Loans	2%	2%	0.729
	<b>MSLP Lender</b>	<b>Non-Lender</b>	<b>p-value</b>
	<i>N=175</i>	<i>N=5067</i>	
Total assets (USD bn)	37.15	2.92	0.000
Loans/Assets	73%	63%	0.000
C&I Loans/Loans	31%	18%	0.000
CET1 ratio	13%	17%	0.000
Core Deposits/Assets	45%	49%	0.000
Loan Loss Reserves/Loans	1.5%	1.4%	0.144
PPP loans/Loans	16%	8%	0.000
SME Loans(<100K)/Loans	2%	2%	0.887
	<b>Registered &amp; Lender</b>	<b>Registered &amp; Non-Lender</b>	<b>p-value</b>
	<i>N=175</i>	<i>N=426</i>	
Total assets (USD bn)	37.15	19.94	0.292
Loans/Assets	73%	73%	0.694
C&I Loans/Loans	31%	27%	0.000
CET1 ratio	13%	13%	0.749
Core Deposits/Assets	45%	47%	0.028
Loan Loss Reserves/Loans	1.5%	1.4%	0.008
PPP loans/Loans	16%	14%	0.095
SME Loans(<100K)/Loans	2%	2%	0.971

This table reports averages for key bank characteristics by MSLP participation status, and p-values for t-tests of equality of means. Source: Call Report, Federal Reserve Bank of Boston (for registration, as of November 24, 2020) and Federal Reserve Main Street [webpage](#) (for lending, as of January 11, 2021).

## 5 Results on Banks' MSLP Participation and C&I Lending Spillovers

In this section we present the main results of our empirical analysis, which has two parts: (a) an analysis of the MSLP lenders' characteristics; (b) an assessment of the program's spillover effects on C&I lending standards and terms more generally. We begin with a brief overview of the empirical approach and identification issues.

### 5.1 Empirical Approach

We conduct two main empirical analyses. First, we examine the factors associated with banks' decisions to participate in the MSLP, focusing on the extensive margin of program participation (registration and actively granting MSLP loans). Then, we conduct a difference-in-differences analysis that compares changes in overall C&I lending standards for MSLP participating banks after the introduction of the program compared to non-participants in prior quarters. This analysis quantifies spillover effects of the program on participants' lending policies and behaviors.

Our empirical approach faces two identification challenges. First, program assignment (or "treatment") is nonrandom, as MSLP participation is potentially endogenous not only to observable bank characteristics such as balance sheet size, funding constraints, and business model, but also to unobservable characteristics that may drive both the decision to participate in the program and lending outcomes. To ensure that the results of the spillover analysis are not contaminated by bank unobservables that may determine both bank participation in the program and lending decisions, we carefully control for all the bank characteristics discussed in the previous section and identified in the next section as robust determinants of MSLP participation in a regression analysis. Furthermore, we conduct a placebo test to show that, once we control for loan demand, there is no correlation between MSLP participation and banks' loan balances from participating in other government credit support programs,

principally the PPP. Finally, we conduct additional several placebo tests to examine if there is any link between MSLP participation and lending standards and terms prior to the pandemic. These tests allow us to determine if MSLP and non-MSLP banks were on “parallel trends” in terms of lending decisions before the program’s implementation and are aimed to boost our confidence that our findings indeed capture the effects of the MSLP.

Second, in the lending spillover analysis it is important to isolate credit supply from credit demand factors since credit support policies can affect equilibrium lending outcomes through both the bank-lending and firm-borrowing channels (Bernanke and Gertler, 1995; Jiménez, Ongena, Peydró and Saurina, 2012). To this end, we exploit microdata from our two credit registers—specifically, loan-level data from the business loan credit register and segment-level from the small business loan credit register—and we identify credit supply effects by comparing changes in loan volumes and terms to the same firm (or cluster of firms) from MSLP vs. non-MSLP participating banks. In other words, we keep firm-level demand fixed over time by including interacted firm×quarter fixed effects (Jiménez, Mian, Peydró and Saurina, 2020; Khwaja and Mian, 2008).

## 5.2 Which Banks Participate in the MSLP?

We analyze the extensive margin of MSLP participation and examine hypothesis H1 using the following specification:

$$MSLP_i = \alpha + \beta' Bank\ characteristics_i + \epsilon_i, \tag{1}$$

where  $i$  indexes banks. The dependent variable  $MSLP_i$  is a dummy variable equal to 1 for registered banks, lending banks (regardless of registration status), or banks that granted loans conditional on being registered (and 0 otherwise). The vector *Bank characteristics* <sub>$i$</sub>  contains bank variables such as size (log-assets), the share of loans in assets, the share of C&I loans in total loans, the ratio of CET1 capital to risk-weighted assets, the ratio of core

deposits to assets, and loan loss reserves. In additional specifications we employ measures of bank specialization in lending to small businesses, such as the share of C&I loans below \$100,000 in total loans and the share of PPP loan balances in total loans. All balance sheet variables are measured at end-2020:Q2. We estimate these specifications using the entire cross-section of banks in the Call Report. Regressions employ the Ordinary Least Squares (OLS) estimator with robust standard errors.<sup>8</sup>

The results are shown in Table 3 for all banks and separately for small banks (<\$1 bn in assets) vs. large banks (>\$1 bn in assets). A priori there is no reason to expect the covariates to vary differently across size groups, but Section 4 showed that MLSP participation was significantly more vibrant among larger banks, justifying a closer look. As shown in columns 1-9, the covariates explaining registration and lending status are broadly similar and confirm the tabulations discussed previously as well as our first hypothesis H1. Program participation is significantly more likely among banks that are larger and more focused on commercial lending. In addition, funding constraints matter: banks are more likely to register and lend if they have lower capital buffers and less core deposits. There are no notable or systematic differences in the relative importance of these bank characteristics by bank size.

In Table A2 we introduce additional controls, including bank specialization in SME lending (proxied by the share of small business loans and the share of PPP loan balances in total loans) and bank-level exposure to economic conditions (which may partly reflect loan demand). The estimation results show that coefficients on the main covariates predicting program participation remain statistically significant in these richer specifications. Furthermore, greater participation in the PPP program positively predicts MSLP registration. This correlation suggests that unobservable bank characteristics could drive both PPP and MSLP bank participation, and in turn could be a confounding factor in our lending spillover analysis (discussed in the next section). To alleviate this worry, in Section 5.5 we check whether this link holds once we control for loan demand. Finally, the bank-level measures of bank

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<sup>8</sup>Descriptive statistics for regression variables are presented in Table A1.

Table 3: Extensive margin of MSLP participation

	(1) All banks	(2) < \$1 bn	(3) > \$1 bn	(4) All banks	(5) < \$1 bn	(6) > \$1 bn	(7) All banks	(8) < \$1 bn	(9) > \$1 bn
Dependent variable:	MSLP Registered			MSLP Lender			MSLP Lender (registered banks only)		
Size (log-assets)	0.0756*** (0.004)	0.0372*** (0.004)	0.1048*** (0.011)	0.0256*** (0.003)	0.0110*** (0.002)	0.0594*** (0.010)	0.0290** (0.012)	0.0383 (0.037)	0.0581*** (0.019)
Loans/Assets	0.1949*** (0.026)	0.1692*** (0.023)	0.5228*** (0.103)	0.0455*** (0.015)	0.0521*** (0.013)	0.1647*** (0.063)	0.0838 (0.175)	0.0706 (0.246)	0.1890 (0.266)
C&I Loans/Loans	0.5268*** (0.043)	0.4396*** (0.044)	0.7749*** (0.124)	0.2038*** (0.028)	0.1552*** (0.029)	0.3884*** (0.080)	0.2921** (0.133)	0.1625 (0.190)	0.4265** (0.190)
CET1 ratio	0.0571 (0.047)	0.0535 (0.043)	-0.6385** (0.265)	-0.0060 (0.020)	-0.0005 (0.018)	-0.2861* (0.151)	-0.5951** (0.283)	-0.5315* (0.277)	-1.0986 (0.911)
Core Deposits/Assets	-0.1380*** (0.037)	-0.1452*** (0.034)	-0.2286** (0.113)	-0.0721*** (0.023)	-0.0635*** (0.021)	-0.1627** (0.074)	-0.3411** (0.171)	-0.3119 (0.262)	-0.3530 (0.233)
Loan Loss Reserves/Loans	-0.9318** (0.461)	-0.6007 (0.437)	-2.7755*** (1.001)	0.0497 (0.246)	0.0719 (0.259)	-0.6752 (0.555)	5.9523* (3.059)	7.7906* (4.123)	2.8168 (4.296)
Mean of dep. var. (in sample)	0.115	0.064	0.370	0.033	0.018	0.108	0.291	0.288	0.291
Observations	4,998	4,112	886	4,998	4,112	886	596	266	330
R-squared	0.215	0.107	0.157	0.084	0.042	0.101	0.045	0.037	0.070

This table reports results of linear probability models relating MSLP participation status to bank characteristics. The dependent variables are Registered (dummy variable that takes value 1 for the banks that are registered as lenders and 0 otherwise), Lending (dummy variable that takes value 1 for banks that are lending (actively granting loans) and 0 otherwise), or Lending conditional on being registered. All bank balance sheet variables are measured as of 2020:Q2. Standard errors are clustered at the bank level. \*\*\* indicates significance at the 1% level, \*\* at the 5% level, and \* at the 10% level. Source: Call Report, Federal Reserve Bank of Boston webpage as of December 31, 2020 and Federal Reserve Main Street webpages as of January 11, 2021.

exposure to a surge in COVID-19 cases or a deterioration of labor market conditions do not predict program participation. This result does not necessarily imply that loan demand did not impact banks' interest in the program. Rather, it is possible that our measures only imperfectly capture demand conditions, for instance because of the rapidly changing trajectory of the pandemic and economic conditions both over time and geographically and the heterogeneity in state-level policy responses to the pandemic (such as lockdowns and mobility restrictions). In Table A5 we examine the correlates of bank participation in the program in the sample of respondents to the September 2020 MSLP SLOOS, and show that an increase in the number of inquiries from MSLP-eligible borrowers predicts a higher probability of bank participation in the MSLP, suggesting an important role for loan demand.

### 5.3 Lending Spillovers: Survey Evidence

To analyze the spillover effects from MSLP participation under hypothesis H2, we conduct a difference-in-differences analysis of banks' C&I lending standards and terms. The data come from the SLOOS editions of April, July, and October 2020, and reflect bank loan officers' assessments of changes in lending standards and demand over the quarter prior to the survey. The three surveys together cover the first three quarters of 2020. Given that the MSLP opened registration to lenders on June 15 2020, the surveys for Q1 and Q2 refer to the pre-MSLP period and the survey for Q3 refers to the post-MSLP period. The SLOOS data have the advantage that respondents assess changes in lending standards and loan terms separately for small vs. large and mid-market borrowing firms (the size cutoff being annual sales of \$50 million). This gives us the opportunity to study banks' lending decisions by level of borrower credit constraints, for which size is an established proxy (Chodorow-Reich, Darmouni, Luck and Plosser (2020), Hadlock and Pierce (2010)).

We start by tabulating survey responses. In Figure 2, we show the fraction of MSLP lenders and non-lenders that report tightening lending standards on C&I loans and credit lines to small firms and respectively to large and mid-sized firms. The main takeaway is

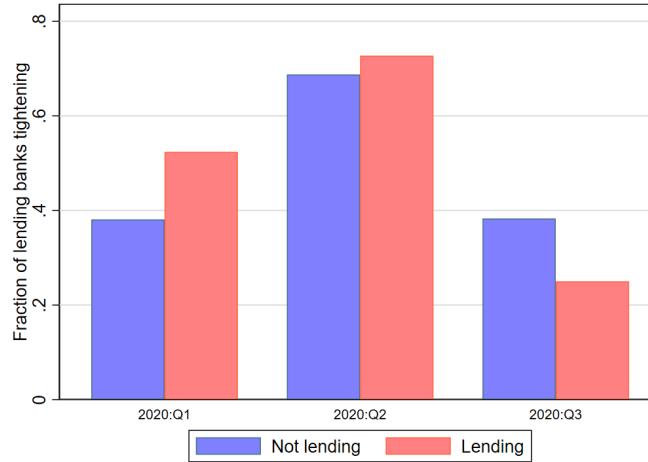
similar across firm size categories: the pre-MSLP surveys show that higher fractions of MSLP lenders tightened standards compared to non-lenders in Q1, but the gap between the two groups narrowed in Q2. By contrast, according to the Q3 survey, there was a remarkable reversal after the program was rolled out, with significantly smaller fractions of MSLP lenders reportedly tightening standards compared to non-lenders. We test for differential effects more formally in the following standard diff-in-diff specification:

$$\begin{aligned} \textit{Tighter standards}_{it} = & \alpha + \beta \textit{MSLP}_i \times \textit{Post}_t + \delta' \textit{Bank characteristics}_i \\ & + \theta \textit{Stronger demand}_{it} \times \textit{Post}_t + \gamma_t + \epsilon_{it}, \end{aligned} \quad (3)$$

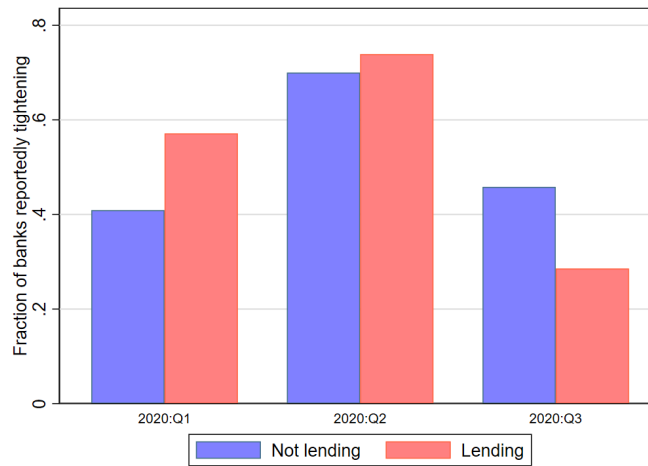
where for each bank  $i$  in quarter  $t$ , the dependent variable  $\textit{Tighter standards}_{it}$  is a dummy variable equal to 1 if the bank reports having tightened C&I loan standards or terms in that quarter (0 otherwise). The diff-in-diff term is the interaction  $\textit{MSLP}_i \times \textit{Post}_t$ , where  $\textit{MSLP}_i$  is a dummy variable for participating banks, and  $\textit{Post}_t$  is a dummy variable equal to 1 for 2020:Q3 (post-MSLP) and 0 for the two previous quarters (pre-MSLP). We carefully control for bank-level loan demand with the dummy variable  $\textit{Stronger demand}_{it}$  which takes value 1 if bank  $i$  reports stronger demand conditions (from small or large and mid-sized firms, respectively) in quarter  $t$  (and 0 otherwise). We also control for the same time-varying bank characteristics from the program participation regressions (shown in Table 3, namely size, loans/assets, C&I loans/loans, CET1 ratio, core deposits/assets, loan loss reserves/loans) and additionally PPP loans/Loans (as of end-Q3)) grouped in the vector  $\textit{Bank characteristics}_i$ . In one specification we replace these characteristics with bank fixed effects. Across all specifications we include quarter (survey) fixed effects  $\gamma_t$  which absorb common macro shocks affecting all banks each reporting period.

Table 4 reports OLS estimation results for C&I lending standards for loans to large firms (columns 1–2) and small firms (columns 3–4) by MSLP participation status. We alternatively include bank fixed effects (and no time-varying controls other than for credit demand);

Figure 2: MSLP Participation and C&I Lending Standards



(a) Lending standards on C&I loans to small firms



(b) Lending standards on C&I loans to large firms

This figure shows the fraction of banks that report tightening C&I lending standards on C&I loans and credit lines to small firms (panel (a)) and to large and mid-sized firms (panel (b)) by MSLP lender status. The data come from three SLOOS surveys for 2020:Q1, Q2 and Q3. Survey responses are coded as indicating “tightening standards” if banks report tightening standards “considerably” or “somewhat” in response to the question “Over the past three months, how have your bank’s credit standards for approving applications for C&I loans or credit lines—other than those to be used to finance mergers and acquisitions—to large and middle-market firms and to small firms changed?”. Small firms are defined as having annual sales below \$50 million. See Appendix A.1 for sample composition and further details on the SLOOS. Source: Federal Reserve.

and drop the bank fixed effects but control for time-varying balance sheet characteristics (coefficients not shown). Credit demand is accounted for with an interaction term between



the dummy variable for higher demand and the Q3 survey dummy (“Post”).

As seen across all specifications, and consistent with hypothesis H2, MSLP-lending banks experience positive spillover effects on C&I lending from participation in the program (top panel). OLS estimates for “Lending×Post” are negative and statistically significant at conventional levels. Given a backdrop of continuously tightening credit conditions during the sample period, these estimates suggest that MSLP lenders tightened C&I lending standards less than other banks after the implementation of the program, to both large and small borrowers. The estimates are also economically significant. Looking at the estimated coefficient on “Lending×Post” in column 2, we have that MSLP lenders had a lower probability of reporting that they tightened lending standards after the program rollout (compared to non-lenders) by one-quarter of a percentage point ( $-0.2544$ ).

The difference-in-difference estimates may be subject to the concern that unobservable bank characteristics are correlated with both the bank’s decision to participate in the MSLP and its lending outcomes. To alleviate these worries, we conduct two additional tests. First, we look for systematic differences by MSLP participation status prior to the pandemic, when there should be no correlation between MSLP participation status and lending standards. For this purpose, we use quarterly SLOOS data collected during 2019, preceding the pandemic and the program’s implementation. As seen in Figure 3, MSLP lenders and non-lenders do not systematically differ in their tendency to tighten lending standards over the course of 2019, suggesting that the observed changes in lending outcomes in Table 4 are likely due to differences in MSLP participation status rather than omitted, unobserved variables. Second, we estimate the main specifications in Table 4 using an instrumental variables strategy that uses proxies of bank familiarity with Federal Reserve procedure and facilities to isolate exogenous variation in MSLP participation. These additional specifications, discussed in Appendix A.2, show positive spillover effects from MSLP participation to lending standards, confirming our OLS baseline.

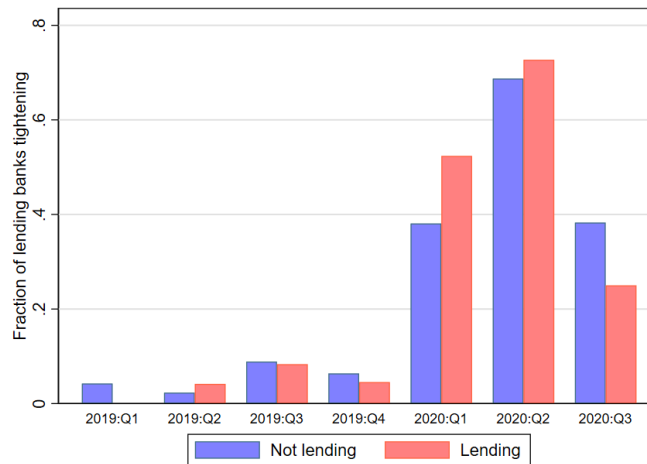
In Table 5 we report similar difference-in-difference estimation results but we zoom in on

Table 4: Spillover effects of MSLP on C&I lending standards: Evidence from survey data

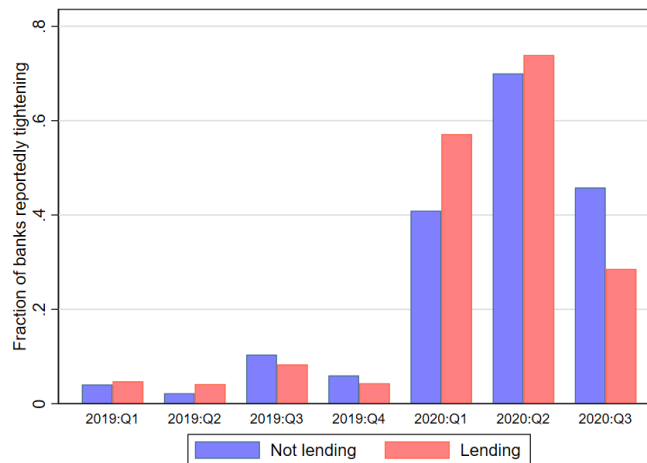
	(1)	(2)	(3)	(4)
Dependent variable	Bank reports tightening C&I lending standards to			
	<b>(a) Large firms</b>		<b>(b) Small firms</b>	
<b>MSLP Lender×Post</b>	-0.2473*	-0.2544**	-0.2519**	-0.2178*
	(0.141)	(0.127)	(0.111)	(0.120)
Demand Increased x Post	-0.0014	-0.0297	0.1999	0.2215
	(0.161)	(0.152)	(0.149)	(0.171)
Mean of dep. var.	53%	53%	50%	50%
St. dev. of “Lending”	46%	46%	46%	46%
Observations	202	206	195	199
R-squared	0.558	0.126	0.650	0.186
<b>MSLP Registered×Post</b>	-0.0593	-0.0697	-0.1198	-0.0271
	(0.150)	(0.135)	(0.124)	(0.120)
Demand Increased x Post	0.0406	0.0099	0.1684	0.1986
	(0.171)	(0.165)	(0.163)	(0.188)
Mean of dep. var.	53%	53%	50%	50%
St. dev. of “Registered”	46%	46%	46%	46%
Observations	202	206	195	199
R-squared	0.547	0.111	0.641	0.174
Bank controls		yes		yes
Bank fixed effects	yes		yes	
Survey fixed effects	yes	yes	yes	yes

This table reports OLS estimates from difference-in-differences regressions relating the likelihood of tightening lending standards on C&I loans and credit lines in Q3 (“Post”) compared to Q1 and Q2 by MSLP lender and registration status. The sample comprises respondents to the SLOOS surveys during the first three quarters of 2020. The dependent variable takes value 1 if the bank reports having tightened select loan terms (indicated as column headings) “somewhat” or “significantly” in response to Question 2 of the survey (“For applications for C&I loans and credit lines from large and middle market firms and from small firms that your bank currently is willing to approve, how have the terms of those loans changed over the past three months?”). Small firms are defined as having annual sales below \$50 million. For further details on the SLOOS, see Appendix A.1. All regressions include survey fixed effects. Regressions in columns 1 and 4 also include bank fixed effects. Regressions in columns 2 and 4 include all the time-varying bank controls from Table 3 (that is, size, loans/assets, C&I loans/loans, CET1 ratio, core deposits/assets, loan loss reserves/loans). Standard errors are clustered at the bank level. \*\*\* indicates significance at the 1% level, \*\* at the 5% level, and \* at the 10% level. Source: Call Report, Federal Reserve.

Figure 3: MSLP Participation and C&I Lending Standards: Placebo on Survey Data



(a) Lending standards on C&I loans to small firms



(b) Lending standards on C&I loans to large firms

This figure shows the fraction of banks that report tightening C&I lending standards on C&I loans and credit lines to small firms (panel (a)) and to large and mid-sized firms (panel (b)) by MSLP lender status. This is Figure 2 extended back with quarterly data for 2019. The data come from three SLOOS surveys for 2020:Q1, Q2 and Q3 and four SLOOS surveys for 2019:Q1, Q2, Q3, and Q4. Survey responses are coded as indicating “tightening standards” if banks report tightening standards “considerably” or “somewhat” in response to the question “Over the past three months, how have your bank’s credit standards for approving applications for C&I loans or credit lines—other than those to be used to finance mergers and acquisitions—to large and middle-market firms and to small firms changed?”. Small firms are defined as having annual sales below \$50 million. See Appendix A.1 for sample composition and further details on the SLOOS. Source: Federal Reserve.

the effects of MSLP lender status on changes in C&I loan terms, once again differentiating between loans to small firms (panel (a)) and large and mid-sized firms (panel (b)). We examine seven loan terms, including maximum size of credit lines, maturity, spreads, covenants, and collateral requirements. The results broadly indicate that for approved C&I loans and credit lines, MSLP lenders were less likely to tighten a range of loan terms compared to non-lenders peers. The terms that appear most robustly impacted by MSLP lender status are maximum maturity, cost of credit lines, premiums charged on riskier loans, covenants, and collateral requirements. These results indicate important spillovers to lending standards from bank participation in the MSLP, suggesting that the removal of risk from banks' balance sheets by the MSLP may have been effective in reducing banks' risk aversion.

## 5.4 Lending Spillovers: Evidence from Large Business Loans

As an alternative way to test our hypothesis H2 on potential spillover effects from MSLP participation on banks' C&I lending behavior more generally, and to deploy more rigorous controls for demand, we conduct a difference-in-difference analysis using supervisory loan-level data from the FR Y-14Q H.1 schedule for large C&I loans compiled by the Federal Reserve (the minimum reporting threshold is \$1 mn). We aggregate the loan-level data at the bank-borrower pair level for each quarter. Like in Section 5.3, we refer to 2020:Q1 and Q2 as the pre-MSLP period and to 2020:Q3 as the post-MSLP period. We use the following diff-in-diff specification:

$$\begin{aligned}
 \text{Loan characteristics}_{ijt} = & \alpha + \beta \text{MSLP}_i \times \text{Post}_t + \\
 & + \gamma' \text{Bank characteristics}_i \times \text{Post}_t + \delta_{jt} + \theta_i + \epsilon_{ijt}, \quad (4)
 \end{aligned}$$

where for each bank  $i$  lending to borrower  $j$  in quarter  $t$ , the dependent variable *Loan characteristics*<sub>ijt</sub> captures the following lending measures aggregated at the bank-borrower pair level: (a) the share of existing loan facilities originated or renewed each quarter; (b) the

Table 5: Spillover effects of MSLP on C&I loan terms: Evidence from survey data (OLS estimates)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Max size of credit lines	Max maturity of loans	Costs of credit lines	Spreads of loan rates	Premiums charged on riskier loans	Loan covenants	Collateral requirements
<b>Bank reports tightening terms of C&amp;I loans to</b>							
Dependent variable:							
<b>(a) Large firms</b>							
<b>MSLP Lender × Post</b>	-0.2475*** (0.078)	-0.1187 (0.088)	-0.1046 (0.118)	-0.0804 (0.121)	-0.0952 (0.125)	-0.1863 (0.130)	-0.2294** (0.108)
Demand Increased × Post	-0.2459*** (0.091)	-0.0123 (0.126)	-0.1452 (0.125)	-0.1189 (0.138)	-0.0707 (0.166)	-0.1802 (0.153)	-0.0422 (0.161)
Mean of dep. var.	30%	30%	39%	48%	45%	43%	41%
Observations	206	205	205	206	207	206	205
R-squared	0.156	0.117	0.125	0.186	0.150	0.086	0.100
<b>(b) Small firms</b>							
<b>MSLP Lender × Post</b>	-0.1287 (0.117)	-0.2676** (0.119)	-0.1689 (0.126)	-0.1726 (0.122)	-0.2006 (0.133)	-0.3099** (0.130)	-0.2334** (0.105)
Demand Increased × Post	-0.0143 (0.158)	0.2761* (0.152)	0.2820 (0.177)	0.5131*** (0.161)	0.3099 (0.213)	0.1299 (0.204)	0.2019** (0.099)
Mean of dep. var.	29%	28%	34%	41%	39%	37%	41%
Observations	194	195	192	194	194	194	191
R-squared	0.599	0.559	0.633	0.662	0.641	0.545	0.665
Bank controls	yes	yes	yes	yes	yes	yes	yes
Survey fixed effects	yes	yes	yes	yes	yes	yes	yes

This table reports OLS estimates of difference-in-differences regressions relating the likelihood of tightening lending terms on approved C&I loans and credit lines in Q3 (“Post”) compared to Q1 and Q2 by MSLP lender status. The sample comprises respondents to the SLOOS surveys during the first three quarters of 2020. The dependent variable takes value 1 if the bank reports having tightened select loan terms (indicated as column headings) “somewhat” or “significantly” in response to Question 2 of the survey (“For applications for C&I loans and credit lines from large and middle market firms and from small firms that your bank currently is willing to approve, how have the terms of those loans changed over the past three months?”). Small firms are defined as having annual sales below \$50 million. For further details on the SLOOS, see Appendix A.1. All regressions include time-varying bank controls from Table 3 (that is, size, loans/assets, C&I loans/loans, CET1 ratio, core deposits/assets, loan loss reserves/loans), and survey fixed effects. Standard errors are clustered at the bank level. \*\*\* indicates significance at the 1% level, \*\* at the 5% level, and \* at the 10% level. Source: Call Report, Federal Reserve.

average spread over LIBOR for floating-rate loans originated or renewed each quarter; (c) the average maturity of loans originated or renewed each quarter; (d) the share of unsecured or partially-secured new loans originated or renewed each quarter. Like in Section 5.3,  $MSLP_i$  is a dummy variable equal to 1 for participating banks, and  $Post_t$  is a dummy variable equal to 1 for 2020:Q3 (and 0 for 2020:Q1 and Q2). Importantly, we use interacted firm $\times$ quarter fixed effects  $\delta_{jt}$  to control for time-varying firm level demand. The inclusion of firm $\times$ quarter fixed effects implies that we limit the sample to firms that were granted loans from at least two banks both the pre- and post-MSLP periods, of which at least one bank (but not all) were MSLP participants. Thus, the coefficient estimate on the diff-in-diff term  $MSLP_i \times Post_t$  shows whether the characteristics of C&I loans provided outside of the MSLP program to a given borrower  $j$  differed in the case of MSLP-participating banks relative to non-participating banks in the post-MSLP relative to the pre-MSLP period. In addition, we use bank fixed effects  $\theta_i$  and time-variant bank controls *Bank characteristics<sub>i</sub>* (the same as in the previous spillover regressions) to absorb the effect of bank characteristics on C&I lending, given the correlation of these characteristics with MSLP participation status (shown in Table 3).

Table 6 shows the OLS estimates for the diff-in-diff specification, with banks' MSLP participation status defined as either lending (panels a-b) or registration (panels c-d).<sup>9</sup> For each definition of MSLP participation, the time-variant *Bank characteristics<sub>i</sub>* enter either alone (panels a and c) or interacted with the  $Post_t$  dummy variable (panels b and d).<sup>10</sup> Consistent with hypothesis H2, the results suggest that MSLP-participating banks were more likely to originate or renew loans to a given borrower than non-participating banks in the post-MSLP period. This is the case for loan originations by MSLP lenders (column 1, panels a and b) and for loan renewals by either MSLP lenders or MSLP-registered banks (column

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<sup>9</sup>Based on the public MSLP data as of November 24 (registration) and January 11, 2021 (lending), out of 32 bank holding companies in Y-14Q in 2020, we identified 21 bank holding companies with MSLP-registered commercial banks and 11 bank holding companies with MSLP-lending banks.

<sup>10</sup>The interaction accounts for the possibility that the differentiated effect of bank characteristics on lending in the post-MSLP period could have been absorbed by the MSLP participation dummy.

2). In addition, consistent with the SLOOS-based spillover results, the MSLP-participating banks were likely to offer more generous terms to a given borrower than non-MSLP banks on the loans originated or renewed in the post-MSLP period, such as lower spreads, longer maturities, and less restrictive collateral requirements. Specifically, MSLP banks offered lower loan spreads (column 3) and longer maturities (column 4) on new loans; furthermore, MSLP lenders were more likely to extend unsecured loans (column 5, panels a and b).

Our estimates are economically significant. First, within each bank-firm pair, the share of loans originated by MSLP lenders was about 1 ppt higher than for non-MSLP banks (column 1, panels a-b); the share of loans renewed by MSLP-registered banks was as much as 5 ppts higher than for non-MSLP banks in the post-MSLP period (column 2, panels c-d), compared to the sample average of 5%. Second, spreads on loans originated or renewed by MSLP banks were lower by 8-to-74 bps than for non-MSLP banks in the post-MSLP period (column 3, panels b and d), compared to the sample average of 2.1 ppts. Third, the maturity of loans originated or renewed by MSLP banks were 147-to-380 days longer than for non-MSLP banks (column 4, panels a and c), compared to the sample average maturity of 1,668 days (approximately 4.75 years).

Our results are subject to the potential endogeneity concern that MSLP banks exhibit differential lending behavior in 2020 due to some omitted unobservable bank characteristics. If this were the case, we would be able to document similar lending outcomes in other periods as well. To test whether this is the case, we estimate the diff-in-diff specification using loan-level data for the first three quarters of 2019, preceding the implementation of the program. The results of this placebo test, shown in Table 7, reveal no evidence of a link from MSLP status to the likelihood of originating or renewing loans or the terms of those loans, suggesting that our baseline findings in Table 6 capture the effects of MSLP participation, and not some other potentially confounding effects.

Table 6: Spillover effects of MSLP on C&I lending: Evidence from large business loans

	(1) <b>Originations</b> (% loans)	(2) <b>Renewals</b> (% loans)	(3) <b>Loan Spread</b> (ppt)	(4) <b>Maturity</b> (days)	(5) <b>Unsecured</b> (% loans)
<b>(a) MSLP-lending banks</b>					
<b>MSLP Lender×Post</b>	0.00734** (0.00293)	0.0147*** (0.00285)	-0.117** (0.0458)	146.7* (78.84)	0.0351* (0.0209)
Bank characteristics	Yes	Yes	Yes	Yes	Yes
R-squared	0.516	0.513	0.945	0.633	0.629
<b>(b) MSLP-lending banks</b>					
<b>MSLP Lender×Post</b>	0.00959*** (0.00286)	0.00731** (0.00294)	-0.0823* (0.0443)	5.158 (75.41)	0.0369* (0.0220)
Bank characteristics×Post	Yes	Yes	Yes	Yes	Yes
R-squared	0.516	0.513	0.945	0.632	0.629
<b>(c) MSLP-registered banks</b>					
<b>MSLP Registered×Post</b>	-0.00584 (0.00516)	0.0550*** (0.00752)	-0.338*** (0.129)	379.3*** (129.3)	0.0183 (0.0344)
Bank characteristics	Yes	Yes	Yes	Yes	Yes
R-squared	0.516	0.514	0.945	0.633	0.629
<b>(d) MSLP-registered banks</b>					
<b>MSLP Registered×Post</b>	-0.0105 (0.00861)	0.0553*** (0.0146)	-0.735*** (0.166)	-57.88 (234.8)	0.00824 (0.0680)
Bank characteristics×Post	Yes	Yes	Yes	Yes	Yes
R-squared	0.516	0.514	0.945	0.632	0.629
Borrower×quarter fixed effects	Yes	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes	Yes
No. of borrowers	8,215	8,211	734	1,585	1,673
No. of observations	82,051	82,026	2,322	6,035	6,345
Mean of dependent variable	0.0497	0.0492	2.133	1668	0.814
St. dev. of dependent variable	0.191	0.207	1.110	1229	0.384

The table shows OLS estimates from diff-in-diff regressions with C&I loan-level data at the bank-firm level during 2020:Q1-Q3. The dependent variables are: the % of new originations and renewed loans each quarter out of outstanding loans; the spread over LIBOR; maturity; and the % of loans not secured with a senior blanket lien for new loans. “Post” is a dummy variable taking value 1 for 2020:Q3 and 0 for 2020:Q1–Q2. Banks’ MSLP status is based on public data as of November 24 2020 (registration) and December 11 2020 (lending). The regressions include the same time-varying bank characteristics from Table 3, borrower×quarter fixed effects and bank fixed effects. Standard errors are clustered at the bank-firm pair level. \*\*\* indicates significance at the 1% level, \*\* at the 5% level, and \* at the 10% level. Source: FR Y-14Q H.1 schedule, Federal Reserve. 31



Table 7: Spillover effects of MSLP on C&amp;I lending: Placebo test for large business loans

	(1) <b>Originations</b> (% loans)	(2) <b>Renewals</b> (% loans)	(3) <b>Loan Spread</b> (ppt)	(4) <b>Maturity</b> (days)	(5) <b>Unsecured</b> (% loans)
<b>(a) MSLP-lending banks</b>					
<b>MSLP Lender×Post</b>	0.00540* (0.00309)	-0.000983 (0.00283)	0.0137 (0.0338)	-6.442 (55.83)	-0.0103 (0.0172)
Bank characteristics	Yes	Yes	Yes	Yes	Yes
R-squared	0.538	0.530	0.947	0.590	0.582
<b>(b) MSLP-lending banks</b>					
<b>MSLP Lender×Post</b>	0.00656* (0.00349)	-0.00121 (0.00300)	-0.0161 (0.0358)	18.41 (58.97)	-0.0258 (0.0186)
Bank characteristics×Post	Yes	Yes	Yes	Yes	Yes
R-squared	0.538	0.530	0.948	0.589	0.583
<b>(c) MSLP-registered banks</b>					
<b>MSLP Registered×Post</b>	-0.000846 (0.00529)	0.00582 (0.00725)	0.0438 (0.140)	30.86 (79.84)	-0.0121 (0.0244)
Bank characteristics	Yes	Yes	Yes	Yes	Yes
R-squared	0.538	0.530	0.947	0.590	0.582
<b>(d) MSLP-registered banks</b>					
<b>MSLP Registered×Post</b>	-0.0204* (0.0113)	0.00139 (0.0132)	-0.106 (0.215)	347.6** (167.1)	-0.0718 (0.0578)
Bank characteristics×Post	Yes	Yes	Yes	Yes	Yes
R-squared	0.538	0.530	0.948	0.589	0.583
Borrower×quarter fixed effects	Yes	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes	Yes
No. of borrowers	8,483	8,480	728	1,756	1,842
Observations	80,581	80,552	2,363	7,089	7,327
Mean of dep. var	0.0644	0.0497	1.879	2004	0.842
St. dev. of dep. var	0.221	0.206	0.927	1173	0.361

The table shows OLS estimates from diff-in-diff regressions with C&I loan-level data at the bank-borrower level for 2019:Q1-Q3. The dependent variables are: the % of new loans originated or renewed each quarter out of outstanding loans; and for new loans, the spread over LIBOR; maturity; and the % of loans not secured with a senior blanket lien. “Post” is a dummy variable taking value 1 for 2019:Q3 and 0 for 2019:Q1-Q2. Banks’ MSLP status is based on public data as of November 24 (registration) and December 11 (lending). The regressions include the same bank characteristics as in Table 3, borrower×quarter fixed effects and bank fixed effects. Standard errors are clustered at the bank-borrower pair level. \*\*\* indicates significance at the 1% level, \*\* at the 5% level, and \* at the 10% level. Source: FR Y-14Q H.1 schedule, Federal Reserve.

## 5.5 Lending Spillovers: Evidence from Small Business Loans

Here we provide an additional test of our hypothesis H2 on potential spillover effects from MSLP participation on banks' C&I lending behavior. We employ granular supervisory data on small C&I loans (less than \$1 million) from the FR Y-14Q A.9 schedule compiled by the Federal Reserve. We employ this second credit register to examine if MSLP participants had relatively better lending outcomes for small firms, which were particularly hard hit by the pandemic (Bloom, Fletcher and Yeh, 2021; Bartik, Bertrand, Cullen, Glaeser, Luca and Stanton, 2020a), while deploying rigorous controls for loan demand. The data are available at the loan portfolio segment level, where a "segment" is given by borrower risk profile and loan characteristics, such that every segment refers to loans to extremely similar borrowers. Borrower risk measured both ex-ante and ex-post with FICO score and delinquency status. We exploit this variation to closely examine MSLP banks' risk taking in the small business loan market.

As in the previous sections, we refer to 2020:Q1 and Q2 as the pre-MSLP period and to 2020:Q3 as the post-MSLP period, and use our standard diff-in-diff specification. The estimates are presented in Table 8, where we examine spillover effects from MLSP lender status<sup>11</sup> on the extensive margin of lending, with dependent variable given by the number of business loan accounts (log). For a granular look at bank risk-taking, we also estimate the specifications by borrower risk: loans to prime vs. subprime borrowers (that is, with above/below FICO score of 620) loans in columns 2–3, loans to borrowers in delinquency status buckets (current, overdue between 30 and 119 days, and past due 120+ days) in columns 4–6, and by loan collateral requirements (secured/unsecured) in columns 7–8. In panel (a) we control for the usual bank characteristics on their own (from Tables 4-6) and in panel (b) we interact these bank characteristics with the "Post" dummy (panel (b)).

Looking at the estimates in column 1 of Table 8, we find that MLSP lenders granted

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<sup>11</sup>We cannot examine spillovers from MLSP registration status because most of the banks in the sample registered for the program.

Table 8: Spillover effects of MSLP on C&I lending: Evidence from small business loans

Dependent variable:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	<b>Log(Number of small business loan accounts)</b>							
All accounts	Prime (FICO>620)	Subprime (FICO<620)	Current or past due < 30 days	Past due: 30-120 days	Past due >120 days	Secured	Unsecured	
<b>MSLP Lender x Post</b>	0.1277*** (0.040)	0.2473*** (0.061)	-0.0208 (0.055)	0.2288** (0.098)	0.0988** (0.048)	0.1197 (0.083)	0.0876* (0.049)	0.1800*** (0.065)
Bank characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	4,458	1,700	1,267	1,095	2,469	894	2,369	2,089
R-squared	0.628	0.685	0.594	0.505	0.406	0.332	0.647	0.709
<b>(a) Control for bank characteristics</b>								
<b>MSLP Lender x Post</b>	0.1556*** (0.045)	0.2488*** (0.069)	-0.0496 (0.073)	0.1956** (0.097)	0.1437** (0.058)	0.1357 (0.087)	0.1229** (0.055)	0.2130*** (0.073)
Bank characteristics x Post	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	4,458	1,700	1,267	1,095	2,469	894	2,369	2,089
R-squared	0.628	0.683	0.593	0.502	0.405	0.332	0.647	0.708
<b>(b) Control for bank characteristics x Post</b>								
Segment x quarter fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

The table shows OLS estimates from diff-in-diff regressions with C&I loan portfolio segment-level data during 2020:Q1-Q3. The dependent variable is the number of loan accounts in each segment (log) for each reporting BHC (matched to its main commercial bank) at end-quarter. A loan portfolio segment is defined according to the level of risk and the loan terms, with risk referring to borrower FICO score (above or below 620) and delinquency status (current, delinquent for 30–59 days, 60–89 days, 90–119 days, or 120+ days); and loan type to credit line or term loan, secured or unsecured, and maturity above or below 3 years. “Post” is a dummy variable taking value 1 for 2020:Q3 and 0 for 2020:Q1-Q2. Bank’s MSLP lender status is based on public lending data as of December 11, 2020. The same bank characteristics as in Table 3 are included. The regressions include segment × quarter and bank fixed effects, and standard errors are clustered at the bank-segment level. \*\*\* indicates significance at the 1% level, \*\* at the 5% level, and \* at the 10% level. Source: FR Y-14Q A.9 schedule, Federal Reserve.

between 12.77% and 15.56% more small business loans in 2020:Q3 than other banks, depending on the set of controls. Furthermore, MSLP lenders extended more small business loans to relatively safer borrowers, with FICO score above 620 (columns 2 vs. 3) and to borrowers that were not significantly delinquent (columns 4–6). Finally, MSLP lenders had relatively easier collateral requirements on small business loans after program implementation, by 18%–21.3% depending on the specification. These results are consistent with those for large business loans in Section 5.4, where we found that MSLP participating banks had lower collateralization rates compared to other banks after the standing up of the program.

Next, we test that our results are not driven by unobserved bank characteristics that may drive bank participation in both the MSLP and PPP programs. This could be a valid concern if, for instance, difficult-to-measure balance sheet constraints or bank-level risk appetite would determine participation in both programs and a relative easing of lending standards in 2020:Q3, which would lead us erroneously to attribute these effects to MSLP participation. To alleviate this potential concern, we check that (log) unpaid balances of federally-guaranteed loans (in \$ terms), reported by the BHCs in our sample in 2002:Q3 for each loan portfolio segment, are uncorrelated with MSLP lender status. In these regressions we carefully control for loan demand with  $\text{segment} \times \text{quarter}$  fixed effects, which allow for time-varying demand shocks to small clusters of borrowers that are extremely similar in terms of risk profile. The results from the diff-in-diff estimations are reported in Table 9, and show no systematic link from MSLP lender status to PPP loan balances.

## 6 Why Was MSLP Take-up So Limited?

Of the \$600 billion in available funds to purchase MSLP loans, only \$16.5 billion were used by the SPV to purchase loans. Why was MSLP take-up so limited? Could more permissive program terms boosted participation and lending flows, potentially generating greater spillovers on C&I lending and more direct support to business through lending via

Table 9: Spillover effects of MSLP on C&I lending: Placebo test for small business loans

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable:	<b>Log(\$ Volume of federally-guaranteed loans)</b>							
	All accounts	Prime (FICO>620)	Subprime (FICO<620)	Current or past due<30 days	Past due: 30-120 days	Past due >120 days	Secured	Unsecured
<b>MSLP Lender</b>	0.0727 (0.083)	-0.0592 (0.037)	0.2266 (0.196)	0.1054 (0.189)	0.0439 (0.079)	-0.0459** (0.023)	0.2031 (0.172)	0.1486 (0.222)
Bank characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Segment x quarter fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	915	486	429	315	269	474	441	238
R-squared	0.691	0.146	0.744	0.198	0.230	0.175	0.704	0.678

The table shows OLS estimates from diff-in-diff regressions with C&I loan portfolio segment-level data during 2020:Q1-Q3. As a placebo test, the dependent variable is the (log) \$ volume of federally-guaranteed loans (mostly granted through the PPP) in each loan portfolio segment for each reporting BHC (matched to its main commercial bank) at end-quarter. Formally, the variable definition is the “total unpaid principal balance for accounts on the book for the segment as of quarter-end that are currently part of a federally guaranteed program, where the guarantee percentage is 100% and no personal guarantees are required (e.g., loans under programs such as the 2020 PPP)”. A loan portfolio segment is defined according to the level or risk and the loan terms, with risk referring to borrower FICO score (above or below 620) and delinquency status (current, delinquent for 30-59 days, 60-89 days, 90-119 days, or 120+ days); and loan type to credit line or term loan, secured or unsecured, and maturity above or below 3 years. “Post” is a dummy variable taking value 1 for 2020:Q3 and 0 for 2020:Q1-Q2. Bank’s MSLP lender status is based on public lending data as of December 11, 2020. The same bank characteristics as in Table 6 are included. The regressions include segment×quarter and bank fixed effects, and standard errors are clustered at the bank-segment level. \*\*\* indicates significance at the 1% level, \*\* at the 5% level, and \* at the 10% level. Source: FR Y-14Q A.9 schedule, Federal Reserve.

the MSLP? In this section, we explore the factors behind the low overall MSLP lending volumes, using both survey-based evidence from the September SLOOS and credit register data on the characteristics of MSLP borrowers.<sup>12</sup>

## 6.1 Restraining Factors: Evidence from Survey Data

Using survey data from the September MSLP SLOOS about banks’ experiences with the MSLP, we review program parameters and reported reasons that may have constrained bank and firm participation in the program. The survey inquired with non-registered banks about their reasons for not registering, and with registered banks about their reasons for not originating (more) MSLP loans to eligible borrowers. Second, banks that reported certain MSLP terms being unattractive to either themselves or to potential borrowers were asked to give further details about those specific terms.

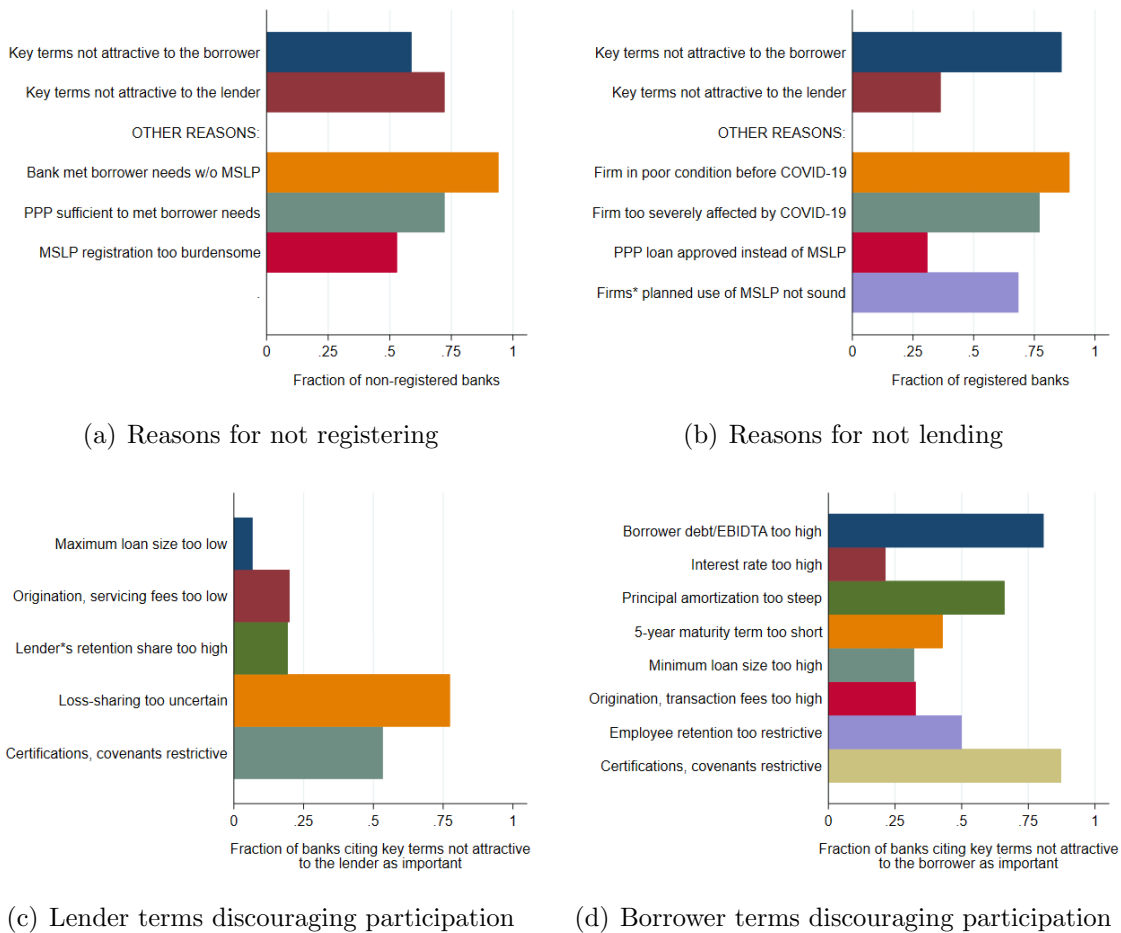
Figure 4 summarizes banks’ responses to the survey. Panel (a) lists the reasons cited by non-registered banks for not registering, along with the fraction of banks rating each reason as “somewhat important” or “very important.” Panel (b) lists the reasons cited by *registered banks* for not originating MSLP loans to eligible borrowers, along with the fraction of banks rating each reason as “somewhat important” or “very important.” In panel (a), the first two horizontal bars show that non-registration was more often associated with MSLP requirements considered unattractive to the lender (cited by 72% vs. 59% of non-registered banks). In contrast, in panel (b), actual lending by registered banks was reportedly deterred by MSLP requirements considered unattractive to the borrower (cited by 86% vs. 36% of registered banks). This pattern echoes our regression result that bank characteristics were more relevant for the decision to register than for the decision to underwrite MSLP loans.<sup>13</sup>

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<sup>12</sup>See [Hanson, Stein, Sunderman and Zwick \(2020\)](#) for a theoretical discussions of the program design features that might have hampered its ability to provide aid to firms; and [Dudley \(2020\)](#) for an early discussion why the program would likely see low overall take-up.

<sup>13</sup>Table A6 shows regression results that relate banks’ reported reasons for not participating in the MSLP bank characteristics. In columns 1 and 2, smaller banks were more likely to report “key MSLP loan terms not attractive to the lender” an important reason for not registering or lending. The same was the case for “traditional lenders” with larger loan/asset ratios and more SME loans relative to total assets. These

Figure 4: **Key MSLP terms cited by banks as too restrictive**



This figure tabulates bank-level responses to survey questions asked in the September MSLP SLOOS that examined the determinants of banks' MSLP participation. Panels (a) and (b) tabulate the key terms cited by non-registered and non-lending banks for not registering and not lending, respectively. Panels (c) and (d) tabulate the key lender and borrower terms cited by banks as reasons for not registering or lending (pooled across banks that did not register and banks that registered but did not lend as of survey close at the end of August 2020). See Appendix A.1 for sample composition and further details on the SLOOS and the Federal Reserve September MSLP SLOOS [webpage](#) for public information about the September MSLP SLOOS. Source: Federal Reserve.

Turning to other reasons cited for non-participation in panel (a), the vast majority of non-participating banks (94%) indicated that they were able to meet borrower needs outside of the MSLP. Burdensome program registration is cited by 53% of non-registered banks, findings are consistent with our earlier find that smaller banks were less likely to participate in the program, suggesting that these smaller banks may have found MSLP terms unattractive. Not reported in the table, we find no link between bank characteristics on the one hand, and the likelihood to invoking unattractive terms vis-a-vis the borrower as a reason for not participating.

suggesting the presence of a non-negligible cost associated with the registration process. In panel (b), other reasons cited by registered banks for not actually making MSLP loans (despite being registered at the time of the survey) suggest credit quality concerns. In particular, 89%, 77%, and 68% of banks reported that they were did not make MSLP loans because potential borrowers were in poor financial condition before the pandemic (and hence did not meet MSLP eligibility criteria), were too severely affected by the crisis, or did not intend to use the MSLP proceeds soundly.

Panels (c) and (d) in Figure 4 focus on the program parameters that banks reported as unattractive to themselves and to potential borrowers. We show the fraction of banks that rate each term as “somewhat or very important” in discouraging participation (in the full sample of respondents). In panel (c), 77% of banks lamented uncertainty in the loss-sharing agreement with the MSLP, and 53% of banks invoked too restrictive certification and covenant requirements. In panel (d), among the MSLP loan terms considered unattractive from the borrowers’ standpoint, the limit on leverage (debt-to-EBIDTA) stood out—cited by 81% of banks. Banks also cited highly restrictive certification and covenant requirements for the borrower (87%) and the steep principal amortization schedule (66% of banks). These survey responses suggest that overly restrictive program terms may have played an important role in dampening lender appetite and borrower demand for MSLP loans.

## **6.2 Who Are the MSLP Borrowers?**

In light of the restrictive eligibility requirements that appear to have dampened demand for MSLP loans, and the fact that banks were largely able to meet credit demand outside the program, we ask, who are the firms that did participate in the program? To answer this question, we use the supervisory data from Y-14Q H.1. schedule, which provides not only information on individual loans, but also financial data for each firm as reported by the lenders. We examine MSLP borrower characteristics at 2019 year end to avoid those characteristics being contaminated by the crisis.



Table 10 compares borrower and loan characteristics for MSLP borrowers vs. eligible non-MSLP borrowers. Recall the eligibility criteria include annual revenues of \$5 billion or less, leverage no higher than 6xEBITDA, and satisfactory creditworthiness.<sup>14</sup> The results show that the MSLP borrowers had (statistically significantly) higher leverage, lower interest coverage ratios (reflecting lower ability to meet debt servicing obligations), lower accounts receivable, lower return on assets, less cash holdings, and lower risk ratings than eligible non-MSLP borrowers before the pandemic crisis. However, they had stronger growth potential as indicated by relatively higher sales growth.

These findings suggest that MSLP borrowers were on average riskier than non-MSLP borrowers. Reflecting the overall worse financials, MSLP borrowers had lower duration loans and paid higher interest rates and spreads on existing bank loans, on average by 50 bps (over LIBOR) than other eligible firms. The average MSLP borrower paid 265 bps over LIBOR on existing bank loans in 2019, which suggests that the 300 bps price point of an MSLP loan may have been overly restrictive. Indeed, Figure 5(a) shows the distribution of spreads on floating-rate C&I loans (indexed to LIBOR and originated during 2014–2019) in the large-loan credit register. The MSLP spread of 300 bps is the 83rd percentile of the historical spread distribution of spreads on C&I loans to large firms. Loan pricing data from regional banks, shown in Figure 5(b), indicates that the 300 bps MSLP spread is even more restrictive for smaller firms (more likely to borrow from regional banks), representing the 95th percentile of the historical spread distribution for bilateral C&I loans during 2012–2020.

## 7 Conclusions

We study the spillover effects of MSLP participation on banks’ lending policies during the COVID-19 pandemic crisis. To our knowledge, ours is the first paper to analyze empirically

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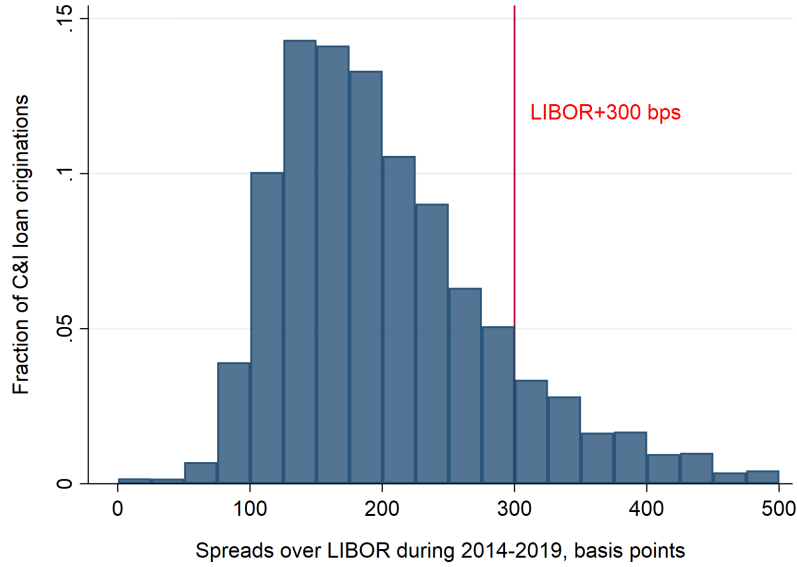
<sup>14</sup>More specifically, we identify MSLP-eligible firms using the following program criteria applied to end-2019 financials: (i) annual revenues of \$5 billion or less; (ii) debt lower than 6x EBITDA; (iii) internal risk rating equivalent to a “pass” in the Federal Financial Institutions Examination Council (FFIEC)’ supervisory rating system (or to at least BB on the S&P rating scale).

Table 10: Borrower and loan characteristics by MSLP participation status: Y-14Q, 2019:Q4

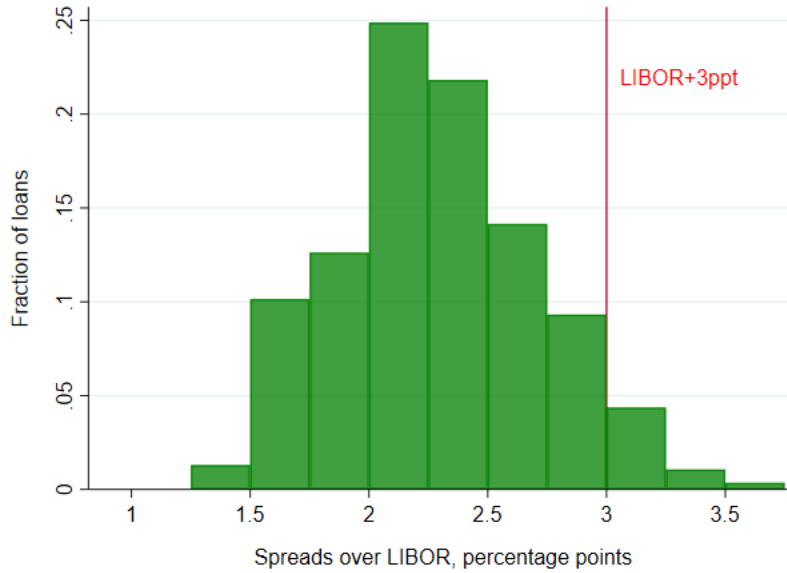
	(1)	(2)	(3)	(4)	(5)	(6)
	<b>MSLP borrowers</b> <i>(N=159)</i>		<b>Eligible non-MSLP borrowers</b> <i>(N=26,729)</i>		<b>p-values</b>	
	Means	Medians	Means	Medians	Means	Medians
<b>(a) Borrower characteristics</b>						
Total assets (\$mn)	169.47	27.46	909.34	20.49	0.26	0.00
ICR (ebitda/interest expense)	15.31	6.44	33.88	12.96	0.00	0.00
Leverage (debt/ebitda)	2.99	2.22	1.79	1.42	0.00	0.00
Debt-to-asset ratio (%)	40.69	38.00	27.86	22.89	0.00	0.00
Capex-to-asset ratio (%)	2.40	0.01	1.77	0.09	0.34	0.55
Cash-to-asset ratio (%)	9.07	4.84	12.18	6.73	0.01	0.00
Acc. rec.-to-assets ratio (%)	18.62	13.59	24.59	18.83	0.00	0.02
ROA (ebitda/assets, %)	18.83	15.66	22.50	16.25	0.04	0.56
Sales growth (%)	24.10	10.26	12.65	7.54	0.00	0.02
Rating (1=AAA, 5=BB, 9=C)	5.40	5.00	4.63	5.00	0.00	0.00
<b>(b) Loan characteristics</b>						
log (total commitments \$)	16.02	15.96	15.53	15.20	0.00	0.00
log (average commitments \$)	15.45	15.33	15.20	14.91	0.01	0.00
Spread (floating, ppt)	2.37	2.50	1.82	1.81	0.00	0.00
Spread (floating LIBOR, ppt)	2.65	2.50	2.10	2.00	0.00	0.00
Rate (all, ppt)	4.96	4.63	4.23	4.01	0.00	0.00
Rate (floating, ppt)	4.79	4.45	4.10	3.96	0.00	0.00
Rate (floating LIBOR, ppt)	4.47	4.30	3.81	3.75	0.00	0.00
Rate (fixed, ppt)	5.59	5.23	4.74	4.21	0.07	0.00
Origination (share of facilities)	0.07	0.00	0.06	0.00	0.54	0.20
Renewed (share of facilities)	0.08	0.00	0.09	0.00	0.85	0.87
Maturity (years)	5.53	5.04	7.54	5.78	0.00	0.00

The table shows means and medians for key C&I borrower and loan characteristics by the borrowers' MSLP participation status, as well as p-values for t-tests of equality of means and medians for the two groups, using Y-14Q data for 2019:Q4. It contrasts actual MSLP borrowers with eligible non-MSLP borrowers in the Y-14Q dataset, where the borrower's MSLP eligibility is defined as: (i) had 2019 annual revenues of \$5 billion or less; (ii) the debt did not exceed 6x the 2019 EBITDA; (iii) had an internal risk rating equivalent to a "pass" in the FFIEC' supervisory rating system (or to not worse than BB on the S&P rating scale). We have matched 159 MSLP borrowers from the MSLP loan data release of January 11 with the Y-14Q dataset as of 2019:Q4, using exact and scrubbed matching by the borrowers' name and city-state location. Source: FR Y-14Q H.1 schedule, Federal Reserve.

Figure 5: MSLP loan pricing vs. historical spreads on C&I loans



(a) Spreads for large loans (bps)



(b) Spreads for smaller bilateral loans (bps)

The figure shows the distribution of loans spreads (over London Interbank Offered Rate) for C&I loans granted to nonfinancial firms. In panel (a), the sample contains loans that satisfy the MSLP eligibility criteria for loan size and maturity, and for borrower revenue, leverage, and rating. The histogram refers to C&I loans reported during 2014–2019. In panel (b), the distribution of spreads is for new and renewed bilateral C&I loans indexed to LIBOR during 2012–2020. For both panels, the vertical line at 300 bps is the MSLP loan pricing point. Source: FR Y-14Q H.1 schedule, Automated Financial Systems (AFS), Federal Reserve.

bank incentives to participate in the MSLP and the program's broader effects on banks' lending decisions. We use a wide range of public data on program activities coupled with confidential survey data and supervisory information on bank lending activities. Specifically, we exploit two credit registers with granular information on banks' loan exposures to both large and small firms to gauge the program's impact on the broader loan market.

We find that bank participation in the form of registration and lending through the MSLP is related to banks' incentives to participate provided by the program. In particular, banks that are larger and whose lending portfolios are more concentrated in C&I loans were more likely to participate. Banks that were funding constrained, as reflected in lower capital buffers and less core deposits, were also more likely to participate in the program.

Our key result is that bank participation in the MSLP is strongly and robustly associated with relatively less tightening of C&I lending standards and terms, as well as a higher likelihood of originations and renewals, lower loan spreads, longer maturities, and lower collateral requirements. MSLP participants also extended relatively more small business loans after the program's implementation, especially to safer borrowers. These results suggest that the program's backstop of the bank loan market and its design features, such as the removal of risk from banks' balance sheets, may have been effective in reducing banks' risk aversion and generally willingness to lend.

These effects are notable given the overall low program take-up. Detailed survey data on banks' experiences with the MSLP indicate that overly restrictive terms may have discouraged bank participation and may have dampened borrower demand. Most surveyed banks were able to meet firms' credit demand outside the program; and the few firms that obtained MSLP loans were at the riskier end of the eligible firm population. Our results suggest that the MSLP had positive effects on banks' willingness to make loans to businesses and hence supported the flow of credit during the pandemic despite the modest take-up, supporting the notion that the program mainly served as a backstop.

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Table A1: Descriptive statistics for key regression variables

	(1)	(2)	(3)	(4)	(5)	(6)
	N	Mean	St. Dev	p10	p50	p90
<b>A. MSLP participation variables</b>						
Registered	5242	0.11	0.32	0.00	0.00	1.00
Lending	5242	0.03	0.18	0.00	0.00	0.00
Lending (registered banks only)	601	0.29	0.45	0.00	0.00	1.00
<b>B. Bank characteristics</b>						
Total assets (\$ bn)	5084	4.08	63.23	0.06	0.26	1.90
Loans/Assets	5078	0.64	0.17	0.41	0.67	0.82
C&I Loans/Loans	5002	0.19	0.13	0.05	0.16	0.34
CET1 ratio	5078	0.16	0.13	0.09	0.13	0.23
Core Deposits/Assets	5078	0.48	0.13	0.34	0.50	0.62
Loan Loss Reserves/Loans	4998	0.01	0.01	0.01	0.01	0.02
PPP Loans/Loans	5050	0.08	0.10	0.00	0.06	0.19
SME Loans(<\$100K)/Loans	5002	0.02	0.05	0.00	0.00	0.05
Exposure to COVID cases	5146	0.05	0.02	0.02	0.05	0.07
Exposure to initial UI claims	5164	3.57	1.79	1.40	3.30	6.70
Exposure to unemployment	5164	0.19	0.06	0.15	0.18	0.25

This table presents descriptive statistics for key regression variables. MSLP participation variables in panel (a) are dummy variables that take value 1 for the banks that are registered as lenders, banks that are lending (actively granting loans), or both. Panel (b) refers to bank balance sheet variables measured as of 2020:Q2. All bank balance sheet variables expressed as ratios are winsorized at the 1st and 99th percentiles of their distributions. Bank-level exposure variables to COVID cases and unemployment are measured by weighting COVID infections and unemployment variables across locations by banks' own deposits shares in those locations. Data on COVID-19 cases are at the county level and unemployment data at the state level. Source: Federal Reserve Bank of Boston MSLP [webpage](#) and Federal Reserve Main Street transaction [webpage](#) as of January 11, 2021, Call Report, FDIC Summary of Deposits, Center for Systems Science and Engineering at Johns Hopkins University, Bureau of Labor Statistics, U.S Department of Labor, U.S. Census.

Table A2: Extensive margin of MSLP participation: Additional business model and demand controls

Dependent variable:	MSLP Registered			MSLP Lender			MSLP Lender (registered banks only)		
	(1) All banks	(2) All banks	(3) All banks	(4) All banks	(5) All banks	(6) All banks	(7) All banks	(8) All banks	(9) All banks
Size (log-assets)	0.0757*** (0.004)	0.0749*** (0.004)	0.0752*** (0.004)	0.0255*** (0.003)	0.0261*** (0.003)	0.0258*** (0.003)	0.0292*** (0.012)	0.0349*** (0.012)	0.0312*** (0.012)
Loans/Assets	0.1843*** (0.026)	0.1878*** (0.026)	0.1869*** (0.026)	0.0426*** (0.015)	0.0401*** (0.015)	0.0416*** (0.015)	0.0746 (0.175)	0.0421 (0.180)	0.0474 (0.182)
C&I Loans/Loans	0.4159*** (0.057)	0.4345*** (0.059)	0.4315*** (0.059)	0.1841*** (0.037)	0.1786*** (0.038)	0.1794*** (0.038)	0.3347* (0.190)	0.2610 (0.195)	0.2613 (0.196)
CET1 ratio	0.0484 (0.046)	0.0854* (0.046)	0.0860* (0.046)	-0.0071 (0.020)	0.0088 (0.021)	0.0072 (0.021)	-0.6056** (0.290)	-0.5966* (0.312)	-0.6200** (0.295)
Core Deposits/Assets	-0.1280*** (0.036)	-0.1209*** (0.036)	-0.1261*** (0.037)	-0.0699*** (0.023)	-0.0695*** (0.023)	-0.0666*** (0.022)	-0.3166* (0.177)	-0.3329* (0.182)	-0.2966* (0.179)
Loan Loss Reserves/Loans	-0.8824* (0.454)	-0.9395** (0.454)	-0.9488** (0.456)	0.0729 (0.247)	0.0640 (0.252)	0.0785 (0.252)	6.1506** (3.087)	6.8805** (3.230)	7.2083** (3.174)
PPP loans/Loans	0.2069*** (0.077)	0.1892** (0.079)	0.1937** (0.079)	0.0410 (0.052)	0.0611 (0.054)	0.0586 (0.054)	0.0000 (0.214)	0.1420 (0.222)	0.1281 (0.227)
SME Loans(< \$100K)/Loans	0.0703 (0.084)	0.0624 (0.085)	0.0636 (0.085)	-0.0114 (0.049)	-0.0131 (0.049)	-0.0123 (0.050)	-0.3551 (0.252)	-0.3696 (0.238)	-0.3106 (0.238)
Exposure to COVID cases		-0.1350 (0.197)	-0.1992 (0.194)		0.0124 (0.108)	0.0584 (0.106)		0.2846 (1.097)	1.2488 (1.061)
Exposure to unemployment		0.0009 (0.002)			-0.0015 (0.001)			-0.0133 (0.010)	
Exposure to initial UI claims			-0.0858 (0.063)			0.0205 (0.041)			0.5633 (0.407)
Mean of dep. var.	0.115	0.064	0.370	0.033	0.018	0.108	0.291	0.288	0.291
Observations	4,991	4,961	4,961	4,991	4,961	4,961	596	589	589
R-squared	0.217	0.216	0.216	0.084	0.085	0.085	0.047	0.053	0.054

This table reports results of linear probability models relating MSLP participation status to bank characteristics and additional controls including business model (share of PPP loans and SME loans in total loans, and bank-level measures of exposure to the pandemic). The dependent variables are Registered (dummy variable that take value 1 for the banks that are registered as lenders and 0 otherwise), Lending (dummy variable that takes value 1 for banks that are lending (actively granting loans) and 0 otherwise), or Lending conditional on being registered. All bank balance sheet variables are measured as of 2020:Q2. Measures of bank exposure to the pandemic are defined in Section 3. Standard errors are clustered at the bank level. \*\*\* indicates significance at the 1% level, \*\* at the 5% level, and \* at the 10% level. Source: Call Report, Federal Reserve Bank of Boston webpage as of December 31, 2020 and Federal Reserve Main Street webpage as of January 11, 2021, FDIC Summary of Deposits, Center for Systems Science and Engineering at Johns Hopkins University, Bureau of Labor Statistics, U.S Department of Labor, U.S. Census.



## A.1 The Senior Loan Officer Opinion Survey (SLOOS)

In Section 5.3 we study the spillover effects of MSLP participation to C&I lending standards and terms. To this end, we assemble data from the all the [Senior Loan Officer Opinion Surveys on Bank Lending Practices](#) conducted by the Federal Reserve in 2020. These surveys address changes in the standards and terms on, and demand for, bank loans to businesses and households over the three months prior to the deployment of the survey, which generally corresponds to the previous quarter. The April (Q1) SLOOS opened on March 23 and responses were due by April 3 2020. The July (Q2) survey ran between June 22 and July 2 2020. In the September (Q3) survey, respondent banks received the survey on September 28 and responses were due by October 9 2020.

In Section 6.1 we examine reasons behind the low MSLP takeup using responses from the September MSLP SLOOS, a supplementary survey conducted by the Federal Reserve to understand banks’ experiences with the program. The survey opened on August 17 2020 and closed for responses on September 1 2020. The survey consisted of questions that asked about C&I loan inquiries and bank participation in the MSLP since mid-June, when lender registration started; banks’ outlook regarding their participation in the program; factors that may have shaped willingness to participate; and the characteristics of borrowers inquiring and receiving MSLP loans. The survey was sent out to 86 domestically-chartered banks, of which 85 responded. Detailed information about the survey is available on the Federal Reserve September SLOOS [webpage](#).

Based on this SLOOS, 66 banks had registered by the time of the survey according to their answers to Question 7 “What best describes your bank’s operational MSLP status?” (options 1–5 indicating that the bank is registered and already underwriting and submitting loans, working to operationalize the program in the expectation of making loans in the next weeks, evaluating the program and how it works, planning to make loans only if conditions deteriorate, and not yet registered but planning to register in the coming weeks). Furthermore, 22 banks were active MSLP lenders according to their answers to Question 7 (options 1–2 indicating that the bank is registered and underwriting and submitting loans, or working to operationalize the program in the expectation of making loans in the following weeks). The fractions of registered and lending banks are thus comparable to those based on the Call Report for banks with total assets above \$50 billion (Table 1).

Table A3 summarizes key balance sheet characteristics of SLOOS respondents. Banks participating in the survey have an average balance sheet size of \$174 bn (with half the banks above \$40bn in size) and have significant commercial lending businesses, with average loan to asset ratio of 65%, and average share of C&I loans in lending portfolio of 27%. These banks were also active lenders to smaller businesses, with PPP balances at end-Q2 representing 8% of total loans, and SME loan balances (lower than \$1 mn) of 7% of total loans. In Table A4 we compare SLOOS banks with their Call Report counterparts and examine the balance sheet correlates of being a SLOOS participant. As shown in column 9, SLOOS respondents are systematically larger than other banks and although they have lower lending portfolios, these portfolios are more heavily concentrated on C&I loans. Furthermore, they have lower PPP balances relative to their total lending portfolios at the end of 2020:Q2 compared to other banks.

In Table A5 we examine the determinants of bank participation in the MSLP. In the

sample of survey respondents, we are able to control for a direct measure of credit demand derived from banks' own assessment of the direction of change of credit demand over the prior three months, based on the number of inquiries received from size-eligible borrowers. Here, the dependent variables are constructed from survey responses to questions regarding self-declared MSLP status: a dummy variable taking value 1 for banks that report being registered or planning to register in the coming weeks (0 otherwise) and a dummy variable taking value 1 for banks that were already underwriting or submitting loans, or actively working to operationalize the program (0 otherwise). The estimation results indicate a statistically significant positive association between inquiries from size-eligible borrowers (the variable "stronger credit demand") and the decision to participate in the program. This result affirms an important role for credit demand in driving MSLP participation, providing further motivation to carefully control for demand effects in the lending spillover analysis.

In Table A5 examines the how bank characteristics relate to factors that banks cite as restraining their participation in the MSLP. In columns 1 and 2, smaller banks were more likely to report "key MSLP loan terms not attractive to the lender" an important reason for not registering or lending. The same was the case for "traditional lenders" with larger loan/asset ratios and more SME loans relative to total assets. These findings are consistent with our earlier find that smaller banks were less likely to participate in the program, suggesting that these smaller banks may have found MSLP terms unattractive. Not reported in the table, we find no link between bank characteristics on the one hand, and the likelihood to invoking unattractive terms vis-a-vis the borrower as a reason for not participating.

Table A3: Balance sheet characteristics of respondents to the September MSLP SLOOS

	(1)	(2)	(3)	(4)	(5)	(6)
	N	Mean	St. Dev	p10	p50	p90
<b>A. MSLP participation variables</b>						
Registered or will register in coming weeks	85	0.79	0.41	0.00	1.00	1.00
Underwriting or submitting loans	85	0.39	0.49	0.00	0.00	1.00
<b>B. Bank-level characteristics</b>						
Total assets (\$ bn)	85	174.56	457.52	2.44	29.67	363.71
Loans/Assets	85	0.65	0.14	0.45	0.68	0.79
C&I Loans/Loans	85	0.27	0.11	0.14	0.26	0.43
CET1 ratio	85	0.12	0.02	0.11	0.12	0.15
Core Deposits/Assets	85	0.53	0.09	0.41	0.52	0.66
Loan Loss Reserves/Loans	85	0.02	0.01	0.01	0.02	0.02
PPP Loans/Loans	85	0.08	0.07	0.02	0.07	0.15
SME Loans(< \$100K)/Loans	85	0.02	0.03	0.00	0.02	0.04
Exposure to COVID cases	85	0.04	0.02	0.02	0.04	0.06
Exposure to initial UI claims	85	0.20	0.04	0.16	0.19	0.25
Exposure to unemployment	85	4.09	1.63	2.04	3.93	5.90

This table presents descriptive statistics for MSLP participation and other bank characteristics for the 85 respondents to the September MSLP SLOOS. Bank balance sheet variables are measured as of end-2020:Q2. Source: Federal Reserve, Call Report, FDIC Summary of Deposits, Center for Systems Science and Engineering at Johns Hopkins University, Bureau of Labor Statistics, U.S Department of Labor, U.S. Census.

Table A4: Determinants of participation in the September MSLP SLOOS

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Size (log-assets)	0.0352*** (0.003)								0.0367*** (0.003)
Loans/Assets		0.0024 (0.010)							-0.0638*** (0.013)
C&I Loans/Loans			0.0942*** (0.016)						0.1049*** (0.024)
CET1 ratio				-0.0660*** (0.009)					-0.0022 (0.013)
Core Deposits/Assets					0.0435*** (0.014)				0.0072 (0.013)
Loan Loss Reserves/Loans						0.3904** (0.183)			-0.0146 (0.194)
PPP loans/Loans							-0.0060 (0.013)		-0.1578*** (0.028)
SME Loans(< \$100K)/Loans								0.0305 (0.026)	0.0526 (0.035)
Observations	4,991	4,991	4,991	4,991	4,991	4,991	4,991	4,991	4,991
R-squared	0.164	0.000	0.008	0.002	0.002	0.001	0.000	0.000	0.182

This table presents a linear probability model of the determinants of being a participant in the September MSLP SLOOS. The dependent variable is a dummy variable that takes value 1 for survey participants. All bank balance sheet variables are measured as of 2020:Q2. \*\*\* indicates significance at the 1% level, \*\* at the 5% level, and \* at the 10% level. Source: Federal Reserve, Call Report.



Table A6: Restraining factors from MSLP participation: Evidence from the September 2020 MSLP SLOOS

	(1) Registered banks	(2) All banks	(3) Registered banks	(4) Registered banks	(5) Registered banks
Dependent variable:	Key terms not attractive to the lender	Key terms not attractive to the lender	Firm in poor condition before COVID-19	Firm too severely affected by COVID-19	Firms' planned use of MSLP not sound
Size (log-assets)	-0.1547*** (0.039)	-0.1633*** (0.037)	0.0494 (0.041)	0.1174** (0.047)	0.0069 (0.048)
Loans/Assets	-1.5644* (0.786)	-1.4433** (0.684)	-0.1521 (0.648)	0.3682 (0.694)	-0.0257 (0.933)
C&I Loans/Loans	-0.8074 (0.733)	-0.4285 (0.668)	-0.7320* (0.391)	-1.3239* (0.713)	-0.2846 (0.781)
CET1 ratio	-5.0243 (3.250)	-4.3985 (3.160)	-5.2520* (2.899)	-3.2025 (3.002)	-3.3911 (3.705)
Core Deposits/Assets	0.3800 (0.694)	-0.2446 (0.619)	0.2793 (0.433)	1.0152** (0.502)	1.1810* (0.648)
Stronger credit demand	0.0166 (0.151)	-0.1253 (0.133)	0.2921*** (0.093)	0.4323*** (0.106)	0.4558*** (0.121)
PPP loans/Loans	-0.1668 (0.941)	-0.2493 (0.976)	0.0169 (0.795)	1.8064* (0.933)	1.1104 (1.234)
SME Loans/C&I Loans	4.6913*** (1.516)	2.5246* (1.459)	0.6803 (1.342)	-0.6231 (1.558)	-1.0268 (2.043)
Observations	53	70	55	55	55
R-squared	0.415	0.298	0.241	0.294	0.244

This table reports results of simple OLS regressions relating banks' responses on factors restraining their MSLP participation at the September MSLP SLOOS to bank characteristics and self-reported changes in demand. In columns 1-2, the dependent variable is a dummy variable that takes value 1 for registered banks that reported "key MSLP loan terms not being attractive to the bank" as a "somewhat important" or "very important" reason for not lending (Question 9, option 6), or by the full sample of registered and non-registered banks for not lending or not registering (Question 8, option 5 and Question 9, option 6). Similarly, the dependent variable is a dummy variable that takes value 1 for registered banks reporting that the reasons listed at the top of columns 3-5 were "somewhat important" or "very important" for not lending (Question 9, options 1, 2, and 4). \*\*\* indicates significance at the 1% level, \*\* at the 5% level, and \* at the 10% level. Source: Federal Reserve September MSLP SLOOS, Call Report.

## A.2 Instrumental Variable Estimator for Spillover Effects from MSLP Participation

A key identification challenge in the spillovers specifications from Section 5.3 is the potential endogeneity of banks’ decision to participate in the program. OLS estimates may be biased if both this decision and lending standards are driven by the same omitted, unobservable factors. To alleviate such concerns, here we focus on the instrumental variable (IV) estimator. The instrumental variables need to be correlated with banks’ decision to participate in the program, orthogonal on lending standards, and should only affect lending decisions through their effect on program participation. Given that registration for the MSLP involved documentation requirements that were seen as complex and may have deterred banks without experience working with the Fed from participating, we argue that a bank’s familiarity with the Fed’s surveys, programs, and facilities would be potential IV candidates.

We use two instruments. The first one is a dummy variable for bank participation in one of the Fed’s flagship surveys—the Senior Financial Officer Survey—a voluntary survey that gathers information about liability management, the provision of financial services, and the functioning of key financial markets. The list of participating banks comes from the September 2020 survey (See the [SFOS webpage](#) for further information.) The second IV is a dummy variable for bank participation in the Paycheck Protection Program Liquidity Facility (PPPLF), a Federal Reserve program providing liquidity to banks participating in the PPP. We obtain this dummy from the bank-level data released as part of the Federal Reserve’s [Reports to Congress Pursuant to Section 13\(3\) of the Federal Reserve Act in response to COVID-19](#) as of January 11, 2021.

We use these two variables as instruments in a two-stage procedure, on the premise that they satisfy the exclusion restriction (they do not have any direct bearing on banks’ lending standards and terms, other than through their correlation with MSLP participation), they are uncorrelated with omitted or unobservable bank characteristics driving MSLP participation, and they are correlated with program takeup. To test the last assumption, we report estimates from the first-stage regressions in Table A7, where we regress the “Registered” and “Lender” dummies on the two IVs and all control variables in our baseline lending specifications (Table 4). We find that survey and PPPLF participation are statistically strong predictors of MSLP participation status.

In the second stage we use the predicted values for the “Registered” and “Lender” outcome variables and use them in an OLS regression that explains changes in lending standards and terms. To constrain predicted probabilities between 0 and 1, we estimate the second stage with a Probit/IV estimator. The results, reported in Table A8, show a statistically significant association between MSLP participation and the probability of tightening lending standards in the post-program period, confirming our OLS baseline results. Similarly, in Table A9, Probit/IV estimates from the two-stage approach indicate that for approved C&I loans and credit lines, MSLP lenders were less likely to tighten a range of loan terms compared to non-lenders peers. The terms that appear most robustly impacted by MSLP lender status are maximum maturity, cost of credit lines, premiums charged on riskier loans, covenants, and collateral requirements.

Table A7: First-stage regression: Predicting MSLP participation with IVs in the cross-section of banks

Dependent variable	(1) Registered	(2) Lender
<b>Instrumental variables</b>		
PPPLF participant	0.0734*** (0.023)	0.0324** (0.015)
SFOS bank	0.0273 (0.065)	0.1075* (0.064)
<b>Second stage control variables</b>		
Size (log-assets)	0.0742*** (0.004)	0.0223*** (0.003)
Loans/Assets	0.1713*** (0.026)	0.0453*** (0.015)
C&I Loans/Loans	0.4231*** (0.056)	0.1784*** (0.034)
CET1 ratio	0.0504 (0.047)	-0.0109 (0.021)
Core Deposits/Assets	-0.1078*** (0.036)	-0.0632*** (0.022)
Loan Loss Reserves/Loans	-0.8308* (0.452)	-0.0051 (0.261)
PPP loans/Loans	0.1283 (0.079)	0.0217 (0.051)
F-statistic	95.75	18.50
Observations	4,991	4,991
R-squared	0.220	0.089

This table presents OLS estimates from the first-stage regression of program participation status on two instrumental variables and all bank controls. The sample corresponds to all banks in the Call Report. The dependent variables are Registered (dummy variable that take value 1 for the banks that are registered as lenders and 0 otherwise) and Lending (dummy variable that takes value 1 for banks that are lending (actively granting loans) and 0 otherwise). The instrumental variables are dummy variables for PPPLF participation and Senior Financial Officer Survey (SFOS) survey respondent. See Section 3 for details on these variables. All other bank balance sheet variables come from the Call Report and are measured as of 2020:Q2. Standard errors are clustered at the bank level. \*\*\* indicates significance at the 1% level, \*\* at the 5% level, and \* at the 10% level. Source: Call Report, Federal Reserve for SFOS dummy, Federal Reserve Bank of Boston and Federal Reserve Main Street webpages for Registered and Lending dummies, and Federal Reserve’s [Reports to Congress Pursuant to Section 13\(3\) of the Federal Reserve Act in response to COVID-19](#) for PPPLF dummy—all as of December 11, 2020.



Table A8: Spillover effects of MSLP on C&I lending standards: Evidence from survey data

	(1)	(2)
Dependent variable	<b>Bank reports tightening C&amp;I lending standards to</b>	
	<b>(a) Large firms</b>	<b>(b) Small firms</b>
<b>MSLP Lender x Post</b>	-1.4451* (0.829)	-1.2633* (0.740)
Demand Increased x Post	0.0535 (0.161)	0.2453 (0.168)
Mean of dependent variable	53%	50%
St. dev. of “Lending”	8%	8%
Observations	206	199
<b>MSLP Registered x Post</b>	-1.2531** (0.519)	-1.0654** (0.431)
Demand Increased x Post	0.0242 (0.160)	0.2456 (0.168)
Mean of dependent variable	53%	50%
St. dev. of “Registered”	12%	12%
Observations	206	199
R-squared		
Bank controls	yes	yes
Survey fixed effects	yes	yes

This table reports Probit/IV estimates from difference-in-differences regressions relating the likelihood of tightening lending standards on C&I loans and credit lines in Q3 (“Post”) compared to Q1 and Q2 by MSLP lender and registration status. The sample comprises respondents to the SLOOS surveys during the first three quarters of 2020. The dependent variable takes value 1 if the bank reports having tightened select loan terms (indicated as column headings) “somewhat” or “significantly” in response to Question 2 of the survey (“For applications for C&I loans and credit lines from large and middle market firms and from small firms that your bank currently is willing to approve, how have the terms of those loans changed over the past three months?”). Small firms are defined as having annual sales below \$50 million. For further details on the SLOOS, see Appendix A.1. All regressions include survey fixed effects and the same time-varying bank controls as in Table 3 (size, loans/assets, C&I loans/loans, CET1 ratio, core deposits/assets, loan loss reserves/loans). Estimates from the first-stage regression are shown in Table A7. Standard errors are clustered at the bank level. \*\*\* indicates significance at the 1% level, \*\* at the 5% level, and \* at the 10% level. Source: Call Report, Federal Reserve.

Table A9: Spillover effects of MSLP on C&I loan terms: Evidence from survey data (Probit/IV estimates)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Max size of credit lines	Max maturity of loans	Costs of credit lines	Spreads of loan rates	Premiums charged on riskier loans	Loan covenants	Collateral requirements
<b>Bank reports tightening terms of C&amp;I loans to</b>							
<b>(a) Large firms</b>							
<b>MSLP Lender × Post</b>	-5.5641*** (1.480)	-1.5233 (0.934)	-0.7406 (0.808)	-1.2668 (0.897)	-1.8551** (0.884)	-2.5193*** (0.848)	-2.7044*** (0.917)
Demand Increased × Post		0.0663 (0.188)	-0.1406 (0.156)	-0.1030 (0.173)	-0.0146 (0.178)	-0.0962 (0.170)	0.0760 (0.182)
Mean of dep.var.	30%	30%	39%	48%	45%	43%	41%
Observations	194	205	205	206	207	206	205
<b>(b) Small firms</b>							
<b>MSLP Lender × Post</b>	-3.1580*** (1.051)	-1.8444** (0.866)	-0.1027 (0.805)	-0.8577 (0.916)	-2.0288** (0.823)	-1.5741* (0.818)	-1.1650 (0.743)
Demand Increased × Post		0.0312 (0.215)	0.2444 (0.199)	0.4279*** (0.142)	0.2116 (0.196)	-0.1816 (0.184)	0.0792 (0.196)
Mean of dep.var.	29%	28%	34%	41%	39%	37%	41%
Observations	191	199	196	198	198	198	196
Bank controls	yes	yes	yes	yes	yes	yes	yes
Survey fixed effects	yes	yes	yes	yes	yes	yes	yes

This table reports second-stage Probit/IV estimates of difference-in-differences regressions relating the likelihood of tightening lending terms on approved C&I loans and credit lines in Q3 (“Post”) compared to Q1 and Q2 by MSLP lender status. The sample comprises respondents to the SLOOS surveys during the first three quarters of 2020. The dependent variable takes value 1 if the bank reports having tightened select loan terms (indicated as column headings) “somewhat” or “significantly” in response to Question 2 of the survey (“For applications for C&I loans and credit lines from large and middle market firms and from small firms that your bank currently is willing to approve, how have the terms of those loans changed over the past three months?”). Small firms are defined as having annual sales below \$50 million. For further details on the SLOOS, see Appendix A.1. All regressions include time-varying bank controls as in Table 3 (size, loans/assets, C&I loans/loans, CET1 ratio, core deposits/assets, loan loss reserves/loans), and survey fixed effects. Estimates from the first-stage regression are shown in column 2 of Table A3. Standard errors are clustered at the bank level. \*\*\* indicates significance at the 1% level, \*\* at the 5% level, and \* at the 10% level. Source: Call Report, Federal Reserve.