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Motivating Banks to Lend? Credit Spillover Effects of the Main Street Lending Program*

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November 23, 2021

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 during the COVID-19 crisis—on bank lending to businesses. Using instrumental variables for identification and multiple loan-level and survey data sources, we document that the MSLP increased banks' willingness to lend more generally outside the program to both large and small firms. Following the introduction of the program, participating banks were more likely to renew maturing loans and to originate new loans, as well as less likely to tighten standards on business loans than nonparticipating banks. Additional evidence suggests that the MSLP, despite low take-up, supported the flow of bank credit during the pandemic by serving as a backstop to the bank loan market and by increasing banks' levels of risk tolerance in the face of uncertainty.

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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1 Introduction

The Federal Reserve took unprecedented actions in response to the financial market and economic upheaval that occurred in March 2020 following the onset of the COVID-19 pandemic. Amongst other policy actions, it established a number of emergency lending facilities under section 13(3) of the Federal Reserve Act to support the flow of credit to the economy. These facilities had limited take-up since their implementation but in many cases were crucial for the normalization of financial market functioning and the flow of credit (Bernanke and Yellen, 2020), suggesting significant effects on market participants' risk attitudes (Cox, Greenwald and Ludvigson, 2020).[1] However, systematic evidence on the effects of the emergency lending facilities intended to support the less liquid bank loan market and the mechanisms through which they may have affected financial institutions remains scarce.

In this paper, we focus on the Main Street Lending Program (MSLP), an innovative policy program aimed at supporting bank lending to small and medium-sized businesses that were affected by the pandemic and generally did not have access to the corporate bond market. We ask how did MSLP participation affect banks' lending behavior, focusing on spillovers to lending standards and the flow of business credit more generally outside of the program and, in turn, through what channels did these spillovers materialize. While the MSLP supported the flow of credit directly via loans offered through the program, overall take-up was limited (about $16 bn or 2.7% of available capacity). 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 thus by assuring lenders that they would have access to a lending program as economic conditions evolved. Two weeks before the program started approving loans, Jerome Powell, Chair of

[1] Total outstanding loans at end-March 2021 across five emergency lending facilities (the MSLP, MLF, PPPLF, SMCCF, and TALF) was estimated at 3.7% out of a total combined capacity of $2.6tn (Cheng, Skidmore and Wessel, 2020). Recent studies show that the introduction of several Fed facilities focused on the corporate and municipal bond markets served as effective backstops, leading to a significant retracing of stress conditions experienced early in the pandemic and generally easing conditions in these markets despite low take-up (Bordo and Duca, 2021b; Covitz, Meisenzahl and Pence, 2021; Gilchrist, Wei, Yue and Zakrajšek, 2020; Kargar, Lester, Lindsay, Liu, Weill and Zúñiga, 2020).

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."[2] Therefore, with respect to spillover channels, we hypothesize that the program's role as a backstop may have boosted banks' general levels of risk tolerance and increased their willingness to extend credit in the face of uncertainty. It may have also supported the flow of credit by easing banks' immediate balance sheet constraints and freeing up funding for other lending activities, or by providing banks with an option to originate MSLP loans as a way of easing future balance sheet constraints that might arise from lending decisions at the height of the COVID-19 crisis.

In assessing the effects of the MSLP and the channels through which it worked, we bring together a variety of data sources, including (a) supervisory loan-level data from the Federal Reserve's Y-14Q data collection effort, with detailed information on bank loans to U.S. corporations and small businesses; (b) survey data on banks' lending standards and terms for commercial and industrial (C&I) loans, motivations for changing lending standards and terms during the pandemic, and experiences with the MSLP; (c) MSLP participation and bank balance sheet data, as well as information on the strength of internal risk controls at banks. Taken together, these data sources allow us to provide a comprehensive view of the relationship between banks' participation in the MSLP and their lending policies.

We examine whether the introduction of the MSLP encouraged banks to lend more generally outside of the program, which we call spillover effects. We find that banks participating in the MSLP were more likely to lend on both extensive and intensive margins. In particular, on the extensive margin, banks participating in the program were significantly more likely to renew and originate new C&I loans and were less likely to tighten their C&I lending

[2]Source: The "Coronavirus and CARES Act" Testimony before the Committee on Financial Services, U.S. House of Representatives, Washington, D.C. (June 30, 2020). At a congressional hearing titled "Lending in a Crisis: Reviewing the Federal Reserve's Emergency Lending Powers During the Pandemic and Examining Proposals to Address Future Economic Crises" before the Committee on Financial Services (September 23, 2021), some participants stated that the Fed's emergency lending facilities were meant as a re-starter for markets, or a backstop, and not a provider of credit. Some contended that the intent was not to replace the market, but to allow the market to return to normal as soon as possible. Furthermore, it was asserted that the mere presence of the facilities reassured investors and allowed markets to function.

standards compared to nonparticipating banks. On the intensive margin of lending, we find that participating banks extended larger loans and charged lower spreads compared to other banks.

A key identification challenge stems from nonrandom selection into the MSLP. Indeed, participating banks tend to be larger, with less capital, larger loan portfolios, and within those portfolios, more specialized in C&I lending—characteristics that may also influence banks' lending behavior. We, therefore, employ an instrumentation strategy in which we exploit plausibly exogenous variation in banks' view of the costliness or burden associated with registering with the MSLP and their previous engagement with the Fed. We use three instrumental variables (IVs). The first uses banks' responses to a special survey which examined reasons why they did not register for the program and identifies banks that cited that registration for the program was perceived as too burdensome as a very important reason for not registering for the MSLP. In addition, we use two measures of bank familiarity with pledging collateral—either loans or securities—at the Federal Reserve's ordinary discount window prior to the onset of the COVID-19 pandemic, like in Anbil, Carlson and Styczynski (2021). We argue that these additional IVs reflect banks' previous engagement and communications with the Federal Reserve regarding the eligibility, riskiness, and custody of eligible collateral, and hence their likely understanding of a loan-based program such as the MSLP.

We also take several steps to possible address threats to identification. First, we present evidence that our results based on loan-level data are not driven by borrower credit demand, for which we control with granular firm×time fixed effects (Khwaja and Mian, 2008), nor by relationship-specific bank lending shocks, for which we control with bank×firm fixed effects (Chodorow-Reich, 2013). In addition, when we use survey data, we employ direct measures of changes in loan demand as reported by senior loan officers at large banks. Second, we find null effects in placebo samples of data for 2018 and 2019, suggesting that differences in unobserved bank characteristics are unlikely to drive our results. Third, our estimates are robust in additional tests that are designed to rule out the effects of potential confounding

factors such as other government support programs (in particular, the Paycheck Protection Program (PPP)), bank exposure to credit line drawdowns and repayments, concerns over asset quality, and bank cyclicality.

Finally, we study the channels through which the MSLP may have affected banks' lending decisions. To this end, we distinguish between an immediate easing of balance sheet constraints versus a reduction in banks' risk aversion as alternative (yet non-exclusive) mechanisms. We find that participating banks were relatively less likely to cite an increase in risk aversion as a reason for tightening lending standards after the introduction of the program, and that banks with stronger risk management practices had larger spillover effects. At the same time, participating banks were no more likely to invoke balance sheet (capital and liquidity) constraints as reasons for tightening lending standards than nonparticipating banks; in addition, we find no evidence of stronger spillover effects for banks with lower excess capital cushions, lower core deposits, or lower access to capital markets. On balance, these results suggest that the MSLP reduced banks' effective levels of risk aversion, increasing their willingness to lend despite high levels of uncertainty about credit risk and the economic outlook. Our results are also consistent with the backstop function of the MSLP having encouraged the lending of banks concerned about future balance sheet constraints, given the support that such banks would have received from the program if economic conditions were to deteriorate further.

Of the $600 billion in available funds to purchase MSLP loans, only $16.05 billion were used by the SPV to purchase loans before the program expired at the end of 2020.[3] Despite its low take-up, our analysis suggests that the overall effects of the MSLP were economically sizeable. In particular, our baseline estimates derived from Y14-Q data on large corporate loans imply that, in the absence of the program, total loan renewals and originations in 2020:Q3 would have been 10% lower than they were.[4] Furthermore, in the absence of

[3]The MSLP had higher total utilization in absolute terms than any other debt-purchasing facilities and program participation was accelerating when it closed on December 31, 2021 (Clampitt and Morgan, 2021).

[4]The lower bound estimate assumes no spillover effects among banks outside our sample, while the upper bound estimate assumes spillover effects among these banks that are as strong as in the sample.

the program, the percentage of banks that would have tightened C&I lending standards in 2020:Q3 would have been higher by close to 5 percentage points (ppts), compared to the actual figure of 37.5%.

Contribution to the Literature Our analysis contributes to the literature by deepening our understanding of the effectiveness of emergency relief measures during the COVID-19 pandemic (see Bordo and Duca (2021a) for a review). To date, two public interventions have taken center stage: SBA's PPP, the large-scale grant-making program for small businesses, and the Fed's Corporate Credit Facilities, especially the SMCCF. Despite some evidence that PPP funds were poorly targeted, studies broadly agree that the program supported employment.[5] Analyses of the Fed's CCFs generally find positive effects on prices and liquidity[6] as well as spillovers to other asset classes or markets. Darmouni and Siani (2021) find that the SMCCF induced large firms to take advantage of the low borrowing costs in the corporate bond market to pay down relatively expensive bank debt, including credit line borrowings. Haddad, Moreira and Muir (2020) and Li and Momin (2020) document dampening effects of the SMCCF on riskier firms' bond spreads not directly targeted by the policy. We bring new evidence that a business credit support program, the MSLP, boosted participating banks' willingness to extend loans outside the program through a reduction in banks' risk aversion, despite low take-up.

By studying a novel program of the Federal Reserve, backed by the U.S. Treasury, that lent through banks to firms facing a temporary funding shortage caused by the pandemic, we extend prior research on the effectiveness of central bank lending programs and unconventional monetary policies that have become a central part of the policy toolkit since the

[5]See, for instance, Bartik, Cullen, Glaeser, Luca, Stanton and Sunderam (2020b); Cole (2020); Granja, Makridis, Yannelis and Zwick (2020); Hubbard and Strain (2020); and evidence that delays in the deployment of PPP funds negatively affected employment and firm survival (Doniger and Kay, 2020; Denes, Lagaras and Tsoutsoura, 2021). Chodorow-Reich, Darmouni, Luck and Plosser (2020) show that several large borrowers used PPP funds to repay bank credit line borrowings.

[6]See, e.g., Boyarchenko, Kovner and Shachar (2020); Kargar, Lester, Lindsay, Liu, Weill and Zúñiga (2020); Falato, Goldstein and Hortaçsu (2020); Hadlock and Pierce (2010); Gilchrist, Wei, Yue and Zakrajšek (2020); Nozawa and Qiu (2020); and Vissing-Jorgensen (2020).

2007-08 financial crisis (Borio and Zabai, 2018). For the United States, 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 also includes negative interest rate policies or credit-support programs that provide cheap funding to banks (Altavilla, Burlon, Giannetti and Holton, 2021a; Dell'Ariccia, Rabanal and Sandri, 2018). Studies of the European Central Bank's Long-Term Refinancing Operations (LTRO), for instance, identify positive, albeit heterogeneous, effects across countries in the supply of loans to bank-dependent firms (see, e.g., Carpinelli and Crosignani (2021), Andrade, Cahn, Fraisse 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 and economic growth. Loan guarantee programs in the Euro area had sizeable effects on credit availability and performance of constrained firms (see, e.g., Barrot, Martin, Sauvagnat and Vallee (2019), Core and De Marco (2020), and Altavilla, Ellul, Pagano, Polo and Vlassopoulos (2021b)). The program we study differs from government loan guarantee programs as such schemes are typically put in place to boost access to credit for small firms and start-ups that lack collateral. It is also different from funding-for-lending schemes (such as the LTRO and TLTRO) where banks are provided cheap funding that is largely earmarked for lending and participation is conditioned on success in making loans.

Finally, our paper advances our understanding of the effects of uncertainty on economic behavior and the transmission of monetary policy. Recent work shows that reducing uncertainty can have significant effects on firm behavior. For instance, Favara, Gao and Giannetti (2021a) document that improved access to debt markets decreases firms' precautionary behavior and supports investment following uncertainty shocks. Reducing uncertainty can also aid in the transmission of monetary policy by influencing investors' willingness to take risks (see, for instance, De Pooter, Favara, Modugno and Wu (2021)). Our paper contributes to this strand of literature by emphasizing the role of a Federal Reserve emergency lending

facility in reducing uncertainty. Our findings suggest the that MSLP boosted participating banks' confidence that they would be able to continue lending through the MSLP to a large set of borrowers in the event of a worsening economic environment, motivating them to make more loans ex ante.

The remainder of the paper proceeds as follows. Section 2 describes the MSLP. Section 3 outlines our approach for empirical identification and Section 4 describes our main data sources. Sections 5 and 6 present baseline results on the program's credit effects, as well as robustness and falsification tests. Section 7 explores the mechanisms behind the program's effects. Section 8 concludes.

2 Institutional Background

The MSLP offers a unique opportunity to study 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 Federal Reserve.[7] This feature differentiated it from other debt-purchasing facilities, which instead purchased assets in publicly-traded markets or directly from borrowers through an SPV. 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 differed from government loan-guarantee programs or a grant-making program such as the PPP through the full-recourse (non-forgivable) nature of MSLP loans and the risk-sharing arrangement between participating lenders and the SPV, by which lenders were required to retain a 5% risk exposure to the borrower.[8]

[7]The SPV was funded jointly by the U.S. Treasury and the Fed, where Treasury funding served as credit protection for the Fed.

[8]See Vardoulakis (2020) for a theory of program design and Arseneau, Filat, Mahar, Morgan and Van den Heuvel (2021), Bräuning, Fillat and Wang (2021), Bräuning and Paligorova (2021), and Kelly (2021) for discussions about program participation.

Targeted Firms The MSLP's 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 normalized. The MSLP targeted the middle portion of the firm size distribution, comprising small and mid-sized bank-dependent firms that were likely too large to qualify for PPP loans but not large enough to issue bonds or syndicated loans, and thus could not benefit from the Fed's CCFs. Targeted firms account for a sizeable part of the economy as they employ more than 50 million people (English and Liang, 2020) or about 30% of the aggregate labor force. At the same time, the MSLP tried to ensure some overlap in borrower eligibility across the PPP and the Fed's CCFs to avoid large gaps in government support.

Program Design and Loan Features The program included three facilities for U.S. businesses and two facilities for nonprofit organizations.[9] The facilities focused on for-profit businesses (to which our analysis refers) accounted for most of the take-up. Borrowers were eligible for MSLP loans if they had at most 15,000 employees in the 12 months before the origination of an MSLP loan or at most $5 billion in revenues in 2019. Through an SPV the MSLP facilities purchased 95% participations in loans to eligible borrowers from the banks, which retained the remaining 5% of the exposure. In addition, loans were eligible if they had an adjustable interest rate of LIBOR plus 300 bps, five-year maturity, deferral periods for principal and interest payments, and allowed for early repayments without penalty. However, the facilities differed in terms of eligible loan size, limits on borrower leverage, and conditions for loan security and seniority relative to the borrower's other debt.[10] The program was designed so as to limit potential losses to the SPV through requirements on borrowers'

[9]These were 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).

[10]For instance, 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. See the Federal Reserve website for detailed term sheets.

leverage and financial creditworthiness, and the seniority status of MSLP loans.[11] Similar to the PPP, the MSLP provided loan origination and servicing fees to participating banks.

The MSLP opened for registration on June 15, 2020 and began accepting loan submissions on July 6, 2020. The program expired on December 31, 2020, and the deadline for processing submitted loans was January 8, 2021.

Key Statistics on Program Participation Data on program participation come from public sources, including the Federal Reserve Board's Reports to Congress Pursuant to Section 13(3) of the Federal Reserve Act in response to COVID-19 for lending information and the Federal Reserve Bank of Boston for the list of registered banks.[12] In Table A2 we summarize registration and lending activities in the universe of banks from the Call Report. The MSLP registration rate among all banks was 11.7% (or 614 banks out of 5,242 banks in the Call Report), of which nearly half of the banks granted MSLP loans. Almost 60% of registered banks granted MSLP loans before November 19, 2020 when it was announced that the program would be terminated by year-end; we return to this point in Section 3.1 where we discuss the baseline program participation variable. The remaining 4,628 banks in the Call Report were not registered. Columns 2–6 show the percentage of banks that participated in the MSLP by bank size: the program participation rate increases steeply with bank size, from 6.5% of registered banks in the smallest size group with assets below $1 billion to 63.8% of registered banks in the largest size group with assets above $50 billion. Given that program participation is more prevalent among larger banks, we select data sets for our empirical analyses to be representative of the banks that were active program participants (see Section 4).

[11] For example, loan amounts were capped so as to keep a borrower's total debt within either 4× or 6×EBITDA (Earnings Before Interest, Taxes, Depreciation, and Amortization) depending on the facility. In addition, to limit moral hazard, only new loans were eligible, with some exceptions. The MSNLF and MSPLF purchased exclusively new loans, whereas the MSELF purchased participations in the incremental portions of preexisting loans.

[12] See the Federal Reserve Board's MSLP webpage and the Federal Reserve Bank of Boston's MSLP webpage. See Appendix A-I for details on matching the lists of participating banks to the Call Report.

Factors that Constrained Program Take-up While our paper focuses on the spillovers from participation on bank lending outside the program, it is also important to understand the factors that may have constrained take-up of the program itself. To this end, we examine data from the supplementary SLOOS conducted by the Federal Reserve in September 2020, which inquired about reasons that may have restrained participation in the MSLP. As discussed in Appendix A-III, the data suggest that bank participation and borrower demand were dampened by overly restrictive program terms. Most of the survey respondents stated that they were able to meet credit demand outside the program and that limits on borrower leverage were too restrictive. Many banks cited concerns regarding the burdensome program registration and uncertainty about the loss-sharing agreement with the MSLP. The price point of 300 bps over LIBOR appeared high compared to the historical cost of bank loans for eligible firms. These findings suggest that banks may have viewed the MSLP as a backstop or a safety net that they could activate if economic conditions deteriorated. Therefore, in assessing the effectiveness of the program, our study looks beyond take-up and analyzes credit effects more generally, outside the program itself.

3 Empirical Approach

In this section we describe the characteristics of banks that participated in the program and the identification challenges of our empirical analysis, along with the steps we take to credibly estimate the effects of the program on bank lending behavior.

3.1 Selection into Program Participation

Defining Treatment In the baseline analysis, program participation is defined according to banks' lending status as of November 18, 2020. This cut-off date is best aligned with the period over which we measure spillovers from MSLP participation (2020:Q3) for two reasons. First, it leaves enough time for MSLP loans that were still in banks' origination pipeline

during 2020:Q3—and that already created lending spillovers outside of the program—to be fully processed and approved by the Federal Reserve. Second, the cutoff date precedes the U.S. Treasury Secretary's announcement on November 19, 2020 that the MSLP was not going to be extended past 2020 year-end. Following this announcement, the backstop role of the MSLP—a key rationale for the spillovers documented in our paper—was likely greatly diminished. In robustness checks we test that our main results are robust to alternative cutoff dates, including September 30, October 31, and November 30, as well as for the full set of registered banks, regardless whether they made MSLP-eligible loans.

Bank Characteristics by Treatment Status Figure 1 depicts the share of "MSLP banks" by bank size, illustrating the relatively more vibrant MSLP participation in larger banks. In Table 1 we explore a wider range of bank characteristics by MSLP participation status (MSLP versus non-MSLP banks) and report tests of equality of sample means and medians. Panel A focuses on standard bank characteristics such as business model (the ratio of loans to assets and the ratio of C&I loans to total loans) and funding (capital ratios and the share of core deposits in total liabilities). Panel B focuses on the degree to which participating and nonparticipating banks were exposed to differences in pandemic intensity, labor market conditions, and small business performance in the areas where they operate.

A key takeaway from panel A is that MSLP-participating banks are systematically different from nonparticipating banks. Participating banks tend to be larger, to have larger loan portfolios, and within those portfolios, to be more specialized in C&I lending. Insofar as banks that are "traditional lenders" may be more willing to ease lending standards during the crisis, these bank attributes may confound our effects, therefore we introduce them as controls in all specifications. MSLP banks also have lower regulatory capital ratios but are no different in terms of reliance on core deposits.[13] If relatively more constrained banks were more likely to enroll in the MSLP, they may have benefited relatively more from an easing of balance sheet constraints due to the program. Therefore, we also introduce capital and

[13]For the definition of excess capital buffers, see Section 7.

deposit ratios in all baseline specifications.

Consistent with larger banks participating being more likely to participate in the program, panel A also shows that MSLP banks experienced larger credit line drawdowns between 2019:Q4 and 2020:Q1, as well relatively larger increases in credit line exposures between 2020:Q1 and 2020:Q2. The increase in credit line exposures was largely driven by repayments of credit line borrowings as conditions in the corporate bond market normalized and large firms used bond issuance proceeds to paid down bank debt (Darmouni and Siani, 2021). Finally, the median MSLP bank put aside relatively larger loan loss reserves than other banks. In robustness tests we check that exposure to credit line drawdowns and loan loss provisioning, as well as other measures of funding constraints (such as the average cost of capital and the volume of capital issuances) do not correlate with MSLP bank participation in a way that would confound our baseline effects.

Local Economic Conditions by Treatment Status Panel B focuses on the local economic conditions facing participating and nonparticipating banks. This comparison is important because local recessionary dynamics created by the viral outbreak may correlate with credit demand which, in turn, may affect banks' decision to participate in the program. We construct bank-level measures of exposure to local economic conditions by weighing banks' deposit shares in a given geography (county or state) by the cumulative number of COVID-19 case infections (over different periods), several labor market variables (unemployment insurance claims, peak level of unemployment, and the change in the unemployment rate), and several indicators of financial stress among small businesses in those locations, respectively. We obtain each bank's share of deposits by location for June 2019 from the FDIC Summary of Deposits. The number of COVID-19 case infections per capita come from the Center for Systems Science and Engineering at Johns Hopkins University. Data on labor market outcomes come from the U.S. Department of Labor and Bureau of Labor Statistics.

Across a wide range of proxies for local economic conditions, the summary statistics in

panel B show that the average and median MLSP bank does not systematically face different conditions in the areas where it operates compared to non-MSLP banks. This finding is robust across multiple measures of pandemic intensity and stress in the labor market and among small businesses. Across all the measures considered we fail to reject that MSLP and non-MSLP banks have the same exposure to local recessionary conditions. In Tables A4 and A5 we confirm these patterns more formally using regression analysis.

3.2 Identification

To quantify the spillover effects from MSLP participation on participating banks' lending policies and behaviors, we employ a difference-in-differences framework by which we compare changes in the lending behavior of MSLP banks after the introduction of the program compared to nonparticipants in previous quarters. Our empirical approach faces two key identification challenges—nonrandom program enrollment and isolating credit supply from credit demand effects. We take several steps towards addressing these challenges, as follows.

Instrumentation Strategy The first challenge is that program participation (or "treatment") is nonrandom. In fact, MSLP participation is likely endogenous not only to observable bank characteristics such as size, funding constraints, and business model, but also to unobservable characteristics. To mitigate potential contamination of the results by bank observables that may determine both bank participation in the program and lending decisions, we control for all the bank characteristics that we found to be robust determinants of MSLP participation (that is, bank balance sheet size, the business model variables, and the capital and core deposit ratios).[14] One might also worry that bank participation in other

[14]If omitted, these characteristics could contaminate the spillover effects, with the direction of bias likely varying across characteristics. For instance, bank capital and more generally the banks' lending capacity could bias downward the program's effects if low-capital banks were both less likely to lend during the pandemic and more likely to join the MSLP. Banks with larger loan portfolios and more specialized in C&I lending were also more likely to participate. At the same time, specialization in commercial lending may have spurred the ability to set up the infrastructure and market the program to clients. Therefore, omitting the size and composition of loan portfolios could induce an upward bias. Other factors, such as credit line drawdowns and repayments during 2020:Q1-Q3 (discussed in Section 6), may have had ambiguous effects.

government-supported credit programs (such as the PPP) influences banks' lending outcomes outside of these programs, and thus can confound potential spillovers from the MSLP. In falsification tests we show that MSLP participation does not predict lending volumes under the PPP and that our baseline results are unchanged when we control for outstanding PPP loan balances at banks. Finally, we conduct placebo tests with data from previous years to show that there are no pre-pandemic differences in lending outcomes between MLSP and non-MSLP banks.

To more convincingly attribute our spillover effects to the MSLP and not other factors, we also employ an instrumentation strategy that exploits plausibly exogenous variation in the banks' decision to participate in the program. The instrumental variables (IVs) should predict banks' decision to enroll in the program, but not their lending behavior during the pandemic (other than through their effect on participation).

Given that MSLP participation involved rules and requirements that were seen as complex and may have deterred banks without experience working with the Federal Reserve from participating, we argue that a bank's familiarity with Federal Reserve programs and facilities would be potential IV candidates. Therefore, we construct three IVs for our analysis. For the first IV, we use banks' responses to the supplementary SLOOS conducted in September 2020, which inquired about reasons that may have restrained participation in the MSLP (see Appendix A-III for details). While some of these reasons (such as too small origination and servicing fees; or too large minimum loan size) may be linked to bank characteristics and would not serve as good instruments, other reasons were likely exogenous to bank characteristics. In particular, banks' assessment of the burden associated with registration may reflect their prior experience with Fed programs and facilities, rather than balance sheet characteristics. Therefore, our first IV is a dummy variable that equals one for banks that cited "MSLP registration was too burdensome" as a very important reason for not registering.

The next two IVs capture banks' familiarity with pledging collateral at the Federal Reserve's ordinary discount window prior to the onset of the COVID-19 pandemic, like in Anbil,

Carlson and Styczynski (2021).[15] In our samples of large banks, nearly all banks have the legal documentation in place (i.e., the "Operating Circular No. 10 Agreement on Lending") and are thus ready to borrow from the discount window. (Anbil, Carlson and Styczynski (2021) show that this figure is 83% of banks for the banking system as a whole.) However, banks differ in the type of pledged collateral—loans versus securities. Therefore, we build two dummy variables as IVs that take the value one for banks with experience in pledging either loan or securities collateral, respectively, at the discount window. We hypothesize that familiarity with pledging loan collateral would enhance banks' understanding of a loan-based program such as the MSLP, given previous communications with the Fed regarding the eligibility, riskiness, and custody of eligible loans, even if such loans are now sold to the MSLP rather than posted as collateral. In contrast, banks that traditionally posted securities collateral would be less likely to participate in the MSLP.

We use our three IVs as instruments in a two-stage least squares (2SLS) procedure, on the premise that they satisfy the exclusion restriction—that is, they do not have a direct effect on banks' credit 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 predict program participation. To explore the relevance of the IVs, we report sample correlation coefficients (with statistical significance) in our three main samples: Y14-Q data on large business loans, Dealscan data on syndicated loans, and SLOOS survey respondents. Table 2 shows that the IVs have directionally intuitive and statistically significant correlations with program participation: (1) banks that reported a more burdensome registration process were less likely to participate, (2) banks that post loans as collateral at the discount window were more likely to participate, and (3) banks that post securities as collateral at the discount window were less likely to participate in the program.

[15]We use a confidential internal data set from the Federal Reserve Bank of Dallas with the type of collateral pledged by depository institutions to the discount window during December 1–31, 2019.

Credit Supply versus Credit Demand In the lending spillover analysis we need to isolate credit supply from credit demand factors, given that 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 on bank lending decisions—notably, loan-level data from the Y-14Q datasets on business loans and Dealscan for syndicated loan originations (described in detail in Section 4)—and we identify credit supply effects by comparing changes in loan volumes and terms to the same firm (or cluster of similar firms) from MSLP versus non-MSLP banks. More precisely, we keep firm-level demand fixed over time with interacted firm×quarter fixed effects (Jiménez, Mian, Peydró and Saurina, 2020; Khwaja and Mian, 2008). We also present specifications with interacted bank×borrower fixed effects to allow for the possibility that some firms may have a preference in borrowing from certain banks, such that bank lending shocks vary within bank-firm pair (Chodorow-Reich, 2013). This can be the case for large industrial firms and exporters in long-term borrowing relationships with specialized banks (Blickle, Parlatore and Saunders, 2021; Paravisini, Rappoport and Schnabl, 2015).

4 Data

To study the effects of the MSLP on the flow of credit to businesses, we bring together data from a wide range of sources, including supervisory loan-level data on bank lending outcomes and terms, for both large and small firms, and survey data on changes in lending standards and terms for C&I loans, as well as reasons for such changes at the bank level. We describe each data source in detail below.[16]

Loan-level Data ("Credit Registry" for Large Business Loans) We use supervisory loan-level data from the FR Y-14Q H1 "Corporate Loan Data Schedule," which contains

[16]Table A3 in the appendix provides descriptive statistics for key regression variables obtained from these sources.

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 (Favara, Ivanov and Rezende, 2021b). The credit registry 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.

Loan Portfolio Segment-level Data ("Credit Registry" for Small Business Loans) We use supervisory loan portfolio segment-level data from the FR Y-14Q A9 "U.S. Small Business" schedule, 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 refers to loans that are grouped together based on borrower risk and loan terms. These are 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), loan type (credit line, term loan, unclassified/other), collateral (secured, unsecured), and 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 registry 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 of loans outstanding at quarter-end. Furthermore, in a placebo test we use data on loan balances outstanding for federally-guaranteed loan accounts in 2020:Q3, where the guarantee percentage is 100%. These accounts refer to loans principally made through the PPP. Similar to the previous dataset, we assign each reporting BHC as an "MSLP bank" if its main commercial bank participated in the MSLP.

Survey Data on C&I Lending Standards and Terms We employ confidential microdata with bank-level responses to the quarterly SLOOS editions of April, July, and October 2020, which inquired about changes in lending standards and terms, and changes in demand for bank loans over 2020:Q1–Q3. In placebo tests we use data from the surveys conducted in 2018 and 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. Furthermore, we use banks' assessments of changes in loan demand each quarter to control *directly for bank-level loan demand*. In tests of the mechanisms behind our main results we also use data on banks' stated reasons for changing lending standards each quarter, including changes in their balance sheet conditions and shifts in risk tolerance levels.

The SLOOS includes questions about changes in both the supply and demand of loans each quarter, offering a clear advantage over other data sources. Nevertheless, the survey nature of the data—provided by financial institutions for which the Federal Reserve may serve the role of regulator—can raise questions about possible reporting biases. In Appendix A-II we take several steps to bolster confidence in the quality of the data. First, we argue that the survey's institutional design, which separates the data collection and use from the supervisory and regulatory functions of the Federal Reserve, incentivizes truth-telling and encourages banks to acknowledge concerns over potential balance sheet constraints (such as capital and liquidity) without fear of regulatory reprisal. Second, we review several studies that use SLOOS aggregates and microdata to document strong predictive power of these data for objective indicators of bank lending and macroeconomic outcomes.

Bank Balance Sheet Characteristics Bank balance sheet data come from the Call Report and include size (total assets), common equity Tier 1 (CET1) capital ratio, core deposits as a share of total liabilities, business model variables (share of loans in total assets

and share of C&I loans in total loans), changes in off balance-sheet unused C&I committed credit (credit line exposures) divided by total assets, loan loss reserves (as % of total gross loans), and outstanding PPP balances (divided by total assets).

5 Results

In this section we present the main results of our empirical analysis, which examine the program's spillover effects on C&I lending standards and terms more generally. We examine changes in banks' lending behavior along both the extensive margin (Sections 5.1 and 5.2) and the intensive margin of loan adjustment (Section 5.4). Descriptive statistics for selected regression variables are shown in Table A3.

5.1 Extensive Margin in Credit Registry Data

We employ a difference-in-difference framework that we apply to the Y-14Q data sets on large and small business loans, respectively. We discuss the econometric specification for each data set in turn, followed by the main results.

Econometric Specification Using the FR Y-14Q H1 schedule for large C&I loans, we aggregate the loan-level data at the bank-borrower pair level for each quarter. Given that the MSLP opened registration to lenders on June 15, 2020 and started accepting loan submissions on July 8, 2020, 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 difference-in-differences specification:

$$\begin{aligned} Loan\ outcome_{ijt} = \alpha + \beta MSLP_i\ bank \times Post_t + \gamma' Bank\ characteristics_{it} + \\ + \delta' Bank\ characteristics_{it} \times Post_t + \zeta_{jt} + \eta_i + \theta_{ij} + \epsilon_{ijt}, \end{aligned} \tag{1}$$

where for each bank i lending to borrower j in quarter t, the dependent variable $Loan\ outcome_{ijt}$ refers to the share of existing loan facilities within each bank-borrower pair that

are renewed or newly originated each quarter. These lending outcomes reflect banks' extensive margin lending behavior.

$MSLP_i$ *bank* is a dummy variable equal to one for MSLP participating banks as defined in Section 3 (zero otherwise). $Post_t$ is a dummy variable equal to one for 2020:Q3 (and zero for 2020:Q1 and Q2). Importantly, we use interacted firm×quarter fixed effects ζ_{jt} to control for time-varying firm-level demand, which means that we limit the sample to firms that were granted loans from at least two banks in any given quarter, of which at least one bank participated in the MSLP. To focus on spillover effects beyond the program, the sample excludes MSLP loans themselves. In addition, we include bank fixed effects η_i and time-varying bank controls $Bank\ characteristics_{it}$—namely bank size, loans/assets, C&I loans/loans, CET1 ratio, and core deposits/liabilities—both in levels and interacted with the $Post_t$ dummy variable. Finally, in some specifications we use bank×borrower fixed effects θ_{ij} which allows loan demand to vary with bank-borrower relationships.

In the data set on small C&I loan balances from the A9 schedule, we examine if MSLP participants granted relatively more loans to small firms, which were particularly hit by the pandemic (Bloom, Fletcher and Yeh, 2021; Bartik, Bertrand, Cullen, Glaeser, Luca and Stanton, 2020a). The data are at the loan portfolio segment level, where a segment comprises similar loans by borrower risk and loan terms (type, maturity, and collateral requirements). We use a standard difference-in-differences specification as follows:

$$\begin{aligned} Loan\ outcome_{ist} = \alpha + \beta MSLP_i\ bank \times Post_t + \gamma' Bank\ characteristics_{it} + \\ + \delta' Bank\ characteristics_{it} \times Post_t + \zeta_{st} + \eta_i + \epsilon_{ist}, \end{aligned} \tag{2}$$

where $Loan\ outcome_{ist}$ is the number of small business loans outstanding (log) at bank i to borrower segment s in quarter t and reflects banks' extensive margin lending behavior. The explanatory variables are the same as in Equation 1, and we control for loan demand with borrower segment×quarter fixed effects ζ_{st} given the granularity level of the data.

Extensive Margin Results Panel A of Table 3 shows the OLS estimates for the difference-in-differences specifications in Equations 1-2. The sample comprises 32 reporting BHCs of which 11 are MSLP banks. For large business loans, columns (1) and (3) include borrower×quarter and bank fixed effects; columns (2) and (4) additionally include bank×borrower fixed effects. Across specifications, the coefficient estimates on MSLP bank×Post are positive and statistically significant, suggesting that MSLP banks were relatively more likely to renew or originate loans to a given borrower in the post-MSLP period.

The estimates are economically significant. Using the coefficients **0.0166** and **0.0156** in columns 1-2, the share of loans renewed by MSLP lenders was about 1.6 to 1.7 ppt higher on average than for non-MSLP banks, compared to the sample average of 5.3%. Similarly, the coefficients **0.0140** and **0.0108** in columns 3-4 indicate that the share of loans originated by MSLP lenders was 1.1 to 1.4 ppt higher than for non-MSLP banks in 2020:Q3 compared to the sample average of 5.1%. Normalized by the sample average, these estimates suggest that MSLP banks were about 30% to 32% more likely to renew loans and 22% to 27% more likely to originate loans than non-MSLP banks. For small business loans (where 7 out of 17 reporting BHCs are MSLP banks), the estimates in column (5) show that MLSP lenders had 17.3% more small business loans in 2020:Q3 than other banks.

Panel B of Table 3 reports 2SLS estimates that aim to alleviate potential concerns that our baseline results are driven by unobserved bank-level confounding factors. As discussed in Section 3.2, the instrumental variables are dummies for those banks that did not participate in MSLP on account of too burdensome a registration process, and also for banks that are eligible to borrow at the discount window and had pledged either loan or securities collateral before the pandemic. In the first stage we use these three instruments in levels, interacted with the Post dummy, and with each other. Across specifications, the estimated 2SLS coefficients in panel B are positive and statistically significant, indicating that MSLP banks were more likely to renew and originate loans in the post-program period. These 2SLS estimates are broadly similar in magnitude with the OLS estimates, suggesting that banks'

self-selection into MSLP participation does not induce a large OLS bias.

Economic Magnitudes How much lower would corporate lending flows been in the absence of the program? To quantify the dollar value of MSLP spillovers, we examine the MSLP banks in the Y-14Q H1 data, which accounted for 44,274 bank-borrower pairs in 2020:Q3. Within each bank-borrower pair, there were 1.38 existing loan commitments per borrower, with an average size of $17.9 million per commitment. On average, 9.5% of existing loans within each bank-borrower pair were renewed and 3.6% were originated in 2020:Q3. Based on the results in Table 3, panel A, column 1, we estimate that MSLP banks renewed and originated 1.66 ppts and 1.40 ppts relatively more loans, respectively, within each bank-borrower pair in 2020:Q3. Therefore, we can infer that in a counterfactual scenario without the program, the total dollar amount of renewals and originations at the Y-14Q H1 MSLP banks in 2020:Q3 would have been lower by **$33.6 billion**, which we obtain as 44,274 bank-borrower pairs × 1.38 loans per pair × (1.66% of extra loans renewed + 1.40% of extra loans originated) × $17.98 million average loan size.[17] This reduction would have made the total value of renewals and originations at all Y-14Q H1 banks (both MSLP and non-MSLP) in 2020:Q3 smaller by about 10%.[18] Furthermore, given that the Y-14Q banks provide about three-quarters of the total amount of C&I loan renewals and originations in the U.S. banking sector, and assuming MSLP spillovers to be of the same magnitude for banks (and borrowers) outside the Y-14Q sample, we estimate that the MSLP spillovers accounted for a total of **$44.8 billion** in C&I lending. Notably, this estimate is almost three times larger than the total program take-up (direct effect) of $16.05 billion.[19]

[17] Conversely, if all Y-14Q H1 banks participated in MSLP, the total dollar amount of renewals and originations would have been higher by $42.2 billion, i.e., 42,493 bank-borrower pairs at non-MSLP banks × 1.46 loans per pair × (1.66% of extra loans renewed + 1.40% of extra loans originated) × $22.25 million average loan size.

[18] Across all Y-14Q H1 banks, there were 86,767 bank-borrower pairs × 1.42 loans per pair × (8.51% renewals + 5.08% originations) × $20.07 million = $336.1 billion in loan commitments renewed or originated in 2020:Q3. Notice that net C&I loan growth was negative in 2020:Q3 relative to the previous quarter, as the value of repayments exceeded that of renewals and originations.

[19] Our back-of-the-envelope calculation hinges on the assumptions we make about program spillovers outside the Y-14Q sample and any crowding out effects at nonparticipating banks. The estimates we provided

Additional Results In Tables A6-A8 we present several additional results. Table A6 shows baseline estimates when we extend the sample by one quarter to include 2020:Q4. In this latter quarter we find the estimated spillover effects to be somewhat smaller that in the baseline sample, which is consistent with the U.S. Treasury's announcement on November 18, 2020 that the programs would be allowed to expire by 2020 year-end, thus removing the backstop from the bank loan market and reducing the associated spillover effects. In Table A7 we show that the baseline effects are broadly robust to alternative MSLP participation variables, including dummies for those banks that were active lenders in the program before September 30, October 30, and respectively November 30, 2020; as well as those banks that registered regardless whether they made MSLP loans. Finally, in Table A8 we obtain similar results when we replace the CET1 capital ratio with excess capital buffers, defined as excess capital held by the bank above the minimum regulatory requirements (4.5% for all banks) and bank-specific regulatory capital buffers (between 2.5% and 7% depending on the bank's risk profile according to stress tests and Global Systemically Important Bank (GSIB) designation) (see Berrospide, Gupta and Seay (2021)).

5.2 Extensive Margin in Survey Data

Next we conduct a difference-in-differences analysis of banks' C&I lending standards around the MSLP program implementation using microdata from the Federal Reserve's quarterly SLOOS. The data reflect bank loan officers' assessments of changes in lending standards and demand over each quarter; we take the surveys for 2020:Q1 and 2020:Q2 to refer to the pre-MSLP period and the survey for 2020:Q3 to the post-MSLP period. Respondents assess changes in lending standards and loan terms separately for small versus large and middle-market borrowing firms (the size threshold is annual sales of $50 million), which allows us to study banks' lending decisions by level of borrower financial constraints as measured by size (Chodorow-Reich, Darmouni, Luck and Plosser (2020), Hadlock and Pierce (2010)). The

should be seen as upper bounds for the true effects, allowing for spillovers to have been less substantial for smaller banks and borrowers and for possible crowding-out effects.

main benefit of the SLOOS data is that we are able to separate changes in lending supply from changes in lending demand by controlling for banks' assessments of loan demand dynamics over the quarter. Given that survey responses are collected separately for small and large firms, we pool the data such that the unit of observation is bank-firm size-quarter level.

Econometric Specification We employ the following specification:

$$\begin{aligned} Tighter\ standards_{ijt} = \alpha + \beta MSLP_i\ bank \times Post_t + \gamma' Bank\ characteristics_{it} + \\ + \delta' Bank\ characteristics_{it} \times Post_t + \zeta Stronger\ demand_{ijt} + \\ + \eta Stronger\ demand_{ijt} \times Post_t + \theta MSLP_i\ bank + \kappa_t + \lambda_j + \epsilon_{it}, \quad (3) \end{aligned}$$

where for each bank i lending to firms in size category j (i.e., small or large and middle-market firms, respectively) in quarter t, the dependent variable $Tighter\ standards_{ijt}$ is a dummy variable equal to one if the bank reports having tightened C&I loan standards or terms in that quarter (zero otherwise). The difference-in-differences term is the interaction $MSLP_i \times Post_t$, where $MSLP_i$ is a dummy variable for participating banks and $Post_t$ takes value one for 2020:Q3 (post-MSLP) and zero for the two previous quarters (pre-MSLP). We control for changes in loan demand with a dummy variable $Stronger\ demand_{ijt}$ which takes value one if bank i reports stronger demand conditions from firms in size category j in quarter t (zero otherwise). We also control for the same time-varying bank characteristics $Bank\ characteristics_{it}$ as in Equations 1-2. We use quarter (survey) fixed effects κ_t, which absorb common macro shocks affecting all banks each quarter and firm size fixed effects λ_j.

Extensive Margin Results Table 4 reports OLS and 2SLS estimates for the link between MSLP participation status and the likelihood that banks tightened C&I lending standards after the program. Columns 1-2 show specifications with and without $Post_t$ dummy, and columns 3-4 open up the coefficient on MSLP bank×Post by firm size. The OLS coefficient estimates for MSLP bank×Post are negative and statistically significant at conventional

levels, suggesting that MSLP banks were relatively less likely to report tightening lending standards on new C&I loans and credit lines. The estimates are also economically significant. Using the estimates **-0.1473** and **-0.1542** in columns 1-2, we have that the probability that MSLP banks tightened lending standards after the program rollout (compared to other banks and before the program) was lower by about 15 ppts, which represents about one third of the probability of banks tightening standards in 2020:Q3 (of 37.5%). Columns 3–4 further show that the spillover effects from MSLP participation appear larger for smaller (more constrained) firms than to large firms. MSLP banks were 16-17 ppts less likely to tighten lending standards to small firms, compared to 13-14 ppts to large firms (and the two effects are statistically significantly different). In columns 5-6 of Table 4 we show 2SLS coefficient estimates that leverage our instrumentation strategy for MSLP bank participation and confirm the positive spillover effects from OLS estimates.

Economic Magnitudes These estimates allow us to conduct the following back-of-the envelope calculation for a counterfactual scenario of no program. Using the estimate **-0.1473** in column 1 of Table 4, we find that, in the absence of the MSLP, the percentage of banks that would have tightened C&I lending standards in 2020:Q3 would have been higher by close to 5 ppts compared to the actual figure of 37.5%.[20]

5.3 Placebo Tests

Next we present several placebo tests for our baseline specifications to determine if MSLP banks exhibit differential lending behavior in 2020:Q3 due to some omitted unobservable bank characteristics. If omitted variables bias were to drive our results, we would find differences in lending outcomes between MLSP and non MSLP banks in other periods as well. Instead, finding that two types of banks exhibit "parallel trends" in lending outcomes

[20] Conversely, if all banks in the SLOOS sample had participated in the program, the percentage of banks that would have tightened credit standards in 2020:Q3 by nearly 10 ppts compared to the actual figure of 37.5%.

before the program's implementation would further boost our confidence that our results indeed capture the effects of the program. As shown in Table 5, we estimate the difference-in-differences specifications for the corresponding period (the first three quarters of the year) in 2019 and 2018, and find that MSLP banks were no more likely to adjust lending decisions on large or small business loans (panel A), nor were they more likely to tighten C&I lending standards in the third quarter of either year compared to other banks (panel B). These findings increase our confidence that the baseline results in Tables 3 and 4 capture the effects of program participation rather than some other potentially confounding effects.

5.4 Intensive Margin

So far, we have documented positive spillovers from MSLP participation on banks' extensive margin lending behavior in both loan-level and survey data: we have shown that participating banks were more likely to renew and originate new loans, increased the number of small business loan accounts more, and were less likely to tighten C&I lending standards in the post-MSLP period. Were MSLP banks more likely to adjust lending terms as well? Here we study the intensive margin of lending adjustments. We start with an examination of loan-level data from the Y-14Q H1 schedule, which we complement with additional evidence from syndicated loan originations reported in Dealscan, and follow with survey data.

Evidence from Loan-Level Data Using loan-level data aggregated at the bank-firm level, from the Y-14Q schedule H1, we estimate the specification in Equation 1 where the dependent variable is the average loan amount (in logs) or, alternatively, the average spread over LIBOR for floating-rate loans renewed or originated each quarter. Given the relatively small number of new loans extended by the 32 reporting BHCs in our sample, we add evidence from syndicated loan originations reported in Dealscan. Focusing on lead arrangers, the Dealscan data set allow us to significantly boost the sample of banks (to a total of 262 banks, of which 51 banks are MSLP participants). Given the relatively few loan originations

during the period analyzed, we aggregate the loan-level data by computing average loan volumes and spreads on new syndicated loans at the firm-cluster level, where firm clusters comprise all firms in the same two-digit NAICS industry and state (see Degryse, De Jonghe, Jakovljević, Mulier and Schepens (2019)). Then we control for quarterly changes in loan demand at the borrower level in the Y-14Q data and, respectively, at the firm-cluster level in the Dealscan data, with the usual firm×quarter and respectively, firm-cluster×quarter fixed effects (similar to the approaches in De Haas and Van Horen (2013) and Acharya, Eisert, Eufinger and Hirsch (2019)).

The results are reported in Table 6, with OLS estimates in panel A and 2SLS estimates in panel B. In the Y-14Q data we find no evidence that MSLP banks granted larger loans (column 1). However, when we expand the sample of banks and examine syndicated loan originations instead (column 3), we find that MSLP banks extended loans that were larger by 11.2% in the post-MLSP period compared to other banks (representing an increase of $2.4 million given the average loan size of $22 million). Columns 2 and 4 indicate that average spreads on loans renewed or originated by MSLP banks were about 9 bps and respectively 13.5 bps lower than at other banks in 2020:Q3. Given that MSLP banks accounted for 43% of the value of C&I loans renewed or originated in 2020:Q3 in the Y-14Q H1 data, and using the coefficient estimate of 9 bps in column 2, we infer that the average spread for all LIBOR-indexed C&I loans renewed or originated in 2020:Q3 would have been 4 bps higher in the absence of the program (i.e., 0.43×9), compared to the actual 235 bps spread in the Y-14Q data. (This effect is economically small.) Moreover, the instrumental variable approach in panel B reinforces these results. According to the 2SLS estimates (which are slightly larger than the OLS estimates), MSLP banks renewed or originated loans with spreads that were on average 19 and 30 bps lower, respectively, than other banks. Finally, newly originated syndicated loans were on average 25% larger at participating than nonparticipating banks.

Evidence from Survey Data Based on banks' survey responses in the SLOOS, we define dummy variables that take the value one for banks that reported tightening specific lending terms each quarter. The survey covers seven lending terms for approved C&I loans and credit lines, including the maximum size of credit lines, maximum maturity, cost of credit lines, spreads, premia on riskier loans, covenants, and collateral requirements. Table 7 reports the estimation results from regressions corresponding to Equation 3, where the dependent variables refer to the likelihood of tightening specific lending terms. The results indicate that MSLP banks were relatively less likely to tighten most loan terms across all borrowers (panel A). There are also several notable differences across borrower sizes (panel B), with MLSP banks appearing to tighten certain terms—specifically maximum credit line amounts, loan covenants, and collateral requirements—relatively less for large borrowers.[21]

Summing up our findings so far, our baseline results for the extensive margin of lending indicate statistically significant and economically sizeable spillovers to C&I lending for MSLP participating banks. Additional analysis of the intensive margin of lending indicates somewhat smaller effects.

6 Threats to Identification

In this section, we address additional potential concerns regarding endogeneity. First, one might worry that unobserved bank characteristics—such as banks' willingness to participate in government-sponsored credit support programs, balance sheet constraints that are difficult to measure, or risk appetite—might simultaneously drive both the decision to participate in the MSLP and the PPP; and that the spillovers we identify in fact are driven by PPP participation and not by MSLP participation. A second concern may be that certain factors such as a bank's exposure to credit line drawdowns at the onset of the pandemic, its optimism regarding the economic outlook, or its business model as reflected in the cyclicality of its loan portfolio, are driving both MSLP participation as well as lending decisions in 2020:Q3.

[21] As seen in Table A9, these results are broadly robust to estimation via 2SLS.

We conduct several additional tests to mitigate these concerns, as follows.

The Paycheck Protection Program First, we test that our results are not driven by unobserved bank characteristics that may induce a bank to participate in both the MSLP and PPP programs. Specifically, we check that outstanding balances of federally-guaranteed loans (in log-$ terms, principally reflecting bank participation in the PPP), reported by the BHCs in our Y-14Q A9 sample in either 2020:Q2 or 2020:Q3 for each loan portfolio segment, are uncorrelated with MSLP lender status. In these regressions we control for loan demand with segment fixed effects, which allow for common demand shocks to small clusters of borrowers that are very similar in terms of risk profile and the types of loans they receive. The results in Table 8 do not show any link between MSLP participation and outstanding government loan balances in either quarter.

Second, we make sure that the baseline results are insensitive to controlling directly for the intensity of PPP participation. In Table A10 we show regressions similar to those in baseline Table 3, to which we add an interaction term between each bank's PPP loan balances (divided by bank assets) either at the end of 2020:Q2 or 2020:Q3 and the Post dummy. The results show that PPP lending volumes are positively associated with the share of renewals and new originations, as well as the number of small business loan accounts, but the coefficient estimates on our key interaction term MSLP bank×Post remain statistically significant and are similar in magnitude with those in the baseline analysis.

Other Confounding Factors In Table 9 we report the coefficient estimates on MSLP bank×Post when we additionally control for off balance-sheet unused C&I loan commitments (divided by total assets) and respectively, loan loss reserves (divided by total gross loans) as a proxy for future asset quality. These tests aim to address potential worries that MSLP banks may have experienced larger drawdowns in 2020:Q1 but also larger debt repayments from their corporate clients in 2020:Q2 and Q3, which might have freed up more balance sheet

space for lending;[22] or, respectively, that they might have felt more confident to make new loans given larger provisions. If this were the case, then our baseline results would reflect the impact of these factors, not that of the program. As seen in Table 9, the coefficient estimates on the interaction term MSLP bank×Post retain their magnitude and statistical significance from the baseline results.

Table 10 repeats the exercise while controlling for the cyclicality of bank lending specific to each bank, measured as the correlation between the bank's C&I loan growth and the growth rate of C&I loan balances of the banking system as a whole (estimated from quarterly Call Report data over 1985:Q1–2021:Q2 using two functional forms). This test aims to allay the concern that MSLP participation is driven by bank-specific loan portfolio characteristics that are correlated with the business cycle. For the two measures of bank cyclicality, we find estimates for the difference-in-differences term that are very similar to the baseline analysis.

7 Mechanisms: A "Psychological Backstop"?

Through which channels did the MSLP affect banks' lending decisions? As discussed in Section 3, the program may have operated through two non-exclusive channels: (a) a reduction in banks' risk aversion, and (b) an easing of current or future balance sheet constraints. These channels should be interrelated to the extent that current balance sheet constraints reflect perceptions of the likelihood of future constraints, which in turn determine fluctuations in risk aversion. Some models of financial intermediaries' risk aversion predict that bank-level changes in risk aversion reflect underlying balance sheet constraints, in particular, leverage (Drechsler, Savov and Schnabl, 2018; He and Krishnamurthy, 2013). At the same time, shifts in risk aversion may be linked to factors such as optimism about the economic outlook

[22]Larger banks—more likely to participate in the program—experienced significant demand for loans early in the pandemic (Acharya, Engle and Steffen, 2021). However, the same banks also experienced higher paydowns from large borrowers in 2020:Q2 and Q3 as favorable borrowing conditions in the corporate bond market lessened the roll-over of debt and repayment of credit line borrowings (Darmouni and Siani, 2021). Overall, credit line drawdowns may have constrained lending initially (Kapan and Minoiu, 2020) while repayments may have eased constraints in the second half of the year, with ambiguous effects on our results.

(Ma, Paligorova and Peydró, 2020), exposures to off-balance sheet risks (Kapan and Minoiu, 2020), the internal risk management function (Ma, 2015; Stulz, 2014; Ellul and Yerramilli, 2013), and past experience with financial crises (Bouwman and Malmendier, 2015).

Regarding the first channel, the MSLP's function of "insurance" against the realization of bad outcomes may also have affected participating banks' risk perceptions. Specifically, the MSLP may have reduced banks' effective levels of risk aversion by building confidence that a lending support program was going to be available should economic conditions deteriorate further—essentially, by serving as a "psychological backstop." Given the unusually elevated uncertainty associated with the path of the pandemic, banks may have chosen to register for the program as insurance, which they could have exercised to continue lending and contain losses under deteriorating economic conditions. This channel is critical for the effectiveness of lender-of-last-resort interventions, by which the central bank makes a credible commitment to backstop a financial market and improves conditions in that market by reducing uncertainty and boosting confidence.[23]

Regarding the second channel, 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% of the full credit exposure was thus intended to open up balance sheet capacity for other profitable lending opportunities (Dudley, 2020; English and Liang, 2020). To the extent that banks felt constrained—for instance, due to a lower level of capital or liquidity, or more volatile funding sources—we expect that the originate-and-distribute features of the program were beneficial, allowing the banks to remove the majority of credit risk from the balance sheet while preserving valuable relationships with corporate clients. This channel predicts that ex ante more constrained banks should have benefitted relatively more from the presence of the program.

[23] Covitz, Meisenzahl and Pence (2021) and Anbil, Carlson and Styczynski (2021) make similar arguments for the TALF and PPPLF, which provided liquidity backstop for eligible asset-backed securities markets and funding for the granting of PPP loans, respectively.

Mechanisms Evidence from Survey Data To start with, we use SLOOS survey data over 2020:Q1–Q3 to test for a reduction in banks' risk aversion and an easing of balance sheet constraints as possible mechanisms. In particular, we examine the link between banks' survey responses that speak directly to these channels and MSLP participation status. To capture the two channels, we rely on survey responses to the following question: *"If your bank has tightened its credit standards or its terms on C&I loans or credit lines over the past three months, how important have been the following reasons?"*. From the menu of options, we take *"Deterioration in your bank's current or expected capital position"* and *"... expected liquidity position"* to refer to balance sheet constraints; and *"Reduced tolerance for risk"* to refer to risk attitudes. We construct dummy variables that take value one for those banks citing each reason as "very important" (zero otherwise) and relate the responses to banks' MSLP participation status in a difference-in-differences setting similar to Equation 3.

Table 11 reports the results. In panel A, we find that the coefficient estimates on MSLP participation status are negative and statistically significant at the 1% significance level in relation to "lower risk tolerance," suggesting that MSLP banks were less likely than other banks to cite a rise in risk aversion as a reason for tightening lending standards after the introduction of the program (column 1). At the same time, participating banks were no more likely to invoke balance sheet constraints—in particular capital and liquidity positions—as reasons for tightening lending standards than nonparticipating banks (columns 2–3). These results support the notion that the MSLP served as a backstop to the private loan market and created an expectation of lending support that may have encouraged banks to feel more confident in their lending decisions knowing that there would likely be supported if economic conditions were to deteriorate further.[24]

Next, we examine the channels further using objective indicators of risk and balance sheet

[24] As shown in Table A11, none of the other factors that banks selected as very important reasons for tightening lending standards (i.e, *"Less favorable or more uncertain economic outlook"*, *"Decreased liquidity in the secondary market for these loans"*, *"Worsening of industry-specific problems"*, or *"Increased concerns about the effects of legislative changes, supervisory actions, or changes in accounting standards"*) were associated with banks' MSLP participation status.

constraints instead of survey data. The rationale is to validate our findings with independent measures of risk attitudes and banks' financial strength. Doing so would alleviate any concerns that survey responses regarding risk tolerance and balance sheet strength during a crisis maybe be contaminated by reporting biases.[25]

Mechanisms Evidence from Risk Management Index of Banks We explore the mechanisms by which the MSLP likely affected lending decisions during the pandemic by measuring banks' attitudes towards risk-taking with an objective measure of risk controls—the risk management index (RMI) developed by (Ellul and Yerramilli, 2013). This index, available for 61 BHCs over 2011–2013 (of which we are able to match 16 BHCs to the Y-14Q H1 sample), measures the strength of the risk management function within each bank, by combining information from a variety of variables, including whether the bank has a chief risk officer (CRO), if the CRO is an executive and among the best paid executives, how the CRO's compensation compares to that of the CEO, the experience of risk committee members, and the frequency with which the risk committee meets.

Ellul and Yerramilli (2013) show that banks with stronger risk management function (higher RMI) had lower tail risk exposure, lower delinquencies, and better stock market performance during the 2007–2008 financial crisis, suggesting stronger risk controls. Interpreting higher levels of the RMI (average over 2011–2013) as indicative of higher risk aversion, we split banks in high versus low RMI (above/below median) and examine how the baseline coefficients on MSLP bank×Post vary by level of risk aversion. The results in Table 12 suggest that the spillovers from MSLP participation are stronger for more risk-averse banks with higher RMI for two out of three lending outcomes. The exception is new loan originations, with no difference across bank groups.

Mechanisms Evidence from Bank Balance Sheets Table 13 shows results for the balance sheet channel using several proxies of bank constraints. We take banks to be constrained

[25]See Appendix A-II for a detailed discussion of SLOOS data quality.

if they have: (1) below-median excess capital buffers; (2) below-median equity issuance; (3) above-median weighted average cost of liabilities; (4) below-median core deposits as a share of total liabilities; and (5) above-median loan loss reserves. All variables are measured at end 2020:Q2 except equity issuance, which refers to issuances of preferred and common equity instruments in the first half of 2020, divided by bank assets.[26]

The results in Table 13 show that the spillovers from MSLP participation are not consistently stronger (and if anything, they are often weaker) for constrained banks than they are for unconstrained banks. These findings partly rule out the balance sheet channel. That said, an important exception is that lower excess capital buffers and higher loan loss reserves—likely reflecting future rather than current balance sheet constraints—are associated with more loan renewals (see panel A, columns 1 and 5). Put differently, it is possible that capital constraints be binding dynamically, not immediately, in which case future balance sheet constraints could have played a role in inducing spillover effects of the program.

Overall, our findings are consistent with the view that the MSLP generated spillovers on bank lending by reducing banks' risk aversion, including by reducing the likelihood of future balance sheet constraints, more so than by easing current constraints.

8 Conclusions

We study the spillover effects of MSLP participation on banks' lending policies during the COVID-19 crisis. Our goal is to deepen our understanding of the effectiveness of emergency relief measures during the pandemic, focusing on a program deployed for the first time. To our knowledge, this is the first paper that presents an empirical assessment of bank incentives

[26]Excess capital buffers are defined following Berrospide, Gupta and Seay (2021) as the amount of excess capital held by the bank above the regulatory requirements (4.5% for all banks) and regulatory capital buffers (ranging between 2.5% and 7% depending on the bank's risk profile). Bank-level equity issuance are sourced from SNL Financial. The weighted average cost of liabilities is given by the weighted average of the interest rate paid on five types of liabilities: (a) transaction deposits, (b) savings accounts, (c) small time deposits, (d) large time deposits, and (e) other borrowed money and trading liabilities, where the weights are obtained from Call Report data aggregated at the top holder level. The cost of each type of liability is computed across small, medium, and large banks from Call Report data, with size given by the top holder.

to participate in the MSLP and of the program's broader effects on banks' lending decisions. 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. MSLP banks were more likely to renew and originate new large corporate loans and made more small business loans after the program's implementation compared to non-MSLP banks. The estimates are larger for banks with stronger internal risk controls and MSLP banks were less likely to cite an increase in risk aversion as the main reason for tightening lending standards. Current balance sheet constraints appear to have played a more muted role.

These results suggest that the program's backstop of the bank loan market was effective in mitigating banks' pullback from risk-taking during the COVID-19 pandemic, boosting the willingness to lend. Overall, our evidence suggests that the MSLP contributed to ease—or at least mitigated against further tightening—financing conditions at participating banks, akin to other Federal Reserve programs that experienced low take-up but served as a credible backstop to major debt markets and helped improve financial conditions.

Why did the program have low take-up? Detailed survey data on banks' experiences with the MSLP suggest that overly restrictive terms dampened bank interest and borrower demand. Most surveyed banks were able to meet credit demand outside the program; and the few firms that obtained MSLP loans were at the riskier end of the eligible firm population. These findings reinforce the notion that the program mainly served as a backstop and that banks viewed it as a safety net that they could activate if economic conditions deteriorated. Together with recent papers discussing related mechanisms (see, for instance, Anbil, Carlson and Styczynski (2021), Covitz, Meisenzahl and Pence (2021) and Cox, Greenwald and Ludvigson (2020)), our study highlights the role of central bank interventions in mitigating financial institutions' risk aversion in the face of uncertainty shocks—a key driver of recessions.

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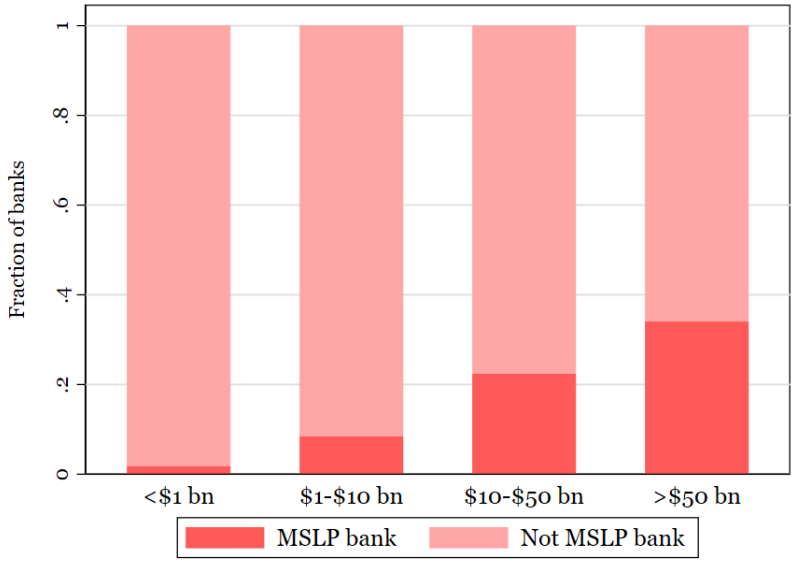
A Tables and Figures

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: Federal Reserve Bank of Boston, Federal Reserve Main Street Reports to Congress Pursuant to Section 13(3) of the Federal Reserve Act in response to COVID-19 (see link, last report dated April 12, 2021), and Call Report.

Table 1: Bank Characteristics by MSLP Participation Status

	(1) **MSLP bank**	(2) **Non-MSLP bank**	(3) **p-value**	(4) **MSLP bank**	(5) **Non-MSLP bank**	(6) **p-value**
			A. Balance sheet characteristics			
	sample means			*sample medians*		
Total assets (USD bn)	63.50	16.66	0.003	5.01	2.05	0.000
Loans/Assets	72.2%	68.9%	0.043	72.3%	72.5%	0.916
C&I Loans/Loans	30.0%	21.2%	0.000	29.1%	19.6%	0.000
CET1 capital ratio	12.1%	14.4%	0.008	12.0%	12.5%	0.015
Excess CET1 capital cushion	5.0%	7.3%	0.008	4.9%	5.5%	0.015
Core deposits/Liabilities	48.3%	50.2%	0.162	49.1%	50.3%	0.597
Credit line drawdowns (2019:Q4 vs 2020:Q1)	0.3%	0.1%	0.168	0.1%	0.0%	0.070
Credit line drawdowns (2020:Q1 vs 2020:Q2)	-1.0%	-0.8%	0.065	-0.8%	-0.5%	0.004
Loan loss reserves	1.6%	1.5%	0.513	1.4%	1.3%	0.000
			B. Exposure to local economic conditions			
	sample means			*sample medians*		
COVID-19 infections (Mar 1-Dec 15)[1]	0.040	0.041	0.650	0.037	0.039	0.467
COVID-19 infections (Mar 1-Dec 15)[2]	52.06	52.93	0.602	50.99	50.99	0.988
COVID-19 infections (Mar 1-Aug 30)[2]	17.38	17.38	0.996	17.76	17.82	0.203
COVID-19 infections (Mar 1-Oct 30)[2]	27.54	28.05	0.562	26.64	28.02	0.245
Unemployment insurance claims (Jan-Nov)	0.21	0.21	0.672	0.21	0.20	0.341
Unemployment rate, max (Jan-Nov)	14.7%	14.7%	0.958	15.4%	15.3%	0.751
Unemployment rate, change (Jan-Nov)	3.07	2.98	0.520	2.99	2.77	0.341
% Small firms missed loan payments	16.6%	16.6%	0.977	15.9%	16.0%	0.916
% Small firms unmet demand through PPP	8.9%	8.5%	0.188	8.5%	8.5%	0.294
% Small firms affected by COVID	84.6%	85.0%	0.433	85.1%	85.1%	0.741
% Small firms experienced revenue drop	54.4%	54.8%	0.428	55.1%	55.1%	0.731
% Small firms permanently closed	27.6%	27.9%	0.712	25.7%	25.3%	0.821
% Small firms temporarily closed	75.2%	75.7%	0.444	76.7%	76.5%	0.597

This table reports sample averages and medians for key bank characteristics by MSLP lender status, along with p-values of t-tests of equality of means across MSLP and non-MSLP banks, in the sample of bank with at least $1 bn in total assets. Credit line drawdowns refer to the negative of changes in the amount of off-balance sheet unused C&I loan commitments (between the two quarters indicated), divided by total assets in the initial quarter (such that positive figures correspond to net drawdowns and negative figures correspond to net repayments). In panel B, local economic conditions facing banks are captured by pandemic intensity, exposure to labor market conditions, and exposure to small business conditions. All variables are computed at the bank level by weighting COVID-19 cumulative case infections (at the county level in 1/ or state level in 2/ and over different type periods), labor market condition variables (unemployment claims, unemployment rates, and the changes in unemployment), and respectively variables on financing conditions of small businesses across locations by banks' own deposits shares in those locations (where deposit shares in each county or state are measured in June 2019). The sample period is 2020:Q1-2020:Q3. Source: Federal Reserve Main Street Reports to Congress Pursuant to Section 13(3) of the Federal Reserve Act in response to COVID-19 (see link, last report dated April 12, 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 2: Correlation of IVs with MSLP Participation Status

	Y14-Q H1 sample	SLOOS sample	Dealscan sample
MSLP registration was costly	-0.1290***	-0.1436***	-0.0610***
Pledged securities at discount window	-0.4927***	-0.0426**	-0.4363***
Pledged loans at discount window	0.1149 ***	0.0870**	0.0703***

The table reports the simple correlation coefficient between the IVs and MSLP participation status in the three samples where we estimate 2SLS. Costly MSLP registration is a dummy variable that takes value one for banks which cited burdensome MSLP registration as a very important reason for not registering, based on the supplementary September 2020 SLOOS on bank experiences with the MSLP (zero otherwise). The dummy variables "pledged securities" or "pledged loans" at discount window take value one for those banks that had securities collateral or loan collateral, respectively, pledged to the Federal Reserve's discount window during December 1–31, 2019 (zero otherwise). Source: Federal Reserve Bank of Boston and Federal Reserve Main Street Reports to Congress Pursuant to Section 13(3) of the Federal Reserve Act in response to COVID-19 (see link, last report dated April 12, 2021), FR Y14-Q H1 schedule, Federal Reserve Senior Loan Officer Opinion Survey, Federal Reserve Bank of Dallas, Refinitiv's Dealscan, and Call Report.

Table 3: Spillover effects of MSLP on C&I lending: Evidence from Y-14 business loans—Extensive margin

Dependent variable:	(1)	(2)	(3)	(4)	(5)
	Renewals (% loans)		**Originations** (% loans)		**No. of small bus. loans (log)**
			A. OLS estimates		
MSLP bank×Post	0.0166***	0.0156***	0.0140***	0.0108***	0.1734***
	(0.00339)	(0.00344)	(0.00331)	(0.00303)	(0.048)
No. of observations	78,081	75,823	78,099	75,829	4,458
R^2	0.517	0.688	0.566	0.739	0.629
Mean of dep. var	0.0530	0.0531	0.0513	0.0513	
			B. 2SLS estimates		
MSLP bank×Post	0.0273**	0.0169***	0.0267**	0.0125**	-
	(0.012)	(0.006)	(0.013)	(0.006)	-
No. of observations	77,172	77,172	77,188	77,188	-
F-stat first stage	2033.8	1090.7	2031.1	1091.0	-
p-value Hansen test overid	0.000	0.000	0.008	0.000	-
Bank controls	Yes	Yes	Yes	Yes	Yes
Bank controls×Post	Yes	Yes	Yes	Yes	Yes
Borrower×quarter FE	Yes	Yes	Yes	Yes	
Bank FE	Yes	Yes	Yes	Yes	Yes
Bank×borrower FE		Yes		Yes	
Segment×quarter FE					Yes

This table shows baseline spillover effects of MSLP participation on the extensive margin of C&I lending using credit registry data. The dependent variables are the share of renewals and new loan originations out of outstanding loans (columns 1-4) and the number of small business loans (log) (column 5). Panel A shows OLS estimates and panel B reports 2SLS estimates where MSLP bank×Post is instrumented with dummy variables taking value one for those banks that reported not participating in the MSLP due to burdensome registration (zero otherwise) and those banks that are familiar with the Federal Reserve in that they are eligible to borrow from the discount window and have pledged loans or securities as collateral at the discount window at any time during December 1–31, 2019 (zero otherwise). The instruments enter in levels and interactions with ×Post and each other. The sample period is 2020:Q1-2020:Q3. The variable "Post" takes value one in 2020:Q3 and zero otherwise. Bank control include: size (log-assets), loan/assets, C&I loans/loans, CET1 capital ratio, and deposits as a share of total liabilities. Standard errors are clustered at the bank-firm level in the Y-14Q H1 data (columns 1-2) and the bank-quarter level in the Y-14Q A9 data (column 3). *** indicates significance at the 1% level, ** at the 5% level, * at the 10% level, and # at the 15% level. See Table A3 for descriptive statistics. Source: Federal Reserve Main Street Reports to Congress Pursuant to Section 13(3) of the Federal Reserve Act in response to COVID-19 (see link, last report dated April 12, 2021), FR Y-14Q H1 and A9 schedules, Call Report.

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

Dependent variable:	(1)	(2)	(3)	(4)	(5)	(6)
	Bank reports tightening C&I lending standards					
	OLS estimates				**2SLS estimates**	
MSLP bank×Post	-0.1473**	-0.1542**			-0.6652*	-0.6043*
	(0.017)	(0.019)			(0.383)	(0.376)
MSLP bank×Post×Large firm [1]			-0.1304**	-0.1373**		
			(0.017)	(0.018)		
MSLP bank×Post×Small firm [2]			-0.1637**	-0.1706**		
			(0.017)	(0.018)		
MSLP bank	-0.0283	-0.0214	-0.0282	-0.0212	-0.6267	-0.6877*
	(0.017)	(0.018)	(0.017)	(0.018)	(0.383)	(0.376)
Post	-0.0552		-0.0408		-1.2682***	
	(0.531)		(0.528)		(0.328)	
Observations	405	405	405	405	405	405
R^2	0.121	0.162	0.120	0.161	-	-
pvalue ttest Ho: coeff [1]=[2]			0.000	0.000		
F-stat first stage, MLP bank×Post					14.38	14.02
F-stat first stage, MLP bank					11.71	11.34
p-value Hansen test overid					0.0995	0.0995
Bank controls	Yes	Yes	Yes	Yes	Yes	Yes
Bank controls×Post	Yes	Yes	Yes	Yes	Yes	Yes
Loan demand	Yes	Yes	Yes	Yes	Yes	Yes
Loan demand×Post	Yes	Yes	Yes	Yes	Yes	Yes
Survey FE		Yes		Yes		Yes
Firm size FE	Yes	Yes	Yes	Yes	Yes	Yes

This table shows baseline spillover effects of MSLP participation on the extensive margin of C&I lending using survey data. The dependent variable takes value one if the bank reports tightening C&I lending standards "considerably" or "somewhat" in any given quarter over the period 2020:Q1-2020:Q3 in responding to Question 1 of the survey ("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?"). Survey responses are collected separately in regards to large and small firms (defined as having annual sales below $50 million) and are pooled such that the data are at the bank-firm size-survey level. Columns 1-3 show OLS estimates and columns 5-6 report 2SLS estimates where the variables MSLP bank and MSLP bank×Post are instrumented with dummy variables taking value one for those banks that reported not participating in the MSLP due to burdensome registration (zero otherwise) and those banks that are familiar with the Federal Reserve in that they are eligible to borrow from the discount window and have pledged loans or securities as collateral at the discount window at any time during December 1–31, 2019 (zero otherwise). The instruments enter in levels and interactions with ×Post and each other. The sample period is 2020:Q1-2020:Q3. The variable "Post" takes value one in 2020:Q3 and zero otherwise. Bank control include: size (log-assets), loan/assets, C&I loans/loans, CET1 capital ratio, and deposits as a share of total liabilities. Standard errors are clustered at the the survey level. *** indicates significance at the 1% level, ** at the 5% level, * at the 10% level, and # at the 15% level. See Table A3 for descriptive statistics. Source: Federal Reserve Main Street Reports to Congress Pursuant to Section 13(3) of the Federal Reserve Act in response to COVID-19 (see link, last report dated April 12, 2021), Call Report, Federal Reserve's Senior Loan Officer Opinion Survey.

Table 5: Spillover effects of MSLP on C&I lending: Placebo tests

Dependent variable:	(1) **Renewals** (% loans)	(2) **Originations** (% loans)	(3) **No. of small bus. loans (log)**	(4) **Bank reports tightening C&I lending standards**	(5)
			A. Placebo test for 2019		
MSLP bank×Post	-0.00181	0.00516	0.0437	-0.0019	-0.0019
	(0.003)	(0.003)	(0.041)	(0.019)	(0.019)
MSLP bank				0.0011	0.0011
				(0.019)	(0.019)
Post				0.3615***	
				(0.034)	
No. of observations	73,133	73,157	4,799	415	415
R^2	0.697	0.755	0.684	0.049	0.049
			B. Placebo test for 2018		
MSLP bank×Post	0.00389	0.00128	-0.0678	-0.0095	-0.0096
	(0.00480)	(0.00472)	(0.084)	(0.022)	(0.022)
MSLP bank				-0.0214	-0.0213
				(0.023)	(0.023)
Post				-0.6924*	
				(0.207)	
No. of observations	71,018	71,033	4,723	373	373
R^2	0.676	0.771	0.695	0.070	0.070
Bank controls	Yes	Yes	Yes	Yes	Yes
Bank controls×Post	Yes	Yes	Yes	Yes	Yes
Survey FE					Yes
Firm size FE				Yes	Yes
Borrower×quarter FE	Yes	Yes	Yes		
Bank×borrower FE	Yes	Yes			
Segment×quarter FE			Yes		

This table shows placebo tests for the spillover effects of MSLP participation on the extensive margin of C&I lending. The dependent variables are the share of renewals and new loan originations (columns 1-2), the number of small business loans (log) (column 3), and a dummy variable that takes value one for banks reporting that they tightened C&I lending standards in any given quarter. Panel A refers to 2019 outcomes and panel B refers to 2018 outcomes. The sample period is 2020:Q1-2020:Q3. Specifications are based on the regressions from panel A in baseline Table 3 and Table 4 with the same controls and fixed effects. Standard errors are clustered at the bank-firm level in the Y-14Q H1 data (columns 1-2), the bank-quarter level in the Y-14Q A9 data (column 3), and the survey level in SLOOS data (columns 4-5). *** indicates significance at the 1% level, ** at the 5% level, * at the 10% level, and # at the 15% level. Source: Federal Reserve Main Street Reports to Congress Pursuant to Section 13(3) of the Federal Reserve Act in response to COVID-19 (see link, last report dated April 12, 2021), FR Y-14Q H1 and A9 schedules, Call Report, Federal Reserve's Senior Loan Officer Opinion Survey.

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

Dependent variable:	(1) **Loan amount**	(2) **Loan spread**	(3) **Loan amount**	(4) **Loan spread**
		A. OLS estimates		
	Large business loans		*Syndicated loans*	
MSLP bank×Post	-0.0136	-0.0907*	0.1127**	-0.1351***
	(0.0862)	(0.0476)	(0.048)	(0.043)
Observations	3,547	2,296	4,858	4,232
R^2	0.795	0.946	0.563	0.616
Mean of dep. var	17.45	2.131	22.676	2.299
		B. 2SLS estimates		
	Large business loans		*Syndicated loans*	
MSLP bank×Post	0.1399	-0.1938**	0.2818***	-0.3817#
	(0.372)	(0.088)	(0.104)	(0.302)
Observations	3,536	2,277	4,297	3,886
F-stat first stage	42.08	79.83	14.02	7.74
p-value Hansen test overid	0.5463	0.000	0.000	0.2248
Bank controls	Yes	Yes	Yes	Yes
Bank controls×Post	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Borrower×quarter FE	Yes	Yes		
Borrower cluster×quarter FE			Yes	Yes

This table shows baseline regressions for the spillover effects of MSLP participation on the intensive margin of C&I lending. The dependent variables are log(loan amount) and log(loan spread). d Columns 1-2 use data on outstanding large business loans from the FR Y-14Q H1 schedule (that is, the baseline sample from Table 3. Column 3-4 use data on new loan originations from Refinitiv's Dealscan. For the FR Y-14Q H1 data, the unit of observation is bank-firm-quarter. For the Dealscan data, the unit of observation is bank-borrower cluster-quarter, where borrower clusters comprise all firms in the same two-digit NAICS industry and state. The sample period is 2020:Q1-2020:Q3. Standard errors are clustered at the bank-firm level in the Y-14Q H1 data (columns 1-2) and the bank-firm cluster level in the syndicated loan data (columns 3-4). *** indicates significance at the 1% level, ** at the 5% level, * at the 10% level, and # at the 15% level. Source: Federal Reserve Main Street Reports to Congress Pursuant to Section 13(3) of the Federal Reserve Act in response to COVID-19 (see link, last report dated April 12, 2021), FR Y-14Q H1 and A9 schedules, Call Report, Federal Reserve's Senior Loan Officer Opinion Survey.

Table 7: Spillover effects of MSLP on C&I loan terms: Evidence from survey data (OLS estimates)

Dependent variable:	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Bank reports tightening the following terms of C&I lending						
	Maximum CL capacity	Maximum maturity	Cost of credit lines	Loan spreads	Premia on riskier loans	Loan covenants	Collateral requirements
				A. To All Borrowers			
MSLP bank×Post	-0.1957***	-0.1189**	-0.2853**	-0.2596***	-0.2817**	-0.2141	-0.1897*
	(0.001)	(0.023)	(0.061)	(0.019)	(0.044)	(0.083)	(0.057)
Observations	404	404	401	404	405	404	401
R^2	0.178	0.181	0.187	0.222	0.216	0.164	0.144
				B. By Borrower Size			
MSLP bank×Post×Large firm	-0.2321***	-0.1129*	-0.2941**	-0.2548***	-0.2673**	-0.2084*	-0.2252*
	(0.008)	(0.027)	(0.064)	(0.025)	(0.048)	(0.071)	(0.057)
MSLP bank×Post×Small firm	-0.1580***	-0.1251**	-0.2762**	-0.2646***	-0.2966**	-0.2199	-0.1528
	(0.008)	(0.020)	(0.059)	(0.013)	(0.039)	(0.095)	(0.059)
Observations	404	404	401	404	405	404	401
R^2	0.178	0.181	0.187	0.222	0.216	0.164	0.144
Bank controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank controls×Post	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan demand	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan demand×Post	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Survey FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm size FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

This table shows spillover effects of the MSLP on the terms of new C&I loans and credit lines using bank-level responses from the Federal Reserve Senior Loan Officer Opinion Survey. The dependent variable takes value one if the bank reports tightening lending terms "somewhat" or "significantly" on approved C&I loans and credit lines in any given quarter over the period 2020:Q1-2020:Q3 in responding 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?"). The lending terms are indicated as column headings. Survey responses are collected separately in regards to large and small firms (defined as having annual sales below $50 million) and are pooled such that the data are at the bank-firm size-survey level. Specifications are based on the regressions from baseline Table 4 with the same controls and fixed effects. The coefficient on "MSLP bank" is estimated but not shown. Standard errors are clustered on survey. *** indicates significance at the 1% level, ** at the 5% level, * at the 10% level, and # at the 15% level. Source: Federal Reserve Main Street Reports to Congress Pursuant to Section 13(3) of the Federal Reserve Act in response to COVID-19 (see link, last report dated April 12, 2021), Federal Reserve's Senior Loan Officer Opinion Survey, Call Report.

Table 8: Falsification Test: Ruling Out Spillover Effects through the PPP

Dependent variable:	(1)	(2)
	Amount of government guaranteed small business loans (log)	
	Sample: 2020:Q3	*Sample: 2020:Q4*
MSLP bank	0.0497	0.0358
	(0.074)	(0.043)
No. of observations	915	1,918
R^2	0.690	0.724
Bank controls	Yes	Yes
Segment FE	Yes	Yes

This table shows a falsification test that relates bank participation in the MSLP with participation in government credit guarantee programs (principally the Paycheck Protection Program). Each regression is for the cross-section of banks reporting small business loans in the FR Y-14Q A9 schedule for 2020:Q3 (column 1) and 2020:Q4 (column 2), respectively, with data at the bank-loan segment level. The dependent variable is the $-amount of outstanding loan balances under federally guaranteed programs (log), where the guarantee percentage is 100% and no personal guarantees are required (e.g., loans under programs such as the 2020 PPP). In the FR Y-14Q A9 data, a segment comprises several loans that correspond to the same borrower risk and loan characteristics, specifically the same borrower FICO score (above or below 620), delinquency status (current, delinquent for 30–59 days, 60–89 days, 90–119 days, or 120+ days), loan type (credit line, term loan, unclassified/other), collateral requirements (secured, unsecured), and loan maturity (above/below three years), for a total of 180 segments. Standard errors are clustered at the loan segment level. *** indicates significance at the 1% level, ** at the 5% level, * at the 10% level, and # at the 15% level. Source: Federal Reserve Main Street Reports to Congress Pursuant to Section 13(3) of the Federal Reserve Act in response to COVID-19 (see link, last report dated April 12, 2021), FR Y-14Q A9 schedule, Call Report.

Table 9: Ruling Out Confounding Factors: Credit Line Drawdowns and Asset Quality

Dependent variable:	(1)	(2)	(3)	(4)
	Renewals (% loans)		**Originations** (% loans)	
MSLP bank×Post	0.0129***	0.0168***	0.0140***	0.0171***
	(0.003)	(0.004)	(0.003)	(0.003)
Credit line exposure	0.5079***		0.2449***	
	(0.138)		(0.079)	
Credit line exposure×Post	-3.1443***		-0.0981	
	(0.438)		(0.290)	
Loan loss reserves		0.2076		-1.5261***
		(0.452)		(0.433)
Loan loss reserves×Post		-0.9886**		0.7228**
		(0.415)		(0.355)
No. of observations	78,081	78,081	78,099	78,099
R^2	0.518	0.517	0.566	0.566
Bank controls	Yes	Yes	Yes	Yes
Bank controls×Post	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Borrower×quarter FE	Yes	Yes	Yes	Yes
Dependent variable:	**No. of small business loan accounts (log)**		**Bank tightened C&I lending standards**	
MSLP bank×Post	0.1929***	0.1774***	-0.1456***	-0.1642**
	(0.050)	(0.050)	(0.013)	(0.032)
Credit line exposure	4.5162**		-4.2524	
	(1.934)		(4.152)	
Credit line exposure×Post	0.2035		0.0299	
	(0.249)		(4.149)	
Loan loss reserves		-11.3619		13.4417*
		(10.650)		(3.814)
Loan loss reserves×Post		-0.5465		-0.4123
		(5.335)		(3.818)
No. of observations	4,458	4,458	405	405
R^2	0.629	0.629	0.168	0.182
Bank controls	Yes	Yes	Yes	Yes
Bank controls×Post	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Segment×quarter FE	Yes	Yes	Yes	Yes
Loan demand			Yes	Yes
Loan demand×Post			Yes	Yes
Survey FE			Yes	Yes
Firm size FE			Yes	Yes

This table shows that our main baseline results are robust to controlling for credit line exposures (defined as amount of off-balance sheet unused C&I loan commitments divided by total assets) and loan loss reserves (divided by total gross loans). The sample period is 2020:Q1-2020:Q3. Specifications are based on the OLS regressions from panel A of baseline Table 3 and Table 4 with the same controls and fixed effects. Standard errors are clustered at the bank-firm level in the Y-14Q H1 data (top panel), at the bank-quarter level in the Y-14Q A9 data (bottom panel, columns 1-2) and the quarter level in the SLOOS data (bottom panel, columns 3-4). *** indicates significance at the 1% level, ** at the 5% level, * at the 10% level, and # at the 15% level. Source: Federal Reserve Main Street Reports to Congress Pursuant to Section 13(3) of the Federal Reserve Act in response to COVID-19 (see link, last report dated April 12, 2021), FR Y-14Q H1 and A9 schedules, Call Report.

Table 10: Ruling Out Confounding Factors: Bank Cyclicality

Dependent variable:	(1)	(2)	(3)	(4)
	Renewals (% loans)		**Originations** (% loans)	
MSLP bank×Post	0.0084***	0.0100***	0.0101***	0.0100***
	(0.003)	(0.003)	(0.003)	(0.003)
Bank cyclicality[1] ×Post	-0.0036***		-0.0019*	
	(0.001)		(0.001)	
Bank cyclicality[2] ×Post		0.0216**		-0.0148*
		(0.010)		(0.008)
No. of observations	78,081	78,081	78,099	78,099
R^2	0.516	0.516	0.566	0.566
Bank controls	Yes	Yes	Yes	Yes
Bank controls×Post	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Borrower×quarter FE	Yes	Yes	Yes	Yes

Dependent variable:	**No. of small business loan accounts (log)**		**Bank tightened C&I lending standards**	
MSLP bank×Post	0.2057***	0.1889***	-0.1625**	-0.1571**
	(0.050)	(0.046)	(0.018)	(0.020)
Bank cyclicality[1] ×Post	0.0444**		-0.0555***	
	(0.019)		(0.003)	
Bank cyclicality[2] ×Post		1.0347		-0.2909*
		(0.786)		(0.077)
No. of observations	4,458	4,458	405	405
R^2	0.629	0.629	0.187	0.173
Bank controls	Yes	Yes	Yes	Yes
Bank controls×Post	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Segment×quarter FE	Yes	Yes	Yes	Yes
Loan demand			Yes	Yes
Loan demand×Post			Yes	Yes
Survey FE			Yes	Yes
Firm size FE			Yes	Yes

This table shows that our main baseline results are robust to controlling for the degree of bank cyclicality. We measure bank cyclicality using quarterly data from the Call Report as the sensitivity of the bank-level C&I loan balances to aggregated banking-system C&I loan balances from two regressions that we run for each bank over the period between 1985:Q1 and 2021:Q2: (1) yearly growth rate of bank-level credit on aggregate credit; and (2) log-log specification of bank-level loan balances on aggregate loan balances. The sample period is 2020:Q1-2020:Q3. Specifications are based on the OLS regressions from panel A of baseline Table 3 and Table 4 with the same controls and fixed effects. Standard errors are clustered at the bank-firm level in the Y-14Q H1 data (top panel), at the bank-quarter level in the Y-14Q A9 data (bottom panel, columns 1-2) and the quarter level in the SLOOS data (bottom panel, columns 3-4). *** indicates significance at the 1% level, ** at the 5% level, * at the 10% level, and # at the 15% level. Source: Federal Reserve Main Street Reports to Congress Pursuant to Section 13(3) of the Federal Reserve Act in response to COVID-19 (see link, last report dated April 12, 2021), FR Y-14Q H1 and A9 schedules, Call Report.

Table 11: Mechanisms—Evidence from Survey Data

Dependent variable:	(1)	(2)	(3)
	Bank cites reason as very important for tightening C&I lending standards:		
	lower risk tolerance	*bank's own capital position*	*bank's own liquidity position*
MSLP bank×Post	-0.3524***	-0.0429	0.0216
	(0.125)	(0.063)	(0.021)
MSLP bank	0.0389	-0.0095	-0.0154
	(0.110)	(0.050)	(0.016)
Observations	103	99	103
R^2	0.171	0.121	0.109
Bank controls	Yes	Yes	Yes
Bank controls×Post	Yes	Yes	-
Loan demand	Yes	Yes	Yes
Loan demand×Post	Yes	Yes	Yes
Survey FE	Yes	Yes	Yes

This table uses survey responses from the Senior Loan Officer Opinion Survey explore the risk aversion and bank balance sheet channels by which MSLP banks may have tightened C&I lending standards less than other banks. The sample only comprises those banks that reported tightening C&I lending standards each quarter and cited reasons why they did so. The dependent variable is given by dummy variables that take value one for those banks that cite any given reason as "very" important in the decision to tighten standards in response to Question 3 of the survey ("If your bank has tightened its credit standards or its terms on C&I loans or credit lines over the past three months, how important have been the following reasons?"). In column one the dependent variable is a dummy that takes value 1 for banks which cited "Reduced tolerance for risk" and in columns 2–3 the dependent variable is a dummy that takes value one for banks which cited a "Deterioration in your bank's current or expected capital position" and "Deterioration in your bank's current or expected liquidity position" as very important reasons for tightening; and zero otherwise. The sample period is 2020:Q1-2020:Q3. Specifications are based on the OLS regressions from columns 1-2 of baseline Table 4 with the same controls and fixed effects. Standard errors are clustered on survey. *** indicates significance at the 1% level, ** at the 5% level, * at the 10% level, and # at the 15% level. Source: Federal Reserve Main Street Reports to Congress Pursuant to Section 13(3) of the Federal Reserve Act in response to COVID-19 (see link, last report dated April 12, 2021), Federal Reserve Senior Loan Officer Opinion Survey, Call Report.

Table 12: Mechanisms—Evidence using Risk Management Index of Banks

Dependent variable:	(1) **Renewals** (% loans)	(2) **Originations** (% loans)	(3) **Bank tightened C&I lending standards**
MSLP bank×Post×Low RMI [1]	-0.0099	0.0292***	-0.1952***
	(0.007)	(0.009)	(0.015)
MSLP bank×Post×High RMI [2]	0.0176***	0.0091**	-0.2407***
	(0.005)	(0.004)	(0.016)
No. of observations	55,265	55,258	175
R^2	0.641	0.751	0.216
p-value t-test Ha: $\|1\| < \|2\|$	0.000	1.000	0.002
Bank controls	Yes	Yes	Yes
Bank controls×Post	Yes	Yes	Yes
Borrower×quarter FE	Yes	Yes	
Bank×borrower FE	Yes	Yes	
Survey FE			Yes
Firm size FE			Yes

This table explores the role of risk aversion as a mechanism for the spillover effects of the MSLP. The measure of risk aversion is the bank-level Risk Management Index (RMI) from Ellul and Yerramilli (2013), which measures the strength of risk management controls during 2011–2013. Banks are split into low versus high RMI based on the sample mean. High RMI banks have stronger and more independent risk management function, as well as lower tail risk, lower delinquencies, and better stock market performance during the global financial crisis, suggesting that they are more risk averse (see Section 7. We also report the p-value of a one-sided t-test of the equality of coefficients across banks against the alternative hypothesis that the coefficient for high-RMI (high risk aversion) banks is larger (in absolute value) than that for low-RMI banks. The sample period is 2020:Q1-2020:Q3. Specifications are based on the OLS regressions from panel A of baseline Table 3 and Table 4 with the same controls and fixed effects, and the difference that they open up the coefficient on MSLP bank×Post by level of RMI. Small business lending results using FR Y-14Q A9 schedule data are not shown as RMI values are available for only 10 BHCs. Standard errors are clustered at the bank-firm level in the Y-14Q H1 data (columns 1-4) and at the survey level in the SLOOS data (column 5). *** indicates significance at the 1% level, ** at the 5% level, * at the 10% level, and # at the 15% level. Source: Federal Reserve Main Street Reports to Congress Pursuant to Section 13(3) of the Federal Reserve Act in response to COVID-19 (see link, last report dated April 12, 2021), FR Y-14Q H1 schedule, Federal Reserve Senior Loan Officer Opinion Survey, Call Report.

Table 13: Mechanisms—Evidence using Bank Balance Sheet Data

Dependent variable:	(1) **Excess capital**	(2) **Equity issuance**	(3) **Cost of capital**	(4) **Deposit share**	(5) **Loan loss reserves**
			A. Renewals (% loans)		
MSLP bank×Post×Constrained [1]	0.0250***	0.0089**	0.0183***	0.0110***	0.0214***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
MSLP bank×Post×Unconstrained [2]	0.0088**	0.0216***	0.0128**	0.0280***	0.0043
	(0.004)	(0.004)	(0.006)	(0.005)	(0.005)
No. of observations	78,081	78,081	77,951	78,081	78,081
R^2	0.517	0.517	0.517	0.517	0.517
p-value t-test Ha: $\|1\| > \|2\|$	0.001	1.000	0.176	1.000	0.001
			B. Originations (% loans)		
MSLP bank×Post×Constrained [1]	0.0137***	0.0146***	0.0148***	0.0151***	0.0122***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
MSLP bank×Post×Unconstrained [2]	0.0143***	0.0136***	0.0120**	0.0117**	0.0187***
	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)
No. of observations	78,099	78,099	77,969	78,099	78,099
R^2	0.566	0.566	0.566	0.566	0.566
p-value t-test Ha: $\|1\| > \|2\|$	0.452	0.413	0.317	0.266	0.135
			C. No. of small business loan accounts (log)		
MSLP bank×Post×Constrained [1]	0.1973***	0.0665	0.1640***	0.1919***	0.2121***
	(0.061)	(0.162)	(0.056)	(0.065)	(0.060)
MSLP bank×Post×Unconstrained [2]	0.1492**	0.1910***	0.2145*	0.1351	0.0780
	(0.067)	(0.051)	(0.116)	(0.108)	(0.079)
No. of observations	4,458	4,458	4,458	4,458	4,458
R^2	0.629	0.629	0.629	0.629	0.629
p-value t-test Ha: $\|1\| > \|2\|$	0.284	1.000	0.353	0.346	0.096
Bank controls	Yes	Yes	Yes	Yes	Yes
Bank controls×Post	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes
Borrower×quarter FE (only panels A-B)	Yes	Yes	Yes	Yes	Yes
Segment×quarter FE (only panel C)	Yes	Yes	Yes	Yes	Yes

This table explores the role of balance sheet constraints as a mechanism for the spillover effects of the MSLP. Banks are split into constrained versus unconstrained banks based on the (above/below sample median) level of excess capital cushions (column 1) in 2020:Q2, total volume of equity issuance during 2020:H1, the weighted average cost of capital on their liabilities (column 3), the share of deposits in total liabilities in 2020:Q2 (column 4), and the level of loan loss reserve in percent of total gross loans in 2020:Q2 (column 5). We also report the p-value of a one-sided t-test of the equality of coefficients across banks against the alternative hypothesis that the coefficient for constrained banks is larger (in absolute value) than that for unconstrained banks. The sample period is 2020:Q1-2020:Q3. Specifications are based on the OLS regressions from panel A of baseline Table 3 with the same controls and fixed effects, and the difference that they open up the coefficient on MSLP bank×Post by bank constraints. Standard errors are clustered at the bank-firm level in the Y-14Q H1 data (panels A-B) and at the bank-quarter level in the Y-14Q A9 data (panel C). *** indicates significance at the 1% level, ** at the 5% level, * at the 10% level, and # at the 15% level. Source: Federal Reserve Main Street Reports to Congress Pursuant to Section 13(3) of the Federal Reserve Act in response to COVID-19 (see link, last report dated April 12, 2021), FR Y-14Q H1 and A9 schedules, Call Report, and SNL Financial.

Internet Appendix for "Motivating Banks to Lend? Credit Spillover Effects of the Main Street Lending Program"

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November 2021

A-I Data Appendix

Data on MSLP Participation and Merging with Call Report We obtained the list of registered banks as of November 24, 2020 from the Federal Reserve Bank of Boston's webpage. We match the list of registered banks with Call Report data (RSSD ID) using information on lender identity and city-state location. 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. Specifically, we perform an approximate 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, Mislang, Shaton and Sicilian, 2018). Then we cross-check all the matches manually to resolve uncertain matches and ensure the accuracy of the data set. Furthermore, we obtain the list of MSLP loan-granting banks and individual loan characteristics (loan amount, MSLP facility under which the loan is granted, borrower identity, city, and state) from the public loan-level disclosures in the Federal Reserve Board's periodic report to Congress, available on the Federal Reserve Main Street webpage (last report dated April 12, 2021). These reports contain banks' RSSD ID.

Y-14Q H1 Schedule Data Filters and Definitions The Y-14Q H1 data we use are restricted to 2020:Q1–Q3 for the baseline analysis (and corresponding quarters for 2018 and 2019 for the placebo test). We constrain the sample such that loan facilities refer to U.S. nonfinancial firms (FR Y-9C field 26 takes value 4). We keep loan terms and lines of credit (field 20 takes values 0 and 17). We drop any syndicated loan facilities that are not closed or settled (values 0 and 4 of the syndicated loan flag). Observations with negative or zero values for committed exposure are dropped. Observations with missing firm identifier are dropped if the firm identifier cannot be inferred from the firm's other loan facilities. The final sample has loan facilities reported by 32 bank holding companies. The two main dependent

variables—both at the bank-firm-quarter level—are defined as follows: (a) renewed (% loans) refers to the share of renewed loans (for which the renewal quarter is the same as the reporting quarter); (b) origination (% loans) refers to the share of newly originated loans (for which the origination quarter is the same as the reporting quarter).

Syndicated Loan Data from Refinitiv's Dealscan and Merging to Call Report Refinitiv Dealscan is a database of large corporate loans, with loan size ranging between $100,000 and $50 billion, of which about two thirds are syndicated. We keep loans extended by U.S. banks to U.S. borrowers; we drop loans that are flagged as cancelled or on-hold. For each individual loan deal we observe the identity of each lender bank (with the portion it contributes to the deal, which is sometimes missing) and the borrower identity, industry, and country. When individual loan shares are missing, we follow Hale, Kapan and Minoiu (2020) and De Haas and Van Horen (2013) and predict them using a regression-based approach. The regression model, which is estimated on the sample of loans with nonmissing shares in the full Dealscan data set, takes as dependent variable the loan share and as explanatory variables the loan amount (log), syndicate size (number of banks), and dummies for loan currency, borrower country, loan type (revolvers with different maturities, term loans, bridge loans, delay-draw term loans, etc.), deal purpose (general corporate purposes/refinance, acquisitions, capital expenditure, leveraged buyouts, real estate loans, working capital, takeovers, etc.), lender role (lead/mandated arranger, bookrunner, syndication agent, documentation agent, administrative agent, and participant), lender country, and year-quarter fixed effects. The model has an adjusted R^2 of 76.34%.

Given that there are no common identifiers between Dealscan and the Call Report, we hand-match the banks between the two data sources. For cross-checks and to resolve uncertain matches, we use the search engine of the Federal Financial Institutions Examination Council (FFIEC) National Information Center (link). In the final data set covering the period between 2020:Q1 and 2020:Q3, we have 262 lead arrangers, of which 51 banks participated in the MSLP.

A-II Validity of SLOOS Survey Responses

In this Appendix we discuss the validity of survey data collected through the Senior Loan Officer Opinion Survey on Bank Lending Practices (SLOOS), which we employ in the paper to examine changes in lending standards at MSLP banks and the mechanisms by which the program may have influenced banks' willingness to lend. Since 1990, the SLOOS collects detailed quarterly information on bank lending decisions from at most 80 large domestic

banks (and more than 20 U.S. branches and agencies of foreign banks, which are not part of our sample). Survey questions cover changes in the standards and terms of the banks' lending and the state of business and household demand for loans. Our analysis uses data from questions that pertain to changes in C&I lending standards, terms, and demand.

The SLOOS incentivizes truthful reporting A key feature of the survey is that it is conducted for purposes of monitoring credit conditions in the banking sector and informing monetary policy. As such, access to the survey is restricted and the microdata are not used for regulatory and supervisory purposes. Furthermore, survey responses are anonymous (and not released to other banks). These design features aim to maximize incentives for truthful reporting from participating banks while ruling out strategic interactions or information manipulation (Paligorova and Santos, 2017).

Changes in lending standards are a good measure of loan supply conditions according to numerous studies. Lown and Morgan (2006) show that shocks to SLOOS-based lending standards are strongly correlated with innovations in bank businss lending and real output; and that lending standards are better predictors of business loan volume and output than are loan rates. After removing from SLOOS lending standards the effect of macroeconomic and bank-specific factors that also affect loan demand, Bassett, Chosak, Driscoll and Zakrajšek (2014) show that changes in lending standards provide an accurate measure of movements in the supply of bank loans available to potential borrowers. In particular, a tightening in lending standards is associated with significant declines in output and credit availability to nonfinancial firms, including a widening of credit spreads. Becker and Ivashina (2014) show that periods when bank credit supply contracts—when firms are more likely to switch from loans to bonds for a new debt issuance—coincide with periods of tightening lending standards in the SLOOS. Niepmann and Schmidt-Eisenlohr (2019) combine SLOOS data with information on loan originations from the Y-14Q H1 schedule and show that an easing of lending standards is associated with more loan originations both in the same quarter and in the following quarter. Indexes of changes in bank lending standards aggregated from survey responses are often used as proxies for changes in credit market conditions (see, e.g., Bates, Neyland and Wang (2018) and Erel, Julio, Kim and Weisbach (2012)).

Survey responses on the reasons for changes in lending standards strongly correlate with objective indicators Data on the reasons cited by banks for changing lending standards are used in several studies, to examine, e.g., changes in risk appetite and liquidity

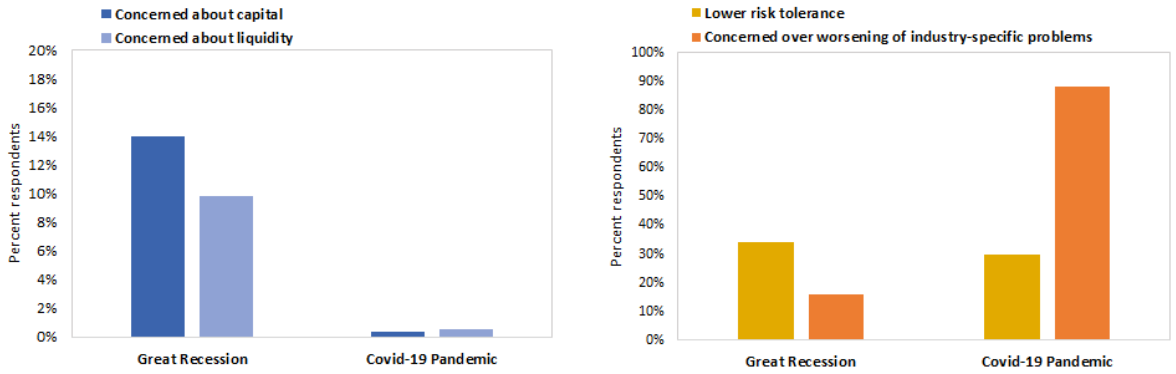
conditions in the secondary market for syndicated credits. Paligorova and Santos (2017) document the risk-taking channel of monetary policy using a measure of bank-level risk appetite that uses information on whether changes in risk tolerance (which we use in Section 7) are a leading factor in the bank's decision to change lending standards. They document that, during periods of monetary policy easing, banks with greater risk appetite take relatively more risk by reducing loan spreads more vis-a-vis riskier borrowers. Niepmann and Schmidt-Eisenlohr (2019) use banks' assessments of how important liquidity in the secondary market for loans was as a reason for changing their own lending standards to relate movements in the U.S. broad dollar index to credit market conditions (as captured by secondary market liquidity). They find that "secondary market illiquidity" responses from the SLOOS are the only reason (among all reasons cited by banks) that correlate with dollar movements.

Comparison of survey responses during Great Recession versus COVID-19 Pandemic To further bolster our confidence that the reasons cited by banks for changing lending standards contain meaningful information, and to gauge if banks are reluctant to acknowledge balance sheet problems, we compare the data for surveys conducted during the Great Recession and COVID-19 crisis. This comparison is informative because the first crisis was rooted in the banking sector while the second one was not. In panel (a) of Figure A1 we report the percentage of banks invoking balance sheet constraints such as the their own current and future capital and liquidity conditions as "very important" reasons for tightening credit standards during the two episodes.[27] We notice that banks were significantly less likely to cite balance sheet constraints during the pandemic than they were during the Great Recession, consistent with the fact that they entered the pandemic crisis with relatively stronger financial positions (Li, Strahan and Zhang, 2020) and were shielded from funding problems (Levine, Lin, Tai and Xie, 2021). If we count concerns that were "somewhat important" as well, then the shares of banks citing these concerns increase to 45% during the Great Recession and 41% during the COVID-19 pandemic for capital. For liquidity, the shares are 38% and 22%, respectively. These findings suggest that there is significant variation in the balance sheet reasons data and that banks do not appear reluctant to express concerns over their own financial strength.

Panel (b) of Figure A1 shows that banks were equally likely to cite lower risk tolerance as a reason behind the tightening in the two crises. However, the pandemic survey witnessed an unusually large share of banks (almost 90%) that reported concerns over a worsening of industry-specific problems (with reference primarily to the industries most affected by

[27] We purposefully ignore the "somewhat important" category in order to make the distinctions starker, but our conclusions carry through if we compare reasons that are "somewhat" or "very" important.

Figure A1: **Reasons for Tightening Lending Standards: A Tale of Two Crises**



(a) Capital and Liquidity Positions

(b) Risk Tolerance and Sectoral Problems

This figure tabulates bank-level responses to survey questions asked in the 2008:Q3 (October) and 2020:Q2 (July) SLOOS. Panel (a) shows the percentage of banks that reported a deterioration in the current or expected capital position and respectively in the current or expected liquidity position as very important reasons for tightening C&I lending standards. Panel (b) shows the percentage of banks that reported reduced tolerance for risk and a worsening of industry-specific problems as as very important reasons for tightening C&I lending standards. See Federal Reserve's September SLOOS for public information about the survey. Source: Federal Reserve Senior Loan Officer Opinion Survey.

the pandemic such as consumer discretionary, transportation, hotels, and leisure). By contrast, the share of banks concerned about sectoral problems was only 16% during the Great Recession, as problems during that crisis were largely confined to the financial sector.

A-III The September 2020 MSLP SLOOS

In this Appendix we describe the September 2020 MSLP SLOOS—the data source for our first instrumental variable—and discuss the factors that constrained program take-up (referenced in Section 2).

The September 2020 MSLP SLOOS was a supplementary survey conducted by the Federal Reserve to understand banks' experiences with the program. The survey opened on August 17, 2020 and closed 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 the program opened for lender registration; 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 banks responded. According to survey responses, 66 banks

had registered by the time of the survey and 22 banks were active MSLP lenders 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).

Why was overall program take-up so low? The data from this special SLOOS helps shed light on the factors that constrained participation. Banks were asked to rate a list of possible reasons why they did not participate 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 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, were also asked to rank the MSLP terms that were unattractive to either the bank or the borrower.

Figure A2 summarizes banks' responses to the survey. Panel (a) lists the reasons cited by nonregistered 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 more 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 nonregistration was more often associated with MSLP requirements being perceived as unattractive to the bank (cited by 72% vs. 59% of nonregistered banks). In contrast, in panel (b), actual lending by registered banks was reportedly deterred by MSLP requirements perceived as unattractive to the borrower (cited by 86% vs. 36% of registered banks).

Turning to other reasons cited for nonparticipation in panel (a), the vast majority of nonparticipating banks indicated that they were able to meet borrower needs outside of the MSLP (94%). Burdensome program registration is cited by 53% of nonregistered banks, suggesting the presence of a non-negligible cost associated with the registration process. In panel (b), other reasons cited by registered banks for not (yet) 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 had not made MSLP loans (yet) 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.

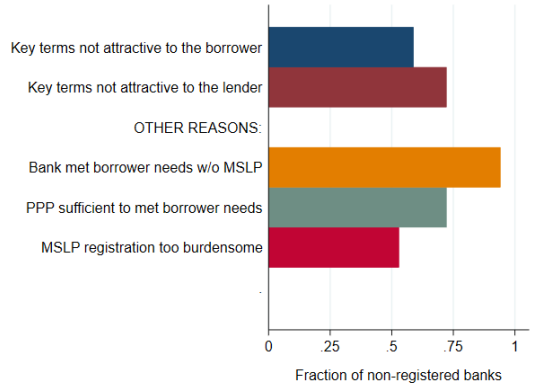
Panels (c) and (d) in Figure A2 focus on the program parameters that banks reported as unattractive to themselves and to potential borrowers. We show the fraction of banks that rate each term as "somewhat important" or "very important" in discouraging participation (in the full sample of respondents). 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, being 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 dampened lender appetite and borrower demand for MSLP loans.

Which firms borrowed in the MSLP? Given 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 actually participated in the program? To answer this question, we use financial data for each borrower as reported by the lenders from the Y-14Q H1 schedule. We conduct an exact and scrubbed string match of MSLP borrowers (using the R package "fedmatch") as listed in the the Federal Reserve Main Street Reports to Congress (dated January 11, 2021) on name and location to the Y-14Q data and obtain 159 MSLP borrowers. Then we examine borrower characteristics at 2019 year-end to avoid any contamination by the pandemic crisis.

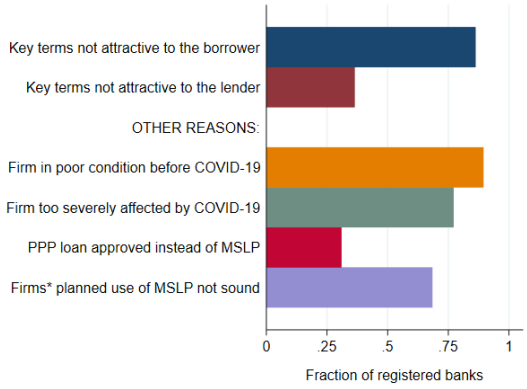
Table A1 compares borrower and loan characteristics of MSLP borrowers to those of firms that were eligible but did not receive an MSLP loan. As discussed in Section 2, the eligibility criteria include annual revenues of up to $5 billion, leverage no higher than 6xEBITDA, and satisfactory creditworthiness. The comparison shows that MSLP borrowers had (statistically significantly) higher leverage, lower interest coverage ratios (reflecting lower ability to meet debt servicing obligations), lower accounts receivable, lower profitability (ROA), lower cash holdings, and lower risk ratings than eligible non-borrowers before the 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 eligible non-borrowers, and that the constraints posed by the MSLP (such as limits on leverage and minimum credit ratings) were more binding to the actual borrowers than to the eligible non-borrowers. Reflecting the overall worse financials, MSLP borrowers had lower duration loans and paid higher spreads on existing bank loans (by 50 bps on average) than other eligible firms. The average MSLP borrower paid 265 bps over LIBOR on outstanding bank

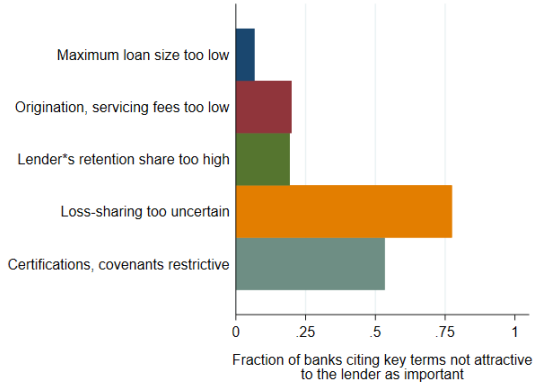
Figure A2: **MSLP Program Design Features Cited by Banks as Too Restrictive**



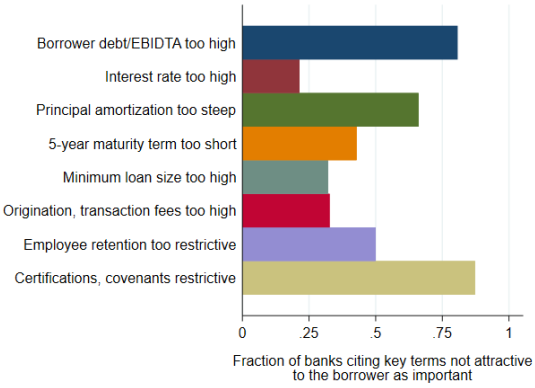
(a) Reasons for not registering



(b) Reasons for not lending



(c) Lender terms discouraging participation



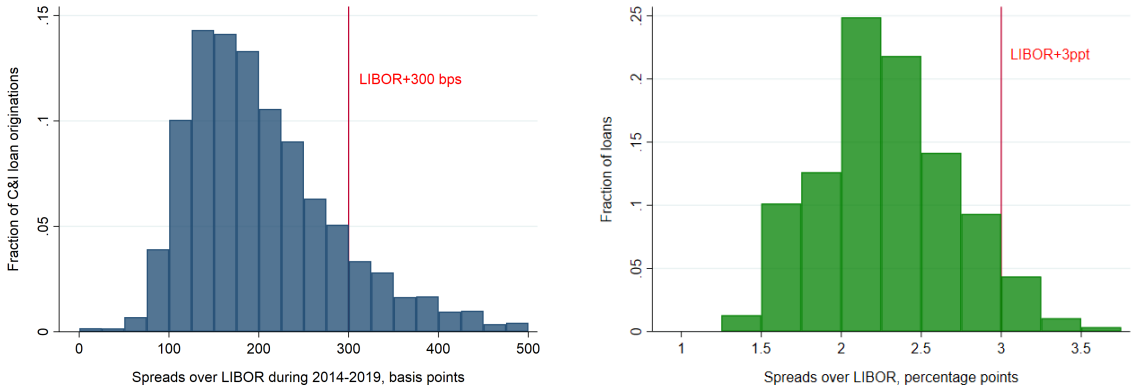
(d) Borrower terms discouraging participation

This figure tabulates bank-level responses to survey questions asked in the September 2020 MSLP SLOOS that examined the determinants of banks' MSLP participation. Panels (a) and (b) show the key terms cited by non-registered and non-lending banks for not registering and not lending, respectively. Panels (c) and (d) show 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 end-August 2020). See Federal Reserve's September 2020 MSLP SLOOS webpage for public information about the survey. Source: Federal Reserve Senior Loan Officer Opinion Survey.

loans in 2019, which suggests that the 300 bps price point of an MSLP loan may have been overly restrictive. To illustrate this point, panel (a) of Figure A3 shows the distribution of spreads on floating-rate C&I loans (indexed to LIBOR during originated during 2014–2019) in the Y-14Q H1 data. The MSLP spread of 300 bps is the 83rd percentile of the historical spread distribution of spreads on C&I loans to large firms. As a complement, loan pricing data from large regional banks, shown in panel (b) of Figure A3, indicates that the 300 bps MSLP spread is even more restrictive for smaller firms (which are more likely to borrow from

regional banks), representing the 95th pctile of the historical spread distribution for bilateral C&I loans during 2012–2020.

Figure A3: 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 the London Interbank Offered Rate (LIBOR)) 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 H1 schedule, Automated Financial Systems (AFS), Federal Reserve.

Table A1: Borrower and loan characteristics by MSLP participation status

	(1)	(2)	(3)	(4)	(5)	(6)
	MSLP borrowers *(N=159)*		**Eligible non-borrowers borrowers** *(N=26,729)*		**p-value t-tests**	
	Means	Medians	Means	Medians	Means	Medians
			A. Borrower Characteristics			
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/ebidta)	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. Loan Characteristics			
log (total commitments $)	16.02	15.96	15.53	15.20	0.00	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

This table reports means and medians for key C&I borrower and loan characteristics for MSLP borrowers and eligible non-borrowers, with p-values for t-tests of equality of means and medians across the two groups using financials data for end-2019. Borrower MSLP eligibility is defined using the following criteria: (i) the firm had 2019 annual revenues of up to $5 billion; (ii) total debt does not exceed 6x the 2019 EBITDA; (iii) internal risk rating equivalent to a "pass" in the FFIEC supervisory rating system (or 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 H1 schedule, Federal Reserve.

A-IV Additional Tables and Figures

Table A2: **MSLP Participation 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
Lender as of Nov 18 2020 (baseline)	181	77	101	63	22	16
Lender before program expiration	304	128	174	119	34	21
Not registered	4628	3917	557	497	43	17
% Registered	11.7%	6.5%	37.6%	33.6%	56.1%	63.8%
% Lender as of Nov 18 2020 (baseline)	29.5%	28.1%	30.1%	25.1%	40.0%	53.3%
% Lender before program expiration	49.5%	46.7%	51.8%	47.4%	61.8%	70.0%
% Not registered	88.3%	93.5%	62.4%	66.4%	43.9%	36.2%

This table shows participation statistics for U.S. banks in the Main Street Lending Program. Size groups are based on total assets at end-2020:Q2. Source: Federal Reserve Bank of Boston and Federal Reserve Main Street Reports to Congress Pursuant to Section 13(3) of the Federal Reserve Act in response to COVID-19 (see link, last report dated April 12, 2021), and Call Report.

Table A3: Descriptive Statistics for Baseline Regression Variables

	(1) N	(2) Mean	(3) St. Dev.	(4) P25	(5) P50	(6) P75
			A. Large business loans (Y14-H1)			
Renewals (% loans)	78,081	0.051	0.212	0.000	0.000	0.000
Originations (% loans)	78,074	0.053	0.203	0.000	0.000	0.000
MSLP bank	78,081	0.442	0.497	0.000	0.000	1.000
Size (log-assets)	78,081	6.316	1.147	5.188	6.190	7.496
Loans/Assets	78,081	0.524	0.126	0.426	0.549	0.630
C&I Loans/Loans	78,081	0.290	0.085	0.222	0.275	0.331
CET1 ratio	78,081	0.126	0.024	0.109	0.123	0.137
Core Deposits/Liabilities	78,081	0.612	0.078	0.570	0.595	0.627
% banks—costly MSLP registration	77,446	0.044	0.204	0.000	0.000	0.000
% banks pledged securities at DW	78,083	0.402	0.490	0.000	0.000	1.000
% banks pledged loans at DW	78,083	0.967	0.179	1.000	1.000	1.000
			B. Small business loans (Y14-A9)			
No. of small business loans	4,458	1532	9933	1.000	5.000	54.000
No. of small bus. loans (log)	4,458	2.606	2.675	0.693	1.792	4.007
MSLP bank	5,760	0.375	0.484	0.000	0.000	1.000
Size (log-assets)	5,760	6.477	9.179	18.620	19.018	19.974
Loans/Assets	5,760	0.196	0.284	0.553	0.635	0.674
C&I Loans/Loans	5,760	0.090	0.134	0.239	0.268	0.320
CET1 ratio	5,760	0.042	0.060	0.109	0.119	0.134
Core Deposits/Liabilities	5,760	0.010	0.026	0.016	0.025	0.035
			C. Survey-based sample (SLOOS)			
Bank tightened C&I loans	405	0.516	0.500	0.000	1.000	1.000
MSLP bank	405	0.331	0.471	0.000	0.000	1.000
Loan demand increased	405	0.240	0.427	0.000	0.000	0.000
Size (log-assets)	405	3.835	1.631	2.602	3.623	4.924
Loans/Assets	405	0.649	0.131	0.602	0.677	0.737
C&I Loans/Loans	405	0.253	0.114	0.167	0.239	0.317
CET1 ratio	405	0.123	0.019	0.110	0.118	0.129
Core Deposits/Liabilities	405	0.599	0.098	0.547	0.594	0.640
% banks - costly MSLP registration	405	0.044	0.206	0.000	0.000	0.000
% banks pledged securities at DW	405	0.395	0.489	0.000	0.000	1.000
% banks pledged loans at DW	405	0.798	0.402	0.000	1.000	1.000

This table shows descriptive statistics for the baseline regression variables. The main MSLP participation variable is a dummy variable for banks that granted MSLP loans as of November 18, 2020 (as discussed in Section 3). Bank balance sheet variables are measured as of 2020:Q2. Balance sheet variables expressed as ratios are winsorized at the 1st and 99th percentiles of their distributions. In panels A and C we report summary statistics for three dummy variables that we use in the instrumentation strategy. Costly MSLP registration is a dummy variable that takes value one for banks which cited burdensome MSLP registration as a reason for not registering, based on survey data from the September 2020 Senior Loan Officer Opinion Survey on Bank Lending Practices (zero otherwise). The dummy variables "pledged securities" or "pledged loans" at discount window (DW) take value one for those banks that had securities collateral or loan collateral, respectively, pledged to the Federal Reserve's discount window during December 1–31, 2019 (zero otherwise). Source: Federal Reserve Bank of Boston and Federal Reserve Main Street Reports to Congress Pursuant to Section 13(3) of the Federal Reserve Act in response to COVID-19 (see link, last report dated April 12, 2021), Federal Reserve Senior Loan Officer Opinion Survey, Federal Reserve Bank of Dallas, and Call Report.

Table A4: Determinants of MSLP Participation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable:	**MSLP bank**							
	Large bank	Large bank	Large bank	Large bank	Large bank	Large bank	Small bank	All banks
Size (log-assets)	0.0519***					0.0571***	0.0112***	0.0264***
	(0.011)					(0.010)	(0.002)	(0.003)
Loans/Assets		0.1393***				0.1673***	0.0536***	0.0492***
		(0.047)				(0.065)	(0.013)	(0.015)
C&I Loans/Loans			0.4816***			0.4120***	0.1622***	0.2153***
			(0.087)			(0.082)	(0.031)	(0.030)
CET1 ratio				-0.3452***		-0.3362**	0.0151	0.0075
				(0.077)		(0.161)	(0.028)	(0.029)
Core Deposits/Liabilities					-0.1149	-0.1573**	-0.0648***	-0.0711***
					(0.074)	(0.076)	(0.021)	(0.023)
Observations	892	892	885	892	892	885	4,104	4,989
R^2	0.045	0.005	0.042	0.008	0.008	0.100	0.045	0.087

This table reports results of linear probability models relating MSLP participation to bank characteristics. The dependent variable is a dummy variable that takes value one for MSLP lenders. The sample comprises large banks (with assets in excess of $1 bn in columns 1-3), all banks with asset information in the Call Report in column 7, and small banks with assets less than $1 bn in column 8. Bank balance sheet variables are measured as of 2020:Q2. The sample period is 2020:Q1-2020:Q3. Standard errors are clustered at the bank level. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level. Source: Federal Reserve Main Street Reports to Congress Pursuant to Section 13(3) of the Federal Reserve Act in response to COVID-19 (see link, last report dated April 12, 2021), and Call Report.

Table A5: Pandemic Intensity and Labor Market Conditions as Determinants of MSLP Participation

Dependent variable:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
						MSLP bank						
Exposure to pandemic intensity												
COVID-19 infections (Mar 1-Dec 15) 1/	-0.3560											
	(0.506)											
COVID-19 infections (Mar 1-Dec 15) 2/		-0.0005										
		(0.001)										
COVID-19 infections (Mar 1-Aug 30) 2/			-0.0012									
			(0.002)									
Exposure to labor market conditions												
UI claims per mil people				0.0982								
				(0.181)								
Peak unemployment over Jan-Nov 2020					-0.0597							
					(0.333)							
Change in UR, ppts, Jan-Nov 2020						0.0001						
						(0.007)						
Exposure to small business conditions												
% Small firms missed loan payments							-0.1205					
							(0.231)					
% Small firms unmet demand through PPP								0.1801				
								(0.404)				
% Small firms affected by COVID									-0.2467			
									(0.282)			
% Small firms experienced revenue drop										-0.2966		
										(0.309)		
% Small firms permanently closed											-0.0895	
											(0.133)	
% Small firms temporarily closed												-0.1642
												(0.249)
Observations	879	882	882	882	882	882	882	882	882	882	882	882
R^2	0.101	0.101	0.101	0.100	0.100	0.100	0.100	0.100	0.102	0.102	0.101	0.101
Bank controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

This table reports results of linear probability models relating MSLP participation to bank characteristics and local economic conditions facing banks, as captured by pandemic intensity, exposure to labor market conditions, and exposure to small business conditions. All variables are computed at the bank level by weighting COVID-19 cumulative case infections (at the county level in 1/ or state level in 2/ and over different type periods), labor market condition variables (unemployment claims, unemployment rates, and the changes in unemployment), and respectively variables on financing conditions of small businesses across locations by banks' own deposits shares in those locations (where deposit shares in each county or state are measured in June 2019). The sample period is 2020:Q1-2020:Q3. Standard errors are clustered at the bank level. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level. Source: Federal Reserve Main Street Reports to Congress Pursuant to Section 13(3) of the Federal Reserve Act in response to COVID-19 (see link, last report dated April 12, 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 A6: Robustness—Expanding the Sample to 2020:Q4

Dependent variable:	(1) **Renewals (% loans)**	(2) **Originations (% loans)**	(3) **No. of small business loans (log)**
MSLP bank×Post	0.00815***	0.0168***	0.1093#
	(0.00283)	(0.00286)	(0.080)
No. of observations	103,851	103,821	5,971
R^2	0.578	0.520	0.635
Bank controls	Yes	Yes	Yes
Bank controls×Post	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes
Borrower×quarter FE	Yes	Yes	
Segment×quarter FE			Yes

This table shows that our main baseline results are broadly robust to extending the sample period by an additional quarter 2020:Q4. Nevertheless, the results are slightly weaker than in the baseline analysis as the program's termination by December 31, 2020 was announced on November 18 2020, effectively removing the backstop. The sample period is 2020:Q1-2020:Q4. Specifications are based on the OLS regressions from panel A of baseline Table 3 with the same controls and fixed effects. Standard errors are clustered at the bank-firm level in the Y-14Q H1 data (columns 1-2) and at the bank-quarter level in the Y-14Q A9 data (column 3). *** indicates significance at the 1% level, ** at the 5% level, * at the 10% level, and # at the 15% level. Source: Federal Reserve Main Street Reports to Congress Pursuant to Section 13(3) of the Federal Reserve Act in response to COVID-19 (see link, last report dated April 12, 2021), FR Y-14Q H1 and A9 schedules, Call Report.

Table A7: Robustness—Alternative MSLP Participation Variables

Definition of MSLP participation:	(1) **Lender** end-Sep	(2) **Lender** end-Oct	(3) **Lender** end-Nov	(4) **Registered**
		A. Renewals (% loans)		
MSLP bank×Post	0.0216***	0.0150***	0.0132***	0.0975***
	(0.004)	(0.004)	(0.003)	(0.013)
No. of observations	78,081	78,081	78,081	78,081
R^2	0.517	0.517	0.517	0.518
		B. Originations (% loans)		
MSLP bank×Post	0.0131***	0.0117***	0.0142***	0.0071
	(0.004)	(0.003)	(0.003)	(0.009)
No. of observations	78,099	78,099	78,099	78,099
R^2	0.566	0.566	0.566	0.566
		C. No. of small business loans (log)		
MSLP bank×Post	0.1320**	0.0904*	0.1118*	0.8553#
	(0.062)	(0.048)	(0.056)	(0.694)
No. of observations	4,458	4,458	4,458	4,458
R^2	0.628	0.628	0.628	0.628
Bank controls	Yes	Yes	Yes	Yes
Bank controls×Post	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Borrower×quarter FE (only panels A-B)	Yes	Yes	Yes	Yes
Segment×quarter FE (only panel C)	Yes	Yes	Yes	Yes

This table shows that our main baseline results are robust to alternative classifications of MSLP banks, specifically banks that granted loans before end-September 2020 (column 1), end-October 2020 (column 2), end-November 2020 (column 3), and all registered banks (column 4). The sample period is 2020:Q1-2020:Q3. Specifications are based on the OLS regressions from panel A of baseline Table 3 with the same controls and fixed effects. Standard errors are clustered at the bank-firm level in the Y-14Q H1 data (panels A-B) and at the bank-quarter level in the Y-14Q A9 data (panel C). *** indicates significance at the 1% level, ** at the 5% level, * at the 10% level, and # at the 15% level. Source: Federal Reserve Main Street Reports to Congress Pursuant to Section 13(3) of the Federal Reserve Act in response to COVID-19 (see link, last report dated April 12, 2021), FR Y-14Q H1 and A9 schedules, Call Report.

Table A8: Robustness—Measure Capital Constraints with Capital Buffer

Dependent variable:	(1) (2) **Renewals** (% loans)		(3) (4) **Originations** (% loans)		(5) **No. of small business loans (log)**
			A. Capital buffer as additional control		
MSLP bank×Post	0.0186***	0.0173***	0.0158***	0.0125***	0.1710***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.046)
No. of observations	78,081	75,823	78,099	75,829	4,458
R^2	0.517	0.688	0.566	0.739	0.629
			B. Capital buffer replaces CET1 ratio		
MSLP bank×Post	0.0162***	0.0149***	0.0142***	0.0104***	0.1851***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.046)
No. of observations	78,081	75,823	78,099	75,829	4,458
R^2	0.517	0.688	0.566	0.739	0.629
Bank controls	Yes	Yes	Yes	Yes	Yes
Bank controls×Post	Yes	Yes	Yes	Yes	Yes
Borrower×quarter FE	Yes	Yes	Yes	Yes	
Bank FE	Yes	Yes	Yes	Yes	Yes
Bank×borrower FE		Yes		Yes	
Segment×quarter FE					Yes

This table shows that our main baseline results are robust to both introducing excess capital buffers as an additional control (panel A) and to replacing the CET1 regulatory capital ratio with the excess capital buffers (panel B). Following Berrospide, Gupta and Seay (2021), excess capital buffers are defined as excess capital held by the bank above the regulatory requirements (4.5% for all banks) and regulatory capital buffers (ranging between 2.5% and 7% depending on the bank's risk profile). The sample period is 2020:Q1-2020:Q3. Specifications are based on the OLS regressions from panel A of baseline Table 3 with the same controls and fixed effects. Standard errors are clustered at the bank-firm level in the Y-14Q H1 data (columns 1-4) and at the bank-quarter level in the Y-14Q A9 data (column 5). *** indicates significance at the 1% level, ** at the 5% level, * at the 10% level, and # at the 15% level. Source: Federal Reserve Main Street Reports to Congress Pursuant to Section 13(3) of the Federal Reserve Act in response to COVID-19 (see link, last report dated April 12, 2021), FR Y-14Q H1 and A9 schedules, Call Report.

Table A9: Spillover effects of MSLP on C&I loan terms: Evidence from survey data (2SLS estimates)

Dependent variable:	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Bank reports tightening the following terms of C&I lending						
	Maximum CL capacity	Maximum maturity	Cost of credit lines	Loan spreads	Premia on riskier loans	Loan covenants	Collateral require-ments
MSLP bank×Post	-0.0106	-0.0567	-0.6843**	-0.6763***	-0.3756***	0.5942	-0.8423***
	(0.247)	(0.256)	(0.309)	(0.025)	(0.092)	(0.659)	(0.288)
Observations	404	404	401	404	405	404	401
R^2	-	-	-	-	-	-	-
F-stat first stage MSLP bank×Post	14.46	13.62	14.65	14.46	13.28	13.35	13.39
Bank controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank controls×Post	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan demand	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan demand×Post	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Survey FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm size FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

This table shows 2SLS estimates for the spillover effects of the MSLP on the terms of new C&I loans and credit lines using bank-level responses from the Federal Reserve Senior Loan Officer Opinion Survey. As in Table 7, the dependent variable takes value one if the bank reports tightening lending terms "somewhat" or "significantly" on approved C&I loans and credit lines in any given quarter over the period 2020:Q1-2020:Q3 in responding 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?"). The lending terms are indicated as column headings. The variable MSLP bank×Post is instrumented with dummy variables taking value one for those banks that reported not participating in the MSLP due to burdensome registration (zero otherwise) and those banks that are familiar with the Federal Reserve in that they are eligible to borrow from the discount window and have pledged loans or securities as collateral at the discount window at any time during December 1–31, 2019 (zero otherwise). The instruments enter in levels and interactions with ×Post and each other. Survey responses are collected separately in regards to large and small firms (defined as having annual sales below $50 million) and are pooled such that the data are at the bank-firm size-survey level. Specifications are based on the regressions from baseline Table 7 with the same controls and fixed effects. The coefficient on "MSLP bank" is estimated but not shown. Standard errors are clustered on survey. *** indicates significance at the 1% level, ** at the 5% level, * at the 10% level, and # at the 15% level. Source: Federal Reserve Main Street Reports to Congress Pursuant to Section 13(3) of the Federal Reserve Act in response to COVID-19 (see link, last report dated April 12, 2021), Federal Reserve's Senior Loan Officer Opinion Survey, Call Report.

Table A10: Robustness—Control for PPP Loan Balances

Dependent variable:	(1)	(2)	(3)	(4)	(5)	(6)
	Renewals (% loans)		**Originations (% loans)**		**No. of small business loans (log)**	
MSLP bank×Post	0.0148***	0.0138***	0.0127***	0.0101***	0.1928***	0.1919***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.057)	(0.056)
PPP loans/assets 2020:Q2×Post	1.1934***		0.8345***		-3.8696	
	(0.258)		(0.233)		(3.332)	
PPP loans/assets 2020:Q3×Post		1.226***		0.432**		-3.7486
		(0.264)		(0.200)		(3.267)
No. of observations	78,081	75,823	78,099	75,829	4,458	4,458
R^2	0.517	0.688	0.566	0.739	0.629	0.629
Bank controls	Yes	Yes	Yes	Yes	Yes	Yes
Bank controls×Post	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Borrower×quarter FE	Yes	Yes	Yes	Yes		
Segment×quarter FE					Yes	Yes

This table shows that our main baseline results are robust to the introduction of PPP loan balances (as a share of total assets) as an additional control. Specifications are based on the OLS regressions from panel A of baseline Table 3 with the same controls and fixed effects. The sample period is 2020:Q1-2020:Q3. Standard errors are clustered at the bank-firm level in the Y-14Q H1 data (columns 1-4) and at the bank-quarter level in the Y-14Q A9 data (columns 5-6). *** indicates significance at the 1% level, ** at the 5% level, * at the 10% level, and # at the 15% level. Source: Federal Reserve Main Street Reports to Congress Pursuant to Section 13(3) of the Federal Reserve Act in response to COVID-19 (see link, last report dated April 12, 2021), FR Y-14Q H1 and A9 schedules, Call Report.

Table A11: Mechanisms—Additional Evidence from Survey Data

Dependent variable:	(1)	(2)	(3)	(4)
	Bank cites each reason below as very important for tightening C&I lending standards:			
	less favorable economic outlook	*secondary market illiquidity*	*industry specific problems*	*legislative & regulatory changes*
MSLP bank×Post	-0.0990	-0.1108	0.0084	-0.1681
	(0.198)	(0.085)	(0.157)	(0.117)
MSLP bank	0.0786	0.0520	0.0977	-0.0202
	(0.067)	(0.060)	(0.103)	(0.072)
Observations	104	104	104	103
R^2	0.098	0.149	0.122	0.165
Bank controls	Yes	Yes	Yes	Yes
Bank controls×Post	Yes	Yes	Yes	Yes
Loan demand	Yes	Yes	Yes	Yes
Loan demand×Post	Yes	Yes	Yes	Yes
Survey FE	Yes	Yes	Yes	Yes

This table uses additional survey responses from the Senior Loan Officer Opinion Survey to rule out additional channels by which MSLP banks may have tightened C&I lending standards less than other banks. The sample only comprises those banks that reported tightening C&I lending standards each quarter and cited reasons why they did so. The dependent variable is given by dummy variables that take value one for those banks that report the following reasons as "very" important in their decision to tighten lending standards in response to Question 3 of the survey ("If your bank has tightened its credit standards or its terms on C&I loans or credit lines over the past three months, how important have been the following reasons?"): less favorable or more uncertain economic outlook (column 1), decreased liquidity in the secondary market for these loans (column 2), worsening of industry-specific problems (column 3), and increased concerns about the effects of legislative changes, supervisory actions, or changes in accounting standards (column 4); and zero otherwise. The sample period is 2020:Q1-2020:Q3. Specifications are based on the OLS regressions from columns 1-2 of baseline Table 4 with the same controls and fixed effects. Standard errors are clustered on survey. *** indicates significance at the 1% level, ** at the 5% level, * at the 10% level, and # at the 15% level. Source: Federal Reserve Main Street Reports to Congress Pursuant to Section 13(3) of the Federal Reserve Act in response to COVID-19 (see link, last report dated April 12, 2021), Federal Reserve Senior Loan Officer Opinion Survey, Call Report.