Financial Intermediation through Financial Disintermediation: Evidence from the ECB Corporate Sector Purchase Programme*

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Abstract

We study the spillover effects of financial disintermediation in the corporate sector on the supply of credit to small and medium enterprises (SMEs). We find that direct central-bank lending to large corporations induces banks to increase lending to SMEs by 10 percent and that this effect is stronger for liquidity-constrained banks. SMEs are also more likely to forge new banking relationships and access credit more cheaply. Finally, SMEs seem to use the additional credit for investment and hiring purposes. We verify that these inferences are not due to changing economic fundamentals or selection effects in central-bank financing.

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Small- and medium-sized enterprises (SMEs) are the backbone of an economy. They account for a vast majority of the number of firms and contribute heavily to output and employment.[1] However, SMEs have comparatively limited access to credit, are highly dependent on bank financing, and are thus disproportionately more exposed to credit market fluctuations (e.g., Berger and Udell, 1998, 1995; Petersen and Rajan, 1994). SMEs' dependence on bank lending impedes their potential for growth and remains a crucial concern that academics and regulators have studied for decades (e.g., Beck, Demirgüç-Kunt, and Maksimovic, 2005; Berger and Udell, 2006; Carbó-Valverde, Rodríguez-Fernández, and Udell, 2016; DeYoung et al., 2015). Moreover, SME credit access contracted substantially during the financial crisis and did not fully recover in the aftermath (Bord, Ivashina, and Taliaferro, 2017; Chen, Hanson, and Stein, 2017; Ferrando, Popov, and Udell, 2017). Accordingly, policymakers and regulators search for policy tools that can increase the supply of bank credit to SMEs.

Typically, these tools aim to increase banks' willingness to lend to small businesses by making this type of lending more attractive to banks. For instance, regulatory authorities might engage in risk-sharing or provide direct credit guarantees to stimulate bank lending (Beck, Klapper, and Mendoza, 2010). Likewise, policymakers may choose to extend long-term financing to lenders under the explicit condition that banks pass on these funds to designated borrowers, such as consumers and small businesses (as reported in the ECB Economic Bulletin, no 7, 2015). Despite the appeal of these measures, they do not monitor banks or provide them with direct incentives to engage in new lending (Duchin and Sosyura, 2014; Stern and Feldman, 2014). Furthermore, these actions do not seem to create the desired boost to the supply of bank credit to SMEs.

In this paper, we examine whether regulator-led financial disintermediation in non-SME credit enhances financial intermediation in the SME sector. The potential mechanism here is that central banks could induce banks to extend more credit to small businesses by making large

[1] Ninety nine percent of U.S. and European companies are SMEs. SMEs are also responsible for two-thirds of employment and an even larger fraction of new jobs. https://web.archive.org/web/20180212010528/https://ec.europa.eu/growth/smes_en.

corporate loans less attractive to banks, which would reduce the opportunity cost of lending to SMEs. To investigate how financial disintermediation in large corporate credit markets affects the availability and cost of bank financing to SMEs, we exploit a major monetary policy intervention by the European Central Bank (ECB). In particular, we study the ECB's latest outright asset purchase program, the Corporate Sector Purchase Programme (CSPP), launched in June 2016. Under this program, member central banks purchase non-financial investment-grade corporate bonds in the primary and secondary markets, thus circumventing the banking channel of financial intermediation.[2]

Why would financial disintermediation for a group of borrowers facilitate financial intermediation for another group of borrowers? The ECB argues that the CSPP would increase the supply and liquidity of credit in the economy, reducing the cost of debt for eligible firms and allowing them to rely (more) on bond financing.[3] As a result, banks with affected corporate borrowers would experience a reduction in demand for their loans from the corporate sector and smaller yields.[4] The reduced demand by corporate customers could increase banks' willingness to lend to SMEs. As SMEs are typically a part of banks' commercial lending portfolio, they provide a natural substitute to large corporate loans. On the other hand, banks might not respond to a decline in large corporate lending by enhancing the credit supply to SMEs. Instead, they might resort to distributing dividends, investing in non-loan assets, or steering toward other types of loans, such as mortgages (Chakraborty, Goldstein, and MacKinlay, 2017). Thus, it is unclear *a priori* whether regulator-led financial disintermediation is an effective tool that can induce banks to increase lending to SMEs.

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[2] The official decision can be found at http://www.ecb.europa.eu/ecb/legal/pdf/celex_32016d0016_en_txt.pdf. For details, see the Committee on Economic and Monetary Affairs Dialogue with Mario Draghi (November 28, 2016, and November 20, 2017). Also, see Mr. Draghi's letter to the European Parliament dated November 8, 2017 at https://web.archive.org/web/20180515131725/https://www.ecb.europa.eu/pub/pdf/other/ecb.mepletter171108_S&D_Members.en.pdf?1bd55d50ff259f3d781%205fdfd508f7566.

[3] See, for example, https://www.ecb.europa.eu/pub/pdf/other/ecb.mepletter170626_several_meps.en.pdf.

[4] Typically, the definition of banks' aggregate corporate lending includes SME loans as well. Throughout the paper, we delineate large corporate borrowers and SMEs as two separate categories.

The CSPP setting offers a number of unique advantages for testing our research question. First, unlike other unconventional asset purchase programs and refinancing operations pursued by the ECB or other central banks, the CSPP is a novel example of direct central-bank lending to nonfinancial corporations.[5] Second, with total bond purchases of more than €167 billion as of August 2018, the program is an economically significant intervention in the commercial credit markets, potentially affecting the population of firms rather than a few specific borrowers.[6] Third, we can examine a variety of data essential to rigorously study credit supply and spillover effects of financial disintermediation. For example, in contrast to other monetary policy interventions, in which identities of targeted banks and firms often remain undisclosed, information on bonds purchased under the CSPP is made public by the Eurosystem. Similarly, identifying SMEs' credit access and their use of obtained funds is an empirical challenge that we overcome by using extensive ECB survey data for SMEs.

As a starting point, we investigate whether affected banks respond to the program by reallocating funding towards SMEs. We utilize the European Banking Association's (EBA) Transparency Exercise disclosures, whose granular details on banks' asset composition allow us to distinguish SME lending from large corporate lending. Consistent with the Eurosystem's direct lending to corporations, which enhances financial intermediation in the SME sector, we find that, relative to a control group, banks directly affected by financial disintermediation—i.e., banks whose borrowers benefited from the CSPP—increase their SME exposures by 12 percent relative to the sample standard deviation.

[5] Other outright asset purchases by the ECB are the currently active Public Sector Purchase Programme (PSPP), Asset-Backed Securities Purchase Programme (ABSPP), and the third Covered Bond Purchase Programme (CBPP3), as well as the terminated Securities Market Programme (SMP) and the first two Covered Bond Purchase Programmes (CBPP and CBPP2). By refinancing operations, we mean the ECB's non-traditional repo activities, including the Long-Term Refinancing Operations (LTRO) and the targeted Longer-Term Refinancing Operations (TLTRO I and II).

[6] We choose the CSPP as our setting because of its economic significance and because it provides us with the necessary data to examine our research question. We note, however, that the CSPP is not the only corporate bond purchase program in history. In fact, the Bank of England (BOE) and the Bank of Japan (BOJ) have conducted similar operations. These activities, however, were limited to secondary market purchases and were significantly smaller in magnitude (BOE's cumulative purchases amount to some 11 billion euros, while BOJ's monthly purchases are less than 1 billion euros). As for other programs pursued by central banks to date, the CSPP is fundamentally different from the ECB's SMP and the Federal Reserve's large-scale asset purchases, which targeted financial entities only.

The bank-level analysis provides evidence of a link between affected banks and SME borrowing. However, inferences based on equilibrium lending or borrowing are confounded and thus insufficient to determine the efficacy of financial disintermediation policies in corporate credit markets. A positive association between ECB bond purchases and ineligible firms' access to financing could be driven by local economic trends or demand shocks rather than the CSPP.[7] We overcome this simultaneity problem by examining the EC/ECB Survey of Access to Financing by Enterprises (SAFE, or the Survey, hereafter).

The Survey has been conducted semi-annually since 2009 and includes a series of questions to small businesses to understand their financing conditions and expectations, as well as operational decisions.[8] It also has anonymized firm identifiers and does not include links between banks and borrowers. Due to this limitation and because the effects of the CSPP are likely to extend beyond relationship lending, as the basis of our analysis, we posit that the benefits of the CSPP accrue to small businesses in a given industry-region. This definition is consistent with local features of the SME sector and is also supported by prior work, which documents that companies in the same industries and regions compete for funds (e.g., Cetorelli and Strahan, 2006). Our analysis of a sample of more than 11,000 SME-half-year observations provides inferences consistent with the CSPP's positive effects spilling over to small businesses: SMEs in affected country-industry grids receive more bank credit, *conditional on* applying for a loan. Economically, the likelihood of SMEs receiving full financing conditional on applying for a loan increases by up to 4 percent, which represents 10 percent of the sample standard deviation.

Another crucial problem that remains even after we focus on a loan application dataset is the channel through which financial disintermediation operates. The aim of our study goes beyond just a policy evaluation—if we wanted to assess the impact of the CSPP, our evidence above would be sufficient. Instead, we aim to answer a bigger economic question about the role

[7] To sidestep this problem, one can resort to cross-sectional analyses by linking eligible borrowers to non-eligible borrowers in various ways, including sharing the same bank, industry, or geographical region. Since these links would also be affected by changes in credit demand, any such inferences would remain confounded and misleading.

[8] For further details on the Survey, see https://www.ecb.europa.eu/stats/ecb_surveys/safe/html/index.en.html.

of financial disintermediation, using the CSPP as an experimental laboratory. For this reason, we need to establish that the enhanced credit access by SMEs is driven by banks' increased willingness to lend to SMEs, rather than omitted economic factors. These confounding effects could be two-fold. First, if CSPP purchases target booming country-industry grids, suggesting the CSPP might not have a causal effect on SMEs and might be susceptible to a selection bias.[9] Alternatively, the CSPP might indeed have a causal effect on SMEs, but this effect operates through the strengthening of the corporate sector. The following example clarifies this explanation. Suppose CSPP purchases have been relatively large in the German automobile manufacturing industry (say, affecting Volkswagen), and suppose we find a relative increase in the access to credit by German SMEs in the automotive sector. The lingering, yet critical, concern is that financing to these SMEs increases not because banks are more willing to lend but simply because Volkswagen's access to additional cheaper capital increases the investment and growth opportunities of German automotive sector SMEs, which do business with Volkswagen. These two issues remain a concern even if we focus on a subset of SMEs that have applied for bank financing because, in these cases, banks increase SME lending not because they are *more willing* to lend but because the average applicant SME has better fundamentals.

To address these issues, we adopt a two-pronged approach. First, we examine SMEs' perceptions on non-bank financing, including trade credit and leasing. If SMEs that are classified to have been affected by the corporate-sector financial disintermediation also enjoy improvements in fundamentals and get more bank credit as a result, then these SMEs should be confident about all types of external financing.[10] Our tests, however, show that this is not the case. Second, we also isolate the effect of financial disintermediation incremental to bond issuance. If our inferences are an artifact of regional or sectoral dynamics rather than the ECB's

[9] We focus our analysis on the direct impact of the CSPP by identifying the ECB's purchases of corporate bonds in the primary market. We find that more than 80% of eligible bonds issued in the primary market are purchased under the program. In addition to our empirical identification strategy, this fact also gives us some comfort that the ECB is not cherry-picking bonds in a particular sector or region of the European Union.

[10] Note that these tests examine SMEs' perceptions; not actual financing. This is an important distinction, as realized financing decisions may be insufficient evidence as they are affected by the pecking order of external financing.

actions, CSPP purchases should have no impact on SME credit access once we account for the amount of corporate bond issuance in that country-industry grid. After all, bond issuances in a particular region or sector should be a better indicator of improved economic conditions than ECB's primary market purchases. We find, however, that purchases under the CSPP continue to explain a significant amount of variation in SME credit access after controlling for bond issuance.[11] This result also allows us to rule out that the increased access of SMEs to financing is only due to decreasing bond yields, and consequently increased reliance and issuance of bonds. Finally, in additional analyses, we also provide direct evidence that our inferences are not driven by other measures implemented by the ECB (e.g., TLTRO).

Why did banks refrain from lending to SMEs before the CSPP? Our findings are consistent with the hypothesis that frictions in the pre-CSPP period, such as liquidity constraints, prevented banks from lending to SMEs. In particular, we observe that our main results are stronger for (or primarily driven by) banks with liquidity constraints in the pre-CSPP period. This inference is consistent with the interpretation that an exogenous decline in large corporate borrowing frees up the balance sheet of constrained banks and induces them to switch to SME lending (Jiménez et al., 2014; Kashyap and Stein, 2000).[12] It could also be the case that the enhanced post-CSPP lending to SMEs is not a positive NPV project for banks. This concern is consistent with Heider, Saidi, and Schepens (2017), who find that the negative policy rates recently observed in the EU resulted in banks offering loans to overly risky borrowers. We find, however, that the subsequent level of nonperforming SME loans of affected banks is no different from that of unaffected banks. Therefore, our findings are in line with the interpretation that financial disintermediation in the corporate sector removes frictions in the credit market for SMEs by easing liquidity constraints for previously constrained banks.

[11] Similarly, our additional placebo tests focusing on the period prior to the CSPP's implementation also confirm our conclusions that it is CSPP purchases rather than other trends in the data that drive our results.

[12] In contrast to concurrent work on CSPP (e.g., Grosse-Rueschkamp, Steffen, and Streitz, 2018), we do not observe stronger effects for capital-constrained banks. This insignificant result is intuitive because SMEs (or even speculative corporates) would require a larger risk weight allocation than investment-grade corporates, rendering an increase in lending to SMEs particularly difficult for capital-constrained banks. Our findings are also in line with Schwert (2018), who shows that bank-dependent borrowers are more likely to borrow from well-capitalized banks.

Next, we identify whether banks increase lending to existing borrowers or form new lending relationships. We examine this question using a novel dataset we construct using bank–borrower links from the Bureau van Dijk Amadeus Bankers. We find that SMEs in the industry-region grids affected by the CSPP are more likely to get credit and form new banking relationships. Economically, a one standard deviation increase in bond purchases increases ineligible borrowers' probability of forging a new borrowing relationship by 1 percent, which corresponds to almost 20 percent of the sample mean likelihood of forming a new banking relationship.

We supplement our inferences on credit supply and lending relationships by using a large sample of SME loan-level data, which allows us to evaluate key loan terms extracted from credit contracts.[13] We examine changes in the cost of debt overall as well as zombie lending. We measure zombie lending as loans with low interest rates but high loss-given-default estimates and show that instances of zombie lending decrease in the industry-region grids affected by the CSPP. Furthermore, we also investigate whether SMEs report a lower cost of financing following the introduction of the CSPP. We find that SMEs in industry-regions that are more exposed to CSPP purchases are also more likely to report a reduction in interest costs. SMEs are also less likely to refuse a loan because the offered interest rate is too high. Our results suggest that financial disintermediation in the corporate sector leads to a reduction in the cost of borrowing for SMEs. This finding is in line with the view that the additional funds provided by regulators lower the cost of credit in the corporate bond markets, inducing banks to reduce their interest margins.

Finally, we shift our focus to real effects. Prior literature documents that when banks deny credit to borrowers, this often leads to negative consequences for firms and ultimately the overall economy (Berg, 2018; Bernanke, 1983). Our setting allows us to measure whether SMEs

[13] The loan-level data comes from the European DataWarehouse (ED). ED is a data repository that has collected and provided loan-level information on securitized SME loans in Europe since 2013. See Balakrishnan and Ertan (2018) and Ertan, Loumioti, and Wittenberg-Moerman (2017) for prior work that utilizes this loan-level data. Regulatory details can be found at https://www.ecb.europa.eu/paym/coll/loanlevel/html/index.en.html.

use increased access to financing to fund their real activities. In particular, we investigate the impact on capital investment and employment. We find that SMEs in the country-industry grids affected by the CSPP are more likely to use newly obtained bank financing to increase capital investment and hire more employees, rather than to finance working capital or refinance their existing debt. These inferences are consistent with central bank lending in the large corporate sector boosting the real activities of SMEs. We also investigate the real effects of financial disintermediation on banks. In keeping with enhanced SME lending entailing greater lender-borrower interaction and more monitoring, we find a relative increase in affected banks' number of branches and employees.

The rest of this paper is organized as follows. In the next subsection, we discuss the related literature and our contribution. In Section I, we describe the CSPP and other relevant ECB programs in more detail. In Section II, we discuss our sample construction, and in Section III, we present our empirical methodology and findings. Finally, we conclude in Section IV.

A. Related Literature

Our paper contributes to several strands of the literature. The inferences we present shed new light on the financing and operating activities of small businesses. SMEs are a crucial engine of economic growth and are heavily bank-dependent, yet they face considerable obstacles to access financing (World Bank, 2013). Prior studies offer a variety of solutions to the SME financing problem: public credit guarantees (Beck et al., 2010), lenders' information sharing (Pagano and Jappelli, 1993), stronger property rights (Beck, Demirgüç-Kunt, and Maksimovic, 2008), more effective collateral regulations (Calomiris et al., 2017; Campello and Larrain, 2016), and more efficient technologies, which facilitate transactional lending (de la Torre, Martínez Pería, and Schmukler, 2010). Berger and Udell (2006) identify asset-based lending, factoring, small business credit scoring, and trade credit as potential remedies that can be used to bridge the SME financing gap. Our conclusions extend this literature by suggesting that regulator-led financial disintermediation in the corporate sector could be an effective way of inducing banks

to increase lending to small businesses, which remains (or becomes) an attractive investment option for banks. Furthermore, a novel feature of our work is documenting the formation of new borrowing relationships for SMEs and the impact access to financing has on their real activities (Amore, Schneider, and Žaldokas, 2013; Berger and Udell, 1995; Petersen and Rajan, 1994).

From a broad macroeconomic perspective, a number of studies have investigated the efficacy of unconventional monetary policy tools. These papers mostly focus on quantitative easing (QE) in the US or asset purchases in Europe. Acharya et al. (2017) find that the ECB's Outright Monetary Transactions helped to stabilize European periphery countries but did not have any meaningful positive real effects likely because of banks' zombie lending and borrowers' cash hoarding. In this regard, the conclusions of Acharya et al. (2017) echo the importance of our tests on SMEs' relationship formation and investment undertakings. Studying the impact of QE in the US, Rodnyansky and Darmouni (2017) find that large-scale asset purchases by the Federal Reserve have a positive effect on banks most exposed to the QE programs (i.e., banks with significant holdings of mortgage-backed securities). These banks in turn also significantly increase their lending. Related to this line of work, we document that financial disintermediation in the corporate sector enhances financial intermediation in the SME sector by leading banks to rebalance their portfolios. We also observe that SMEs experience higher availability of bank funding at a cheaper cost, which they utilize to invest in real activities. Collectively, we contribute to the emerging literature on the impact of unconventional monetary policy interventions. More broadly, our paper also relates to a broad set of theoretical and empirical work that studies substitution between bank and bond financing (e.g., Aiyar, Calomiris, and Wieladek, 2014a, 2014b; Bolton and Freixas, 2000; Crouzet, 2018; de Fiore and Uhlig, 2011, 2015; Diamond, 1991; Santos and Winton, 2008).

In the specific context of the CSPP, Grosse-Rueschkamp, Steffen, and Streitz (2018) and Arce, Gimeno, and Mayordomo (2017) show empirically that ECB purchases of eligible bonds overall lead to affected corporate borrowers substituting bank lending with bond issuances. The authors argue that banks then increase lending to private firms and report interesting evidence relating to evaluating the CSPP as a policy intervention. In contrast, we examine financial

disintermediation as an economic construct and use the CSPP as a policy shock. The critical difference between our work and these concurrent papers is that we identify the bank-lending channel by (*i*) investigating loan applications and holding credit demand constant and (*ii*) removing confounding factors that could have improved the fundamentals and investment opportunities of applicant firms. Our empirical research design and data allow us to go this extra mile, which is a critical contribution in this setting because both supply and demand factors could explain the changes in SME financing, yet the implications of these channels would be completely different. Similar to Ferrando et al. (2017; 2018), our identification approach allows us to measures supply effects directly from the firm-level Survey dataset explicitly designed for this purpose and to be representative for the overall Eurozone economy.[14]

Importantly, we also show that this increase in lending to SMEs comes directly from the ECB's primary market bond purchases and not from the general rise in liquidity in the secondary bond market or from increased bond issuances overall. This important difference is another novel feature of our paper. While the aforementioned papers investigate primary and secondary market purchases together, which is consistent with their policy evaluation objective, our investigation of financial disintermediation must focus exclusively on primary market purchases. This is because secondary-market CSPP purchases do not constitute new central-bank lending to corporations or an appropriate example of financial disintermediation. In fact, secondary-market CSPP purchases are, in essence, the same as the ECB's then-existing asset purchase programs (i.e., PSPP, ABSPP, and CBPP3). Finally, using unique micro-level data that matches banks and firms, we are able to show which firms benefited from the increase in bank lending and through what channel. In particular, we document that affected banks become more willing to lend to SMEs, both by expanding credit on favorable terms to existing clients and by establishing new lending relationships.

[14] This type of data also has been used in other studies, which analyze the credit crunch in Europe during the financial crisis (Beck et al., 2008; Ferrando et al., 2017, 2018; Popov and Udell, 2012).

I. Institutional Background

A. Description of the CSPP

Since the financial crisis of 2007–2009, the Governing Council of the European Central Bank (ECB) has taken extraordinary steps to stabilize prices and stimulate the economy and job creation in the Eurozone. By January 2016, the ECB had lowered the nominal interest rates to negative values and started to purchase marketable debt instruments from banks. With very few other tools left at its disposal, on March 10, 2016, the ECB announced a novel program to increase inflation aimed directly at the corporate sector (ECB, 2016). Launched on June 8, 2016, the Corporate Sector Purchase Programme (CSPP) allows designated central banks in the Eurozone to purchase corporate bonds in the primary and secondary markets. Corporate debt instruments are eligible for the CSPP if they satisfy the following criteria: 1) denominated in euros; 2) have investment-grade credit rating (as determined by Standard & Poor's, Moody's, Fitch Ratings, or DBMS); 3) have remaining maturity longer than six months, but shorter than 31 years at the time of purchase; 4) satisfy eligible collateral requirements under the Eurosystem collateral framework for credit operations; 5) issued by a company incorporated in the euro area, but may have a parent company outside of the Eurozone; and 6) issued by a non-bank corporation whereby both the issuer and its parents are not subject to banking supervision.[15]

While the ECB supervises the bond purchase program, the actual purchases are carried out by Belgian, Finnish, French, German, Italian and Spanish central banks. These six national central banks are responsible for purchases based on the geographic location of the borrower. The amount of purchases from the overall allocated volume is based on these banks' contribution to the Eurosystem. Central banks are instructed not to differentiate among securities whose parent operates in the Eurozone, nor favor local securities over foreign securities that are under the responsibility of a particular central bank.

[15] See https://www.ecb.europa.eu/mopo/implement/omt/html/cspp-qa.en.html for details on CSPP eligibility criteria.

The ECB refrains from announcing in advance the total volume it intends to purchase in a given week to allow for flexibility in providing additional liquidity to bond markets if needed. In addition, national central banks are only allowed to buy up to 70 percent of the outstanding amount, and on the issuer-group level, there is an unspecified cap to ensure "a diversified allocation of purchases across issuers" (ECB, 2016). The six national central banks do not provide a direct overview of the securities purchased on both the primary and secondary market, but instead offer weekly updates on these securities. In Section II below, we discuss how we infer the volume of corporate bond purchases under the CSPP.[16]

B. The CSPP and the ECB's Other Monetary Policy Interventions

To maintain price stability in the post-financial and sovereign crises Eurozone, the ECB has followed a number of strategies, including open market operations, standing facilities, minimum reserve requirements, and asset purchase programs. The CSPP is an example of an asset purchase program—a category that also includes the ECB's purchase of covered bonds, asset-backed securities, and public sector securities. These other asset purchase programs provide a significant amount of liquidity to Eurozone banks, but they neither overlap with the CSPP period nor directly relate to banks' lending to the real sector. Likewise, standing facilities and minimum reserve requirements do not directly target private sector credit and seldom vary in the cross-section of banks.

As for the open market operations, the ECB pursues two types of such actions, which differ from one another in terms of procedure, clauses, frequency, and objectives. "Main refinancing operations" have short maturity (typically a week) and aim for regular liquidity provision. Administered by national central banks, these activities provide the majority of refinancing to Eurozone banks. The second type of refinancing efforts pursued by the ECB is

[16] European Union countries also have specific credit guarantee schemes to address SMEs credit gaps. Since these schemes were in existence before the CSPP intervention, we use the CSPP as a setting to identify an incremental effect of financial disintermediation in the presence of existing credit guarantee schemes (see Chatzouz et al., 2017 for more information on credit guarantees in Europe).

"longer-term refinancing operations." Whereas regular long-term refinancing operations have a maturity of about one to three months, targeted longer-term refinancing operations, or TLTROs, could have maturities of up to 48 months.

Unlike in its regular refinancing operations with liquidity objectives, through TLTROs, the ECB aims to enhance credit to the private sector by providing banks with stable funding at affordable prices (i.e., negative rates). The first TLTRO series was conducted in 2014, while TLTRO II was announced in March 2016, launched in June 2016, and performed on a quarterly basis over the following 12 months. Under TLTRO II, which allowed banks to borrow an amount of to up to 30% of their outstanding eligible loans, the ECB allotted about 235 billion euros to 474 banks.[17]

TLTROs are related to the CSPP for two main reasons. First, the TLTRO period (the second wave) overlaps with the CSPP period. Second, the ECB's targeted lending to the Eurozone banks requires recipient banks to use these funds only for lending to non-financial corporations and households, including SMEs. Similar to the CSPP, the effects of TLTROs vary highly in the cross-section of banks, with certain banks obtaining funding under these programs. We note that target refinancing could interact with or confound the effects of the CSPP. Accordingly, in Section III and the Online Appendix, we discuss the implications of TLTROs (and, to a lesser extent, those of the other monetary policy interventions) on our inferences.

II. Data

A. Measuring CSPP Exposures

In our study, the independent variable of interest is the exposure to CSPP (*Disintermediation*). We calculate this variable as the total ECB purchases at the country-industry-time level. The data for this calculation comes from the Eurosystem's public disclosures of the total amount of bond purchases under the CSPP. These disclosures include only the total

[17] For more details, please see https://www.ecb.europa.eu/pub/pdf/other/ebbox201704_03.en.pdf?4c92fdae71b53a5515155bd2678e8157.

value of securities purchased under the program on both the primary and secondary markets and thus do not provide volume information on individual purchases. Therefore, we assume that the ECB buys the same percentage of all bonds it purchased on the primary market in a given month to estimate the amount of ECB investment in a given security. To be precise, the ECB investment in a particular bond is defined as the tranche value divided by the total tranche values of all securities purchased by the ECB in the primary market during a given month and multiplied by the total monthly amount of all ECB purchases in the primary market.

As the capital market effects of CSPP purchases in the primary and secondary markets differ, it is essential to distinguish between these two types of transactions. In particular, for this study, purchases in the primary market represent directly affected eligible borrowers' ability to raise new financing in the public debt market. Secondary market purchases, on the other hand, have a more indirect effect through increased bond market liquidity and therefore decreased marginal cost of new debt issuance in the public debt market. The ECB and the national central banks do not disclose the volume and exact timing of their purchases. However, central banks publish weekly which securities are available for securities lending. All securities purchased by the national central banks are required to be available for securities lending. The high frequency of these overviews allows us to estimate with a reasonable degree of accuracy whether the ECB purchased these bonds on the primary or the secondary market. (See Section I and Online Appendix Figure OAI for more details on CSPP primary and secondary market purchases.)

We extract all weekly updates on security lending from the participating national central banks' websites starting from May 9, 2017. For prior periods, we obtain data directly from the six national banks. All weekly overviews begin in the third week of July 2016, which corresponds to the initial coverage of the CSPP by the media. As the CSPP commenced on June 8, 2016, we cannot accurately determine whether bonds were purchased in the primary or secondary markets and hence exclude the 13 bonds that were issued during this period from our analyses. We compare the date that securities appear for the first time on the securities lending overview with their issue date to classify the bond as a primary or secondary market purchase.

We classify a central bank purchase as a primary market purchase if the security's ISIN appears on the central bank's security lending overview within eight days of the issue date. This approach allows us to account for bonds that are not settled on the issue date.

We use Dealogic DCM data to identify bond issuance in the Eurozone. Dealogic provides information on all bonds issued and outstanding in the EU and globally. To make purchases comparable across countries and industries, we aggregate ECB investments in the primary market by country and industry in the corresponding period and deflate them by all bonds outstanding in Dealogic for the European bond market in that specific country-industry grid as of June 1, 2016 (i.e., before the start of the CSPP).

B. Sample Construction

We use several data sources in our study. We start our analyses by examining the effect of the CSPP on large EU bank exposures to corporate and SME borrowers using the exposures data from the EBA regulatory disclosures related to the 2016 and 2017 Transparency Exercises. The transparency exercises and stress tests cover the largest banks in the European Union and include bank-level information from 2015 to 2017. We then combine this data with the Dealogic syndicated loan dataset and CSPP purchases to identify which banks lent money to companies that received a direct investment by the ECB when they issued corporate bonds.[18]

To study the impact of financial disintermediation on SMEs more directly, we rely on the Survey on the Access to Finance of Enterprises (SAFE). The critical role of the Survey for our study is that it allows us to hold constant any confounding demand effects and focus directly on the supply of bank credit to SMEs. It is crucial to highlight that the Survey is the source used by the ECB itself for the evaluation of the impact of its monetary policy interventions on small

[18] The Dealogic dataset contains 75,183 outstanding loans and credit facilities in the EU with a maturity later than June 1, 2016, and issued before June 1, 2016. Dealogic also provides full firm-parent and bank-parent hierarchy structures with identifiers that are fully compatible across the DCM bond and Loan datasets. This allows us to link firms that issue bonds purchased by the ECB via their loans and bank subsidiaries to the banks included in the EBA regulatory disclosures. We exclude a handful of banks that appear in the EBA regulatory disclosures but not in Dealogic DCM or Loans datasets. Most of these banks are subsidiaries of foreign banks from outside of the EU. We believe this is a conservative assumption allowing us to focus on banks that we can identify with a high degree of certainty as being directly affected by the CSPP.

businesses.[19] The Survey also allows us to study the effects of the CSPP on a very timely basis—before the real actions are observable in financial statements—and for a group of firms that are typically not well covered by financial databases.[20] The Survey is a collection of sensitive information about small businesses which, for privacy reasons, masks company identities and is not very granular with regards to industry information (providing industry information on the aggregate level of six sectors). For this reason, we exploit the industry variation in CSPP purchases at a somewhat coarse level.[21]

We gather information on firms' bank relationships through two different data sources. First, we use the Bureau van Dijk Amadeus Bankers dataset that contains all bank relationships between banks and private and public firms. This dataset includes rich information on countries and industries; however, Amadeus does not report this data historically. In our tests, therefore, we compare a snapshot of this dataset containing bank relationships as of 2014 and 2015 to a snapshot of banking relationships as of 2016 and 2017. For a more frequently updated but smaller sample, we use (syndicated) loan data from the Dealogic Loans database. This option allows us to create a panel dataset on a quarterly basis and to determine whether firms (1) obtain a new loan, (2) establish a new bank relationship or (3) have a new bank as a contributor on a new syndicated loan. A new relationship in this context is defined as a bank with whom the company has not had an active borrower relationship in the prior six months.

We supplement our analysis using the detailed data provided by the ECB Loan-Level Disclosure (LLD) Initiative. The contract-level data comes from the ECB member banks' disclosures of loan-level details of the SME-loan-backed securities they offer as collateral to borrow from the ECB standing facilities programs. These disclosures include information on the

[19] See, for example, https://www.bis.org/review/r160623b.pdf.

[20] See Balakrishnan and Ertan (2018) and Ferrando et al. (2017) for a description of the Survey data and its geographical coverage.

[21] According to the ECB, in the most recent waves of the survey, the typical response rate was 12%–14%, with country-specific rates lying between 7% and 19% for wave 17. ECB also conducts validity checks to ensure accurate responses to questions. In particular, validity and consistency checks are run both by the survey company and by the ECB. Some additional quality checks are performed, for example, on the variable on interest rates (Q8b), which is also checked against official interest rates statistics. Finally, the ordering of questions in the survey is respected by the interviewers and questions always appear in the same order.

performance and structure of individual loans and have been reported in a standardized format every quarter since 2013. We focus on loans issued during the CSPP period and identify a sample of 327,452 individual SME loan contracts, which we use to analyze the impact of the program on loan characteristics, such as interest rates. We also use SNL Financial data for bank-specific characteristics.

III. Empirical Methodology and Results

In this section, we introduce our empirical research design and discuss how we use the combined data to study the spillover and real effects of financial disintermediation for large borrowers on bank lending to SMEs using banks' and industry exposure to the CSPP as our setting.

A. Banks' Exposure to SMEs

We first examine whether large European banks change their exposure to corporate and SME borrowers following the introduction of the CSPP. To do so, we estimate the following standard differences-in-differences (DiD) model at the bank-half-year level:

$$\begin{aligned} \textit{SME Exposure}_{bt} = \quad & \beta_1 \textit{ Affected Bank}_b + \beta_2 \textit{ Post CSPP}_t + \beta_3 \textit{ Affected Bank}_b \times \textit{Post CSPP}_t \\ & + \gamma X_{bt} + \alpha_b + \delta_t + \varepsilon_{bt}, \end{aligned} \tag{1}$$

where b indexes banks and t indicates time, which, in these tests, is a half-year, as per the frequency of the EBA data. α_b and δ_t are bank and time fixed effects respectively. *Affected Bank* and *Post CSPP* are the two components of the DiD model. *Affected Bank* is an indicator that equals one if the bank in question has at least one large corporate borrower with bonds purchased by the Eurosystem under the CSPP. (We use a continuous version of this variable as a robustness check.) *Post CSPP* switches on for the two half-year data points after the implementation of the CSPP: 2016H2 and 2017H1. This data is from the results of the 2017 Transparency Exercise. (The two data points from the pre-CSPP period are 2015H2 and 2016H1

and are from the results of the 2016 Transparency Exercise.) *SME Exposure* is bank *b*'s exposure to SMEs relative to its total exposures at time *t*. X_{bt} is a vector of control variables, consisting of banks' exposures to the corporate sector (*CORP Exposure*) measured as bank *b's* relative exposure to the corporate borrowers (excluding SMEs) at time *t*. We obtain SME and corporate sector exposures from the regulatory disclosures because information on European banks' asset composition, and especially details of commercial lending, is not available in other publicly available databases.

Table I presents the summary statistics for the sample used in our empirical analyses. As shown in Panel A, almost half of the observations are from the post-CSPP period, while half of the sample banks are affected by the CSPP (*Affected Banks*). SME lending constitutes 8.2 percent of banks' total exposures. By comparison, bank exposures to large corporate borrowers are bigger, with an average of about 13 percent of total exposures.

We present the estimation results of equation (1) in Table II, which shows that the sample banks affected by financial disintermediation (i.e., banks whose borrowers have benefited from direct purchases of their bonds by the ECB) increase their exposures to SMEs relative to unaffected banks.[22] Columns (1) through (6) of Table II show the results of three specifications for SME exposures, all of which exhibit significant positive increases. We find that on average, exposures to SMEs at affected banks increase by a relative 2.28 percent if we take into account time fixed effects, 2.03 percent if we also use country fixed effects, and 0.95 percent if we also use bank-specific fixed effects.[23] These results are economically meaningful as well, respectively representing 28 percent, 25 percent and 12 percent of the sample standard deviation of SME exposures.

Next, we control for banks' exposures to the corporate sector. Columns (4) to (6) of Table II, Panel A show that banks with corporate exposures are also more likely to have exposures to the SME sector. In specifications (5) and (6), we also control for the pre-treatment trend by

[22] In our models, we take into account the within-bank correlation by including clustering of standard errors by banks.

[23] Each model includes individual indicators for *Affected Bank* and *Post CSPP* as well. The coefficients on these terms are not identified in the presence of bank and time fixed effects, respectively.

introducing an interaction variable of *Affected Bank* × *Pre CSPP*, which takes the value of one for banks exposed to corporate borrowers affected by the CSPP in the period before 2016H2. We find no evidence of a differential trend prior to the introduction of the CSPP. In specification (6), we use *Affected Bank* as a continuous variable, which equals the natural logarithm of banks percentage exposure to corporate borrowers whose bonds are purchased under the CSPP. This estimation model also supports our main inferences. Overall, our first set of findings suggests that the large EU banks with borrowers who have benefited from financial disintermediation appear to increase their exposures to SMEs following the introduction of the CSPP.

Thus far, we find that banks increased their lending to SMEs following the commencement of financial disintermediation in the corporate sector. However, this might not be sufficient to address the concerns regarding why banks were not lending to SMEs before the introduction of the CSPP. If lending to SMEs is profitable and represents a positive NPV opportunity for a given level of risk and funding costs, we would have expected banks to lend to SMEs prior to the CSPP intervention in the absence of economic frictions. We therefore investigate whether banks that might have been relatively liquidity- or capital-constrained before financial disintermediation in the corporate sector were less likely to lend to the SME sector prior to the CSPP intervention. We identify banks that were relatively liquidity-constrained as being in the lowest quartile of liquid assets relative to deposits in 2015 (i.e., before the start of our pre-period). Columns (1) and (2) of Panel B in Table II show that banks that were relatively liquidity-constrained in 2015 are significantly more likely to lend to SME borrowers following the introduction of the CSPP if they have affected corporate borrowers with bonds eligible for purchase by the ECB. Columns (3) and (4) however show that relatively capital-constrained banks (measured as the lowest quartile of Tier 1 regulatory capital ratio in 2015) do not incrementally increase their lending to SMEs following the introductions of CSPP. This is not surprising as SME loans tend to be relatively riskier and hence might result in a

higher capital charge for banks, therefore, suggesting that capital-constrained banks are less likely to increase lending to SMEs even in the presence of financial disintermediation.[24]

To validate our inferences, we conduct two sets of robustness analyses, the results of which are included in the Online Appendix. First, we test the sensitivity of our choice of the dependent variable (i.e., SME exposure as a proportion of total exposures). To minimize the concern that a decline in corporate exposures may mechanically trigger a relative increase in SME exposures as a fraction of total exposures, we define this dependent variable in raw values (billions of euros). As can be seen from Table OAI, our conclusions continue to hold.

The second robustness test we undertake relates to the concurrent monetary policy interventions conducted by the ECB. As discussed in Section I.B, TLTRO II appears to be the most relevant program because it overlaps with the CSPP, affects the cross-section of banks differently, and requires banks to lend to non-financial entities, including SMEs. We tackle this problem by controlling for *TLTRO* (an indicator variable that switches on only if Bloomberg records include a TLTRO borrowing by the bank). The estimates presented in column (1) of Table OAII show that our main inferences do not change, in that *Affected Bank* × *Post CSPP* has a positive and significant coefficient after controlling for *TLTRO*. (We also note that TLTRO banks increase SME lending, consistent with the objectives of the program.) In columns (2) and (3), we present our findings from a subsample that is limited to banks that borrow under TLTRO (column 3) or not (column 2). In both cases, we continue to find that exposure to the CSPP and resulting financial disintermediation in the corporate sector enhances bank lending to SMEs. Finally, it is important to note that TLTRO programs provide access to long-term financing for banks at a fixed rate based on existing funding available through the Eurosystem. While the amount that banks could borrow is indeed derived from their lending portfolio to the non-financial sector, the fact that the CSPP was introduced alongside TLTRO

[24] Another potential friction that might create constraints on banks' lending choices is government intervention through liquidity support, recapitalization and full nationalization prior to and during our sample period (see, for example, Kleymenova, Rose, and Wieladek, 2016; Rose and Wieladek, 2014). We find that banks that received government support were less likely to increase lending to SMEs than banks that received no government support.

suggests that the former is complementary to the existing programs (including TLTRO). Hence, financial disintermediation via the CSPP represents a separate macroeconomic policy tool aimed at strengthening the pass-through of asset purchases to ease corporate financing conditions and credit growth ultimately creating financial disintermediation in the corporate sector and providing positive spillover effects to credit access for SMEs.

In addition to the robustness analyses above, we also perform tests on banks' non-SME exposure levels. This investigation helps us provide a fuller picture of affected banks' portfolio decisions and shed light on the substitution effect we propose. Here, we estimate the regression in equation (1) with corporate assets and all other non-corporate, non-SME exposures on the left-hand side. The results shown in the Online Appendix Table OAIII provide economically meaningful insights. Column (1) includes our main result on SMEs shown in Table (2). Consistent with our prediction that financial disintermediation reduces commercial-bank lending to corporations, we observe a decrease in affected banks' corporate exposures post-CSPP (column (2)). We do not find a significant fluctuation in banks' other exposures post-CSPP (column (3)).

B. SMEs' Credit Access

Next, we examine the effects of the CSPP corporate bond purchases on SMEs' ability to access bank financing. Specifically, we estimate the following cross-sectional model:

$$SME\ Credit\ Access_{it+1} = \beta_1 Disintermediation_{cjt} + \gamma X_{it} + \nu_{cj} + \lambda_{ct} + \sigma_{jt} + \varepsilon_{it+1}, \qquad (2)$$

where i indexes firms, t indicates half-year survey data frequency (survey waves), c corresponds to a country and j to an industry. ν_{cj} are country-industry fixed effects, λ_{ct} *are* country-time fixed effects and σ_{jt} are industry-time fixed effects. X_{it} is a vector of control variables. *SME Credit Access* corresponds to SMEs' responses to the Survey question 7b_a, which asks companies about the outcome of their application for bank loans in the prior six months. One key contribution of our paper is that we keep the demand for credit constant, which we do by

concentrating exclusively on companies that apply for a bank loan. We define *SME Credit Access* as an indicator variable that takes the value of one if applicants receive the full amount of the loan they apply for and zero if they receive less than the full amount or if their application is unsuccessful. Since not all firms apply for credit, we observe this variable for 11,180 observations. Panel B of Table I presents the summary statistics of the Survey variables we use in our analyses. *SME Access to Bank Credit* has a mean (standard deviation) of 0.802 (0.398) and median of 1, suggesting that the average SME firm in our sample obtains a full amount of the loan it seeks.

Our primary variable of interest, *Disintermediation*, is the intensity of the CSPP impact in a given country and industry. More specifically, *Disintermediation* is measured as the aggregate corporate bond purchases by the ECB in the primary market within a country-SAFE industry during the corresponding wave period and deflated by the total value of all bonds outstanding in the country-SAFE industry. This variable is zero for the survey observations before June 2016 and the country-industry grids without eligible corporate bond purchases in the post-June 2016 Survey waves. For ease of interpretation, we express this amount in percentage points. Panel B of Table I shows that the average share of CSPP purchases for industries and countries represented in the Survey is 0.09 percent of total bonds outstanding at the time of the Survey (including zeros).

We also control for SME characteristics based on the demographic information available in the Survey. In particular, we control for *SME size*, measured as one if annual sales are up to €2 million, two if annual sales are between €2 and 10 million, three if sales are between €10 and 50 million, and four if sales are over €50 million. Table I, Panel B shows that the average size of SMEs in our sample is 2.18, corresponding to firms with annual sales of between €2 and 10 million. *SME age* measures the age of the company and varies between one (one to two years) and four (older than 10 years). The average SME firm in our sample ranges in age from five to older than 10 years. We also control for the change in credit quality over the prior six months (*SME credit quality*) and change in profitability (*SME profitability growth*). These ordinal variables range in values from one (credit quality deteriorated) to three (credit quality

improved) and one (profitability decreased) to three (profitability increased). Panel B of Table 1 indicates that, on average, SMEs' credit quality and profitability growth remained the same. We also control for overall bond issuances in a given country-industry grid (*Bond issuance*). Panel B of Table I shows that on average, 2.58 percent of bonds were issued during our sample period relative to all bonds outstanding in the same country-industry and time.

We estimate SMEs' credit access model in the post-CSPP period after June 2016, as well as during the full period from 2015 to 2017. While the post-CSPP period analysis focuses on the cross-sectional variation, the full period is effectively a difference-in-differences (DiD) specification, in which we compare SMEs' access to financing before and after the introduction of the CSPP. In this estimation, the *Disintermediation*, which is a continuous variable, captures the heterogeneous intensity of the CSPP impact.

In additional tests, we also examine SMEs' views on external financing. We do so to address the lingering concern that even if we hold the demand for credit constant, some of our inferences might be driven by increasing credit quality or fundamentals of SMEs. This could be a problem, especially if the Eurosystem targets booming industries. Even though there is no reason to believe that CSPP purchases are statistical artifacts of country-industry performance, we deal with this potential problem by comparing the variation in *Bank Loan Availability* to that in *Trade Credit Availability* and *Lease Financing Availability*. If the CSPP has a genuine impact, we should observe that SMEs perceive an increase in the supply of bank funding but not trade credit. As before, we observe *Bank Loan Availability* and *Trade Credit Availability* also at the SME-half-year level and define them as indicator variables. Some 26 percent (19 and 21 percent) of the respondents state that they believe the availability of bank financing (trade and lease credit) has improved (Panel B of Table I).

Table III presents our findings for credit availability for SMEs following the introduction of the CSPP. Models (1) through (3) of Panel A show availability of bank credit in the full period (i.e., DiD setting) controlling for time-varying SME attributes, including firm size, age, employees, credit quality, and profitability growth. Model (1) does not include fixed effects while model (2) incorporates wave, industry, and country fixed effects to take into account

unobserved heterogeneity at the time, industry, and country dimensions. Model (3) uses the multi-dimensional fixed effects structure of industry and survey waves (i.e., time), country and wave, as well as industry and country. We find positive and statistically significant results across all specifications. Economically, a 1 percentage point increase in CSPP intensity increases SMEs' access to full bank financing between 2 (model 2) and 4 (model 1) percent. Columns (4) through (6) in the same table show the results of CSPP intensity on SME bank credit in the period following the introduction of financial disintermediation using the same specifications as the previous three models. Consistent with the earlier results, we find that in the post-CSPP period, an increase in the magnitude of the CSPP by 1 percentage point results in an increase in SMEs' access to bank credit by 2 to 3 percent.[25]

We substantiate our finding that the CSPP primary market purchases have contributed to an increase in SME lending by performing several robustness checks in Panel B of Table III. First, we utilize the survey population weights, which allow us to scale our findings to the overall populations of European SMEs and take into account any potential oversampling of smaller SMEs by the Survey (Ferrando et al., 2017). We find that using survey weights in the full DiD setting (column 1) as well as in the post-CSPP period only (column 2) results in similar findings as before, namely SMEs access to credit increases in their exposure to CSPP. This is not surprising as the Survey is created using randomized sampling and even if oversampling were to occur it is likely to be at the country level, which is subsumed by our use of country-level fixed effects (Ferrando et al., 2017). Next, we also introduce SME-fixed effects for a subsample of SMEs that appear multiple times in the survey (columns 3 and 4). Controlling for unobserved SME heterogeneity, we continue to find similar results that exposure to CSPP increases their ability to obtain bank financing.[26]

[25] We also examine SMEs' applications to bank credit lines. The results from these tests are statistically and economically comparable to those on term loans (not tabulated).

[26] The observations count in the table includes singletons. In total, we have 8,030 distinct SMEs for a sample of 11,180 firm-years.

C. Ruling Out Alternative Hypotheses

Thus far, we find that SME access to bank financing increases with their exposure to the CSPP. To rule out alternative explanations that overall improvement in macroeconomic conditions and not CSPP might drive our findings, we conduct a number of tests. Another lingering concern is that our results might be driven by the positive effects that financial disintermediation might have had on bond issuances through increased liquidity (instead of CSPP primary market purchases).[27] As new bond issuances are a necessary condition for the ECB to purchase bonds in the primary market, these variables could be correlated and therefore drive our main results. In Table IV, Panel A, models (1) and (2), we replace CSPP purchases by new bond issuances within a particular country-industry-time period. We find that bond issuances do not explain the increase in SME lending, as the coefficients are neither statistically nor economically different from zero, while CSPP purchases have a significantly positive effect on SME lending.[28] As bond issuances are highly correlated with CSPP purchases (with a pairwise correlation coefficient of 0.64), we also orthogonalize our variables. However, orthogonalizing our variables does not alter our prior conclusions, as we find similar results.

We also conduct several placebo tests to confirm the robustness of our results and to alleviate further any concerns that the increase in SME lending may be driven by a correlation between CSPP primary market purchases and issuance of investment grade bonds. If instead of the CSPP primary market purchases, the correlation between the CSPP and the issuances of investment grade bonds is driving our results, we should see similar results in the period that directly precedes our pre-treatment period.[29] We therefore use the eligibility criteria for CSPP corporate bond purchases to estimate the choice and the value of the bonds that the ECB likely

[27] See for example the findings of Abidi and Miguel-Flores (2018) for the impact of the CSPP on yields and bond issuances of the eligible large corporates.

[28] Additionally, by using the Survey data, we investigate the likelihood of SMEs making a loan application. We find no increase in SME' decision to apply in country-industry grids with intense bond purchases under the CSPP. This inference provides further support that the economic conditions in treatment grids are not significantly better than that in non-treatment grids.

[29] The pre-period with no CSPP purchases runs from January 2012 until June 2013, and our placebo post-period with CSPP purchases runs from July 2013 until December 2014. For all placebo tests, we use the actual SME lending and control variables as observed in this period.

would have purchased in the placebo period. We first determine which bonds would be eligible to be bought by the ECB in both our regular sample period and the placebo period and then calculate the percentage of all eligible bond issuances that were purchased by the ECB on the primary market every half year. We then multiply these semi-annual country-industry percentages with the corresponding value of eligible bonds in the placebo period to generate a placebo amount of CSPP purchases.

We find no economically or statistically significant results of our placebo tests presented in columns (3) of Table IV, Panel A. This strengthens our interpretation that CSPP primary market purchases indeed represent an important driver of SMEs' access to bank credit and are unlikely to be driven by factors related to CSPP (eligible) bond issuances. In column (4) of Panel A, we also present results from a naïve placebo test for which we use the actual CSPP purchase amounts of our regular sample period, and a placebo test where we rescale our placebo estimates to match the total purchase amounts over all industries with our regular sample period. Both sets of placebo tests lead to similar results, in which the placebo CSPP purchases are not statistically significantly related to SME financing.

Next, we examine whether improvements in the overall economic conditions in region-sector grids affected by financial disintermediation, not bond purchases themselves, may drive banks' willingness to lend to SMEs. Holding credit demand constant and including country-time and industry-time fixed effects alleviate this concern to a significant extent. Nevertheless, because these potentially confounding effects may not be fully ruled out even on a dataset focusing on loan applications or eliminated by our fixed effects structure, we investigate SMEs' expectations and views on different types of external financing opportunities after the introduction of the CSPP. In Panel B of Table IV, we present our findings on SMEs *expectations* of availability of credit by capturing their perceptions about the likelihood of getting financing in the future. Model (1) shows the results for SMEs' perceptions of whether the availability of bank financing changes, while model (2) presents the results of SMEs' perceptions of whether their access to trade credit changes and model (3) shows the results for SMEs' perceptions about lease finance availability. We find that following financial

disintermediation in the large corporate sector, SMEs' perceive that bank loan availability increases by 2 percent. However, the coefficient for Disintermediation for trade credit availability and lease financing availability is indistinguishable from zero. We therefore interpret these results as providing additional evidence that CSPP-induced availability of bank credit, and not the overall market conditions, drives our findings of increased access to financing for SMEs.

D. Extensive and Intensive Margins

Having established that financial disintermediation in the corporate sector increases SMEs' access to financing, we next investigate whether the CSPP has increased the availability of credit in a broader sense. In particular, if banks observe increased availability of funding due to their borrowers relying more on bond financing as a result of the CSPP, we would expect banks to be willing to provide access to financing for new borrowers overall. This implies that banks would be more likely to offer credit to new customers and form new banking relationships. Even though SME lending falls under the same category as corporate lending for most banks, it is not clear whether SMEs would be the first point of substitution for banks affected by the decreased demand for loans from corporate borrowers affected by the CSPP. In particular, prior research argues that banks may increase lending to their existing commercial borrowers (Acharya et al., 2017) or simply switch to other types of lending such as mortgages or consumer loans (Chakraborty et al., 2017). To shed light on this empirical question, we consider two sets of analyses: 1) changes in SMEs' debt financing (intensive margin) and 2) formation of new relationships for all potential borrowers we observe in the Amadeus Bankers and Dealogic Deals data (extensive margin).[30]

To shed more light on the intensive margin, we examine the amount of lending by affected banks to SMEs in the industry-regions with non-zero CSPP interventions using Amadeus

[30] Amadeus collects information on SME banking relationships from a limited number of countries. We are able to perform these tests for borrowers based in Austria, Germany, the Netherlands, Portugal, and Spain, because *New Relationship* is non-missing and non-degenerate only for these sample countries.

Bankers dataset. Given that Amadeus Bankers dataset provides us with a snapshot of data before and after the introduction of CSPP, we present our findings in first differences using the intensity of CSPP exposure as our heterogeneous treatment variable from the following model:

$$Debt\ Growth_i = \beta_1 Disintermediation_i + \gamma X_i + \varepsilon_i, \tag{3}$$

where *Debt Growth* is the percentage change in the debt over non-cash assets ratio of an SME firm i in the Amadeus Bankers sample from 2015 to 2016. X_i is a vector of control variables. *Disintermediation* in this specification is defined as the aggregate amount of CSPP purchases by the ECB in the primary market during a quarter within a country-2 digit NAICS industry code and deflated by the total value of all bonds outstanding in the country-2 digit NAICS industry. ECB purchases by security are defined as the tranche value divided by the total tranche values of all securities purchased by the ECB on the primary market during a month and multiplied by the total monthly value of ECB purchases in the primary market. In this specification, we also control for firm characteristics such as *Firm size* (natural logarithm of total assets), *Firm age* (firm age in the number of years), *Firm employment* (natural logarithm of the number of employees), *Firm profitability* (pre-tax income as a percentage of total assets), and *Firm leverage (total debt as a percentage of total assets*).

Panel C of Table I shows the summary statistics for the Amadeus Bankers sample we use in our intensive and extensive margin tests. Each observation is at the firm level. We note that SME debt increases by 0.042 percent of total assets on average, and this variable has a standard deviation of over 10 percent. The median firm has total assets of 59 million euros and 111 employees. The median age of firms in this sample is 25 years, the return on assets is 5.5 percent, and leverage is about 6 percent. The inherent skewness in *firm size* and *firm employment* is removed in the logged form.

Our estimates in Table V, Panel A, indicate an economically and statistically significant effect on increases in debt issuance by banks to SMEs. Economically, a 1 percentage point increase in CSPP translates to a 0.253–0.338 percent of an increase in leverage, which corresponds to about 3 percent of the sample standard deviation of *Debt Growth*. This inference

suggests that the more exposed banks are to the CSPP, the more likely they are to increase lending to SMEs.

Next, we examine the impact on the extensive margin by focusing on the relationship formation. First, we use the Amadeus Bankers dataset to study the relationship formation using information on private firms, most of which fall into the category of SMEs as defined by the Survey. We investigate the same first differences model as in equation (3) above replacing the dependent variable with a *New Relationship*. It takes the value of one if a firm shows a new relationship with a lender after the introduction of the CSPP with which it does not have a relationship before the program. All other variables are defined as in equation (3) above. Panel D of Table I shows that 5.56 percent of observations experience a new lending relationship in the CSPP period. Panel B of Table V shows our estimation results. We find that, following the introduction of financial disintermediation in the corporate credit market, affected banks form new banking relationships. These firms on average appear to be smaller in size, less profitable and younger. In particular, we find that a 1 percentage point increase in Disintermediation increases the likelihood of establishing a new lending relationship by about 1 percent, or 20 percent of the sample mean of a new relationship.[31] This inference is significant statistically and economically.

As the Amadeus Bankers dataset does not allow us to have a full DiD specification, we also analyze new relationship formation using the Dealogic Loans Database, which contains bank lending information, including syndicated and private bank loans. This data allows us to estimate the following model:

$$New\ Relationship_{it+1} = \beta_1 Disintermediation_{cjt} + \gamma X_{it} + \nu_{cj} + \lambda_{ct} + \sigma_{jt} + \varepsilon_{it+1}, \qquad (4)$$

where i indexes firms, t indicates quarter, c corresponds to a country and j to an industry. ν_{cj} are country-industry fixed effects, λ_{ct} are country-time fixed effects and σ_{jt} are industry-time

[31] We also limit our sample to companies with fewer than 250 employees and include additional controls for changes in size, employment, profitability, and leverage. Our conclusions continue to hold in this specification (untabulated).

fixed effects. X_{it} is a vector of control variables. We define several proxies for a new relationship using this model. *Log of a Number of New Relationship Formations* is the natural logarithm of the number of banks with whom a company started a borrower-lender relationship in the current quarter and did not have an active bank relationship in the prior six months. *New Relationship Formation* is an indicator variable that takes the value of one if a company started a new borrower-lender relationship in the current quarter with a bank with which it did not have a banking relationship in the prior six months. *New Loan Originations* is an indicator variable which takes the value of one if a company obtains a new loan in a given quarter and zero otherwise. *New Relationship Formation (main bank)* is an indicator variable that switches on only if a company signed a new loan deal in the current quarter with the main bank, defined as a bank with an important role, and with whom it did not have an active main bank relationship in the prior six months. *Disintermediation* is defined as the aggregate CSPP purchases by the ECB in the primary market within a country-5 digit NAICS-industry code in a given quarter. The average CSPP exposure is 0.05 percent in the overall Dealogic sample.

Panel D of Table I shows that we observe 35,505 relationships using Dealogic data. The average number of new relationship formations in this sample is a bit over one, and 3.2 percent of the sample borrowers form a new lending relationship. A total of 3.8 percent of companies in the sample also originate a new loan. Similarly, 3.5 percent of the sample forges a new lending relationship with a bank designated as a lead arranger (or another form of a lead bank) for their loans. In Table V, Panel C shows that the number of new relationships (columns 1 and 2) and new loan originations (columns 3 and 4) increase significantly following the introduction of the CSPP. In particular, the larger the exposure to CSPP intensity in a given industry and country-industry grid, the more likely a firm will establish a new borrowing relationship with a bank. In particular, a 1 percentage point increase in Disintermediation results in a 3 percent increase in the number of new relationships and a 2 percent increase in the likelihood of forming at least one new banking relationship. Similarly, a 1 percentage point increase in CSPP intensity also results in a 1 percent increase in new loan originations and a 2 percent increase in forming a relationship with a new main (or lead arranger) bank. We find that smaller companies are more

likely to create new lending relationships in the post-CSPP period as coefficients on their overall total loans outstanding (as captured by Dealogic loans data) are negative. We use the natural logarithm of total loans outstanding for a borrower in the prior period as a proxy for size as we do not directly observe borrower size or other borrower characteristics in Dealogic. Overall, our findings using Amadeus Bankers and Dealogic data suggest that banks exposed to the CSPP increase their lending to SMEs (intensive margin) and form new lending relationships with new borrowers, including SMEs (extensive margin).

E. Loan Characteristics

Prior literature has identified one potential concern with banks responding to macroeconomic stimulus by increasing loans to poorly performing relationship borrowers, the so-called "zombie lending" (e.g., Acharya et al., 2017; Bruche and Llobet, 2014). Using a detailed loan-level data from the ECB's LLD Initiative, we investigate whether banks affected by the CSPP, instead of offering new credit to new borrowers, continue to lend to their existing borrowers at preferential rates. Consistent with Acharya et al. (2017), we define zombie or forbearance loans as loans to existing customers which exhibit high loss given default (above the sample median) and low interest rates (below the sample median). We therefore estimate the following model:

$$Loan\ Characteristic_k = \beta_1 Disintermediation_{rjt} + \gamma X_k + \nu_{rj} + \lambda_{rt} + \sigma_{jt} + \alpha_i + \pi_p + \varepsilon_k, \qquad (5)$$

where each observation is an individual loan, indexed by k, i indexes firms, t indicates half-year, r corresponds to a region, j to an industry, i to a borrower and p to ABS pools. ν_{rj} are region-industry fixed effects, λ_{rt} are region-time fixed effects, σ_{jt} are industry-time fixed effects, α_i are borrower fixed effects and π_p are ABS pool fixed effects. X_k is a vector of loan control variables consisting of amount and maturity. The granularity of this data, which is collected as a part of the ECB's LLD Initiative, allows us to adopt an even more restrictive fixed effects structure. In addition to the multidimensional region-time, industry-region, and industry-time fixed effects,

we can include indicators for borrowers and asset-backed security (ABS) pools, which are a subset of bank fixed effects. Here, the region dimension is a finer classification than the country dimension, defined as the European Commission's nomenclature of territorial units for statistics.

The two dependent variables in these tests are *Interest Rate* and *Zombie Lending*. *Interest Rate* is the cost of credit charged, with a sample average of 2.156 percent (Table I, Panel E). *Zombie Lending* is an indicator variable that switches on if the spread charged on the contract is low (i.e., below the sample median) while the bank's loss given default estimate on the same loan is high (i.e., above the sample median). This empirical definition captures the spirit of the "extend and pretend" type of lending behavior, which is also referred to as zombie, forbearance, or evergreen lending, in keeping with Acharya et al. (2017) and Bruche and Llobet (2014). On average, we classify about 20 percent of the sample contracts as *Zombie Lending*.

In Panel A of Table VI, we present the results of the CSPP's impact on loan pricing. As we do not observe the underlying borrower characteristics, we use a tight fixed effects structure to take into account any unobserved heterogeneity across industry-time, region-time, industry-region, ABS pool, and borrowers. We find that banks decrease interest rates on new loans following the introduction of corporate-sector financial disintermediation. In particular, a 1 percentage point increase in the magnitude of CSPP exposure leads to a 0.02 to 0.096 percentage point decrease in interest rates on new loans for smaller borrowers. These coefficient estimates are economically meaningful relative to the sample standard deviation of interest charged, which is 0.44 percentage points. This inference is in line with the ECB's stated objectives: financial disintermediation in the corporate sector lowers financing costs for SMEs by providing extra funds to the commercial credit markets and by enhancing liquidity.

In Panel B of Table VI, we find that the likelihood of zombie lending decreases following the introduction of the CSPP and in Disintermediation. In particular, a 1 percentage point increase in a bank's exposure to the CSPP results in an 8.7 to 16.9 percent decrease in instances of zombie lending. This inference also corroborates our earlier findings on the formation of new bank-SME relationships.

In addition to the LLD results, we also check whether SMEs report lower interest rates in their Survey responses following the introduction of the CSPP. Using the same specification as in equation (2) above, we define *SME Interest Rate Decreased* as an indicator variable, which takes the value of one if SMEs respond that their interest rates decreased in the prior six months (question Q2_d of the Survey). As Table I, Panel B shows, 29 percent of our sample saw a decrease in interest rates over the whole period. In Table VI, Panel C, we find positive and statistically significant results. In particular, the likelihood of getting a lower interest rate increases in the magnitude of the industry-country exposure to the CSPP by 4 percent in the full period. It also increases by 3 percent if we consider only the post-CSPP implementation period specification, albeit our results are statistically weaker.

The Survey also allows us to capture whether SMEs refused to take credit because the offered interest rate was too high. In columns (3) and (4) of Table VI, Panel C we show that the likelihood of SMEs refusing credit because the offered interest rate is too high decreases by about 0.5 percent, which is economically and statistically significant. Overall, our findings for loan characteristics suggest that banks extend new credit on better terms to new borrowers, including SMEs, and also reduce rolling over credit on preferential terms to poor credit quality borrowers.

F. Real Effects

Having established that financial disintermediation in the corporate credit market enhances SMEs' access to financing, new banking relationships, and improved credit terms, we turn to our last set of results on spillover effects. In particular, we are interested in whether increased access to financing leads SMEs to fund real activities such as increased investment and hiring. In these tests, we rely on the Survey data and perform a cross-sectional analysis using post-CSPP data and a quasi-DiD using the full sample data. These approaches are in the spirit of the models for credit access defined in equation (2). Similar to our first set of analyses,

we also control for SME size, age, employment, profitability, and credit quality and include industry-time, country-time, and industry-country fixed effects.

Our main dependent variables that capture the real effects of CSPP purchases are based on answers to the variants of the Survey question (Q6a) about the purpose for which the financing is obtained. In particular, *Purpose: capital investment*, is an indicator that switches on only if the purpose of financing is fixed assets. *Purpose: employment*, is an indicator that switches on only if the purpose of financing is hiring. *Purpose: working capital,* is an indicator that switches on only if the purpose of financing is working capital. Finally, *Purpose: refinancing,* is an indicator that switches on only if the purpose of obtaining financing is to refinance.

These responses are not mutually exclusive, as the borrower can pick multiple loan purposes. Nor are they commonly exhaustive because the respondents can choose "other" or "do not know" as alternative options. As can be seen in Panel B of Table I, investment and employment reasons are given 61.4 percent and 8.3 percent of the time, whereas 40.6 percent and 16.9 percent of loan applications are for working capital and refinancing purposes, respectively.

Table VII presents our findings. As with the SMEs' credit access results in Table III, models (1) through (4) investigate the impact of corporate-sector financial disintermediation using the full sample, while models (5) through (8) focus on the post-CSPP period. Similar to our tests for credit access, we control for SME size, age, credit quality and profitability across all specifications. We also consider potentially unobserved heterogeneity by including a tight fixed effect structure by industry-time, country-time, and country-industry.

In both specifications, we observe that SMEs use increased access to financing to fund their real activities such as capital investments and increasing employment. This is an important takeaway, as our paper provides a direct link between the CSPP and real activities by looking exclusively at SMEs that apply for bank credit. Economically, a 1 percentage point increase in exposure to the CSPP results in a 4 percent increase in affected SMEs' likelihood to invest funds in capital projects and a 2 to 3 percent increase in hiring new employees. SMEs,

however, are 2 to 3 percent less likely to use the new funds to finance their working capital and 2 to 3 percent less likely to use the funds to refinance their existing loans. Overall, our findings indicate that increased access to financing leads to positive real activities for SMEs, suggesting positive real effects of corporate-sector financial disintermediation on the SME sector.

In the final stage of our analysis, we focus on the real effects of financial disintermediation on banks' operations. The shock that induced banks to steer toward lending to the SME sector may have also triggered a change in their lending technology and operational features. To shed light on this issue, we look at the number of bank branches and employees by using SNL Financial data. Since we observe this data on an annual frequency, we conduct our tests on a sample spanning 2014–2017. The numbers presented in the natural logarithm form in Panel F of Table I suggest that an average bank (median bank) in this sample has 424 branches and 9,685 employees (660 branches and 7,772 employees). Table VIII, Panel A shows our main findings. The estimates on *Affected Bank* × *Post CSPP* vary between 5.0 and 8.3 percent and are statistically significant. This suggests that the switch to SME lending necessitates banks to increase their access to small businesses, which need physical interactions to obtain a loan.

It is possible that CSPP results in banks' lending to riskier borrowers, chasing higher yields and, as a result, decreasing the quality of their loan portfolios. Using EBA data, we test whether non-performing loans (NPLs) for banks' SME portfolios have significantly increased following their exposure to the CSPP. Using a similar model as in equation (1) and changing our dependent variable to the percentage of SME NPLs relative to banks' overall SME loan portfolio (*SME NPLs % of SME Loans*), we find that the quality of SME loan portfolios has not changed significantly for affected banks following financial disintermediation in the corporate sector. Table VIII, Panel B shows that the coefficients on loan portfolio quality for affected banks are statistically insignificant and negative following the introduction of the CSPP. In untabulated results, we also find that liquidity-constrained banks actually observe a significant improvement in the quality of their SME loan portfolios, while less liquidity-constrained banks see a significant decrease in the quality of their SME portfolios. We find no significant difference in the quality of the SME portfolios for capital-constrained banks relative to unconstrained

banks. Finally, we test whether banks' default risk changes as a result of their increased exposures to the CSPP and SME lending. As a timely and market-based metric of credit risk, we examine banks' credit default swaps (CDS). The estimates in columns (3) and (4) in Panel B of Table VIII suggest no significant changes in banks' default risk using CDS spreads following financial disintermediation.

Overall, our findings are consistent with financial disintermediation in the corporate sector having positive real effects on SMEs through increased access to bank financing, as SMEs use new funds to invest into real activities such investments and hiring. We also find that banks invest in opening more branches and hiring more employees. Furthermore, we do not find evidence that the quality of the overall SME loan portfolios or bank default risk deteriorates for affected banks.

IV. Conclusion

What is the role of banking regulation in credit creation to small businesses, which are essential for the economy yet widely regarded as underserved by banks? Could the shrinking of one credit market for banks (e.g., corporate bond markets) prompt banks to increase lending to small businesses? If so, what are the channels through which financial disintermediation in one sector facilitates financial intermediation in another? To answer these important economic questions, we examine the European Central Bank's Corporate Sector Purchase Programme (CSPP). Since June 2016, the Eurosystem has purchased in the primary and secondary markets euro-denominated, investment-grade corporate bonds of non-financial corporations. The ECB argues that these outright asset purchases would benefit small businesses by increasing the amount of available bank credit and by lowering the cost of commercial debt in the Eurozone.

Despite its appeal and importance, however, examining the effect of corporate-sector financial disintermediation on SMEs' financing and investment activities is an empirical and economic challenge because any observed effects on equilibrium borrowing amounts could be driven merely by improving SME fundamentals or enhanced SME demand for credit, rather

than an increase in the supply of bank credit. We overcome this challenge by utilizing ECB's SME credit access surveys and provide evidence that SMEs affected by financial disintermediation (i.e., those in the country-industry grids with significant CSPP activity) enjoy a relative increase in the amount of bank credit, *conditional on* applying for credit. Furthermore, they are more likely to forge new borrowing relationships, use the additional funds for investment and hiring purposes, and pay lower interest costs, consistent with positive real effects of corporate-sector financial disintermediation. Further tests at the bank- and loan-level confirm these inferences.

Overall, our conclusions contribute to the ongoing debate about the economy-wide effects of financial disintermediation in the large corporate borrowers' sector having an impact on financial intermediation for SMEs. We use a specific example of an unconventional monetary policy intervention to study this impact. However, it is important to note that not all such interventions have desirable outcomes. Furthermore, our paper does not explore potentially adverse or unintended consequences of the policy intervention we study. More generally, future research could shed light on the attributes of regulatory policy tools that help small businesses more.

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Appendix A. Variable Definitions

Sample: EBA Disclosures

Variable Name	Definition	Data Source
Affected Bank	Indicator equals one for banks with at least one relationship borrower whose bonds were purchased by ECB	ECB and Dealogic
Post CSPP	Indicator equals one for half-years on or after 2016H2	EBA Transparency Exercise results
SME Exposure	SME lending as a fraction of total exposures of the bank	EBA Transparency Exercise results (Retail - of which: SME and Standardised Total)
CORP Exposure	Non-SME corporate lending as a fraction of total exposures of the bank	EBA Transparency Exercise results (Corporates and Standardised Total)

Sample: ECB Survey on the Access to Finance of Enterprises (SAFE)

Variable Name	Definition	Data Source
Disintermediation	Total purchases by the ECB within a country-SAFE industry during the corresponding wave time period deflated by the total value of all bonds outstanding in the country-SAFE industry. ECB purchases by security are defined as the tranche value divided by the total tranche value of all securities purchased by the ECB on the primary market during the month and multiplied by the monthly total value of ECB purchases on the primary market	ECB and Dealogic
Credit Access (bank loan)	1 if rejected, 2 if got up to 75%, 3 if got more than 75% but less than 100%, 4 if got 100% of the applied amount	ECB SAFE (Original question: Q7b_a)
Bank Loan Availability	Indicator that switches on only if the respondent SME believes that the availability of bank loans is increasing.	ECB SAFE (Original question: Q23_b)
Trade Credit Availability	Indicator that switches on only if the respondent SME believes that the availability of trade credit is increasing.	ECB SAFE (Original question: Q23_d)
Lease Financing Availability	Indicator that switches on only if the respondent SME believes that the availability of trade credit is increasing.	ECB SAFE (Original question: Q23_i)

Purpose: Capital Investment	Indicator that switches on only if the purpose of financing is fixed investment	ECB SAFE (Original question: Q6a_1)
Purpose: Employment	Indicator that switches on only if the purpose of financing is hiring	ECB SAFE (Original question: Q6a_3)
Purpose: Working Capital	Indicator that switches on only if the purpose of financing is working capital	ECB SAFE (Original question: Q6a_2)
Purpose: Refinancing	Indicator that switches on only if the purpose of financing is refinancing	ECB SAFE (Original question: Q6a_5)
SME Interest Rate Decreased	Indicator that switches on only if the respondent SME states that interest expense has decreased	ECB SAFE (Original question: Q6a_5)
Borrower Refused Because Interest Cost Was High	Indicator that switches on only if the respondent SME states that its loan application was accepted, but it decided not to take the loan because the cost was too high.	ECB SAFE (Original question: Q2_d)
Bonds issuance	Total primary market issuances within a country-SAFE industry during the corresponding wave period deflated by the total value of all bonds outstanding in the country-SAFE industry.	Dealogic
SME size	1 if annual sales up to €2 million, 2 if between €2 and 10 million, 3 if between €10 and 50 million, and 4 if over €50 million.	ECB SAFE (Original question: d4)
SME age	1 if up to two years, 2 if between two and five years, 3 if between five and ten years, 4 if over 10 years	ECB SAFE (Original question: d5_rec)
SME credit quality	1 if credit quality deteriorated over the past six months, 2 if credit quality remained the same, 3 if credit quality improved	ECB SAFE (Original question: Q11_e)
SME profitability growth	1 if profits decreased over the past six months, 2 if profits remained the same, 3 if profits increased	ECB SAFE (Original question: Q2_e)

Sample: Amadeus

Variable Name	Definition	Data Source
Disintermediation	Total purchases by the ECB within a country-2 digit NAICS industry from 1 July 2016 until 31 December 2017 deflated by the total value of all bonds outstanding in the country-2 digit NAICS industry. ECB purchases by security are defined as the tranche value divided by the total tranche value of all securities purchased by the ECB on the primary market during a month and multiplied by the monthly total value of ECB purchases on the primary market	ECB and Dealogic
Debt Growth	The percentage growth in SME debt as a fraction of total non-cash assets calculated once for each SME.	Amadeus Financials (mnemonic *loan*, *ltdb*, *toas, cash*)

New Relationship Formation	Indicator variable, which takes the value of one if a firm has more lenders in 2017 and 2016 than it did in 2015 and 2014; and zero otherwise.	Amadeus Bankers
Firm size	Natural logarithm of total assets	Amadeus Financials (mnemonic *toas*)
Firm age	Firm age in years	Amadeus Financials
Firm employment	Number of employees	Amadeus Financials
Firm profitability	Pre-tax income as a percentage of total assets	Amadeus Financials (mnemonics *plbt* and *toas*)
Firm leverage	Total debt as a percentage of total assets	Amadeus Financials (mnemonics *totdebt* and *toas*)

Sample: Dealogic Firm-Creditor Relationship

Variable Name	Definition	Data Source
Disintermediation	Aggregate purchases by the ECB within a country-5 digit NAICS in a given quarter. ECB purchases by security are defined as the tranche value divided by the total tranche value of all securities purchased by the ECB on the primary market in the corresponding month multiplied by the monthly total value of ECB purchases on the primary market	ECB and Dealogic
Log of Number of New Relationship Formations	Natural logarithm of the number of banks with whom the company started a new borrower-lender relationship in the current quarter and did not have an active relationship in the prior 6 months	Dealogic
New Relationship Formation	Indicator variable, which takes the value of one if a company started a new borrower-lender relationship in the current quarter with a bank with whom it did not have an active bank relationship in the prior 6 months	Dealogic
New Loan Originations	Indicator variable, which takes the value of one if a company takes out a new loan and zero otherwise	Dealogic
New Relationship Formation (main bank)	Indicator variable, which takes the value of one if a company signs a new loan deal in the current quarter with the main bank with which it did not have an active main bank relationship in the prior six months. The main bank is defined as a bank playing an important role(mnemonics *isleadleft*), has the largest participation amount and the most important role (mnemonics *bankroleid*)	Dealogic
Log total loans outstanding$_{(t-1)}$	Natural logarithm of the total loans outstanding in the previous quarter	Dealogic

Sample: ECB Loan-level Data

Variable Name	Definition	Data Source
Disintermediation	Total purchases by the ECB within a country-one digit NACE industry during the quarter deflated by the total value of all bonds outstanding in the country-one digit NACE industry. ECB purchases by security are defined as the tranche value divided by the total tranche value of all securities purchased by the ECB on the primary market during a month and multiplied by the monthly total value of ECB purchases on the primary market	ECB and Dealogic
Interest Rate	Percentage spread	ECB Loan-level Data (variable as80)
Zombie Lending	Indicator that switches on only if the sample interest rate is below the median and loss given default estimate is above the median.	ECB Loan-level Data (variable as80 and as37)
Log (Amount)	Original loan amount	ECB Loan-level Data (variable as54)
Loan Maturity	Tenor of the loan, calculated as the difference between the stated maturity date and origination date (in months)	ECB Loan-level Data (variable as51 and as50)

Sample: SNL Bank Data

Variable Name	Definition	Data Source
Affected Bank	Indicator equals one for banks with at least one relationship borrower whose bonds were purchased by ECB	ECB and Dealogic
Post CSPP	Indicator equals one for years 2016 and 2017	SNL
Pre CSPP	Indicator equals one for the year 2015	SNL
Log(Number of Branches)	Number of branches of the bank	SNL Financials (field 134882)
Log(Number of Employees)	Annual average number of full-time employees of the bank	SNL Financials (field 134875)
Log(Total Assets)	Bank total assets	SNL Financials (field 131929)

Table I: Descriptive Statistics

This table presents the sample statistics. Panel A presents summary statistics for the EBA sample in which each observation is a bank-half-year. Panel B lists the summary statistics for the ECB Credit Access Survey for SMEs (SAFE), in which each observation is a firm-half-year. Panel C presents the summary statistics for the Dealogic sample, in which each observation is a firm-quarter. Panel D includes the summary statistics for the Amadeus sample, in which each observation is a firm. Panel E shows the summary statistics for the LLD sample, in which each observation is a loan contract. Panel F includes the summary statistics for the SNL sample, in which each observation is a bank-year. Only mean values are presented for indicator variables. All variables are defined in Appendix A.

Panel A. EBA

	Mean	stdev	p10	p50	p90	N
Affected Bank × Post CSPP	0.256					386
Affected Bank	0.500					386
Post CSPP	0.492					386
Affected Bank × Pre CSPP	0.122					386
SME Exposure (%)	8.220	7.982	0.0	7.135	18.488	386
CORP Exposure (%)	12.882	12.237	1.739	9.758	27.560	386
Balance Sheet Illiquidity	2.486	1.115	1.0	2.0	4.0	368
Capital Constraints	2.522	1.127	1.0	3.0	4.0	364
SME NPLs (% of SME Loans)	5.137	7.835	0.017	2.258	13.556	386

Panel B. ECB Credit Access Survey

	Mean	stdev	p10	p50	p90	N
Disintermediation (%)	0.085	0.316	0.0	0.0	0.180	11,180
SME Access to Bank Credit	0.802	0.398	0.0	1.0	1.0	11,180
SME Interest Rate Decreased	0.288					10,927
Borrower Refused Because Interest Rate Was High	0.012					12,587
Purpose: capital investment	0.614					11,180
Purpose: employment	0.083					11,180
Purpose: working capital	0.406					11,180
Purpose: refinancing	0.169					11,180
SME size	2.184	1.059	1.0	2.0	4.0	11,180
SME age	3.840	0.478	3.0	4.0	4.0	11,180
SME credit quality	2.264	0.624	2.0	2.0	3.0	11,180
SME profitability growth	2.054	0.815	1.0	2.0	3.0	11,180
Bond issuance	2.583	6.653	0.0	0.0	6.978	11,180
Bank Loan Availability	0.263					5,606
Trade Credit Availability	0.190					5,606
Lease Financing Availability	0.211					3,333

Panel C. Amadeus

	Mean	stdev	p10	p50	p90	N
Disintermediation (%)	0.483	1.108	0.0	0.0	1.256	6,042
Debt Growth (%)	0.042	10.387	-7.498	0.0	6.855	1,739
New Relationship Formation (%)	5.561					6,042
Firm size	19.964	4.066	15.747	17.893	25.248	6,042
Firm age	31.201	24.705	11.0	25.0	59.0	6,042
Firm employment	4.594	1.490	2.708	4.710	6.263	6,042
Firm profitability	11.444	216.063	-1.337	5.484	22.096	6,042
Firm leverage	17.162	26.896	0.0	6.111	48.457	6,042

Panel D. Dealogic

	Mean	stdev	p10	p50	p90	N
Disintermediation (%)	0.046	0.361	0.0	0.0	0.0	35,505
Log of Number of New Relationship Formations	0.045	0.271	0.0	0.0	0.0	35,505
New Relationship Formation (%)	3.188					35,505
New Loan Originations (%)	3.828					35,505
New Relationship Formation (main bank) (%)	3.540					35,505
Log total loans outstanding$_{(t-1)}$	3.699	2.463	0.0	4.146	6.621	35,505

Panel E. ECB Loan-level Data

	Mean	stdev	p10	p50	p90	N
Disintermediation (%)	0.131	0.082	0.096	0.121	0.270	327,452
Interest Rate (%)	2.156	0.444	2.170	2.190	2.240	327,452
Zombie Lending (%)	20.295					327,452

Panel F. SNL Data on Bank Branches and Employees

	Mean	stdev	p10	p50	p90	N
Affected Bank × Post CSPP	0.269					271
Affected Bank	0.520					271
Post CSPP	0.502					271
Affected Bank × Pre CSPP	0.133					271
Pre CSPP	0.258					271
Log(Number of Branches)	6.049	1.812	3.912	6.492	7.826	271
Log(Number of Employees)	9.178	1.224	7.632	8.958	10.759	271
Log(Total Assets)	18.268	1.294	16.705	18.098	20.181	271

Table II: Effects of the CSPP on Banks' Exposures to the SME Sector

This table presents the results of the OLS estimation of the impact of the CSPP on systemically important European Banks using the EBA Transparency Exercise data, which reports banks' SME and corporate exposures. Panel A presents the main treatment effect and Panel B presents the cross-sectional variation in treatment effects. *SME Exposure (CORP Exposure)* corresponds to a given bank's SME (Corporate) loan assets relative to total exposures. *Affected Bank* is an indicator that switches on only if the bank has at least one large corporate relationship borrower (as per Dealogic), whose bonds are purchased under the CSPP. As a robustness check, *Affected Bank* is a continuous variable in column (6) of Panel A. *Post CSPP* is an indicator variable that switches on for 2016H2 and 2017H1. *Pre CSPP* is an indicator variable that switches on for 2015H2 and 2016H1. *I* corresponds to a quartile rank which takes the value of one if a bank is in the top quartile of liquidity (capital) and four if the bank is in a lower quartile (based on the proportion of liquid assets (Tier 1 regulatory capital) before the introduction of CSPP in June 2016). As denoted in the table, *T*-statistics (reported in parentheses) are robust to within-bank correlation and heteroscedasticity. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A. The Main Treatment Effect

	(1)	(2)	(3)	(4)	(5)	(6)
	SME Exposure	*SME Exposure*	*SME Exposure*	*SME Exposure*	*SME Exposure*	*SME Exposure*
Affected Bank	-2.257	-2.630	.	.	.	.
	(-1.41)	(-1.50)	.	.	.	.
Affected Bank × Post CSPP	2.279***	2.027***	0.947**	1.088**	1.442**	0.355*
	(2.84)	(3.10)	(2.20)	(2.51)	(2.24)	(1.78)
CORP Exposure				0.135	0.136	0.130
				(1.48)	(1.49)	(1.42)
Affected Bank × Pre CSPP					0.707	0.285
					(1.29)	(0.70)
Observations	386	386	386	386	386	386
Adjusted R-squared	-0.001	0.381	0.947	0.949	0.949	0.948
Definition of *Affected Bank*	Indicator	Indicator	Indicator	Indicator	Indicator	Continuous
Time FE	Y	Y	Y	Y	Y	Y
Country FE	N	Y	N	N	N	N
Bank FE	N	N	Y	Y	Y	Y

Panel B. Cross-sectional Variation in Treatment Effect

	(1)	(2)	(3)	(4)
	I = Balance Sheet Illiquidity	*I = Balance Sheet Illiquidity*	*I = Capital Constraints*	*I = Capital Constraints*
	SME Exposure	*SME Exposure*	*SME Exposure*	*SME Exposure*
Affected Bank × Post CSPP × I	5.305***	0.742*	-0.786	0.023
	(3.49)	(1.74)	(-0.56)	(0.05)
Affected Bank × Post CSPP	-14.875***	-1.533	-1.219	0.355
	(-3.14)	(-1.16)	(-0.30)	(0.30)
Post CSPP × I	-2.008	-0.482	2.423**	0.019
	(-1.58)	(-1.36)	(2.07)	(0.06)
Observations	368	368	364	364
Adjusted R-squared	0.076	0.938	0.061	0.937
Controls	Y	Y	Y	Y
Time FE	Y	Y	Y	Y
Bank FE	N	Y	N	Y

Table III: Spillover Effects on Credit Access for SMEs

This table presents the results of OLS regressions of SME credit access on the intensity of the CSPP. The unit of observation is at the firm and Survey-wave level. *SME Access to Bank Credit* captures SMEs' ability to raise financing through loan applications (Panel A). This variable varies between 1 (full financing received upon application) and 0 (less than the full amount received). *Disintermediation* is a continuous variable measured as the aggregate corporate bond purchases by the ECB in the primary market within a country-SAFE industry during the corresponding wave period and deflated by the total value of all bonds outstanding in the country-SAFE industry. This variable is zero for the survey observations before June 2016 and for SAFE industries, which do not observe eligible corporate bond purchases in the post-June 2016 waves. Models (1) to (3) include the full sample of observations in a quasi-DiD setting. Models (4) to (6) include a post-treatment period only. Panel B presents the results of regressions which uses survey weights (columns (1) and (2)) and SME fixed effects (columns (3) and (4)). Variables are defined in Appendix A. *T*-statistics (reported in parentheses) are robust to within-country correlation and heteroscedasticity. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: SMEs' Loan Applications

	(1)	(2)	(3)	(4)	(5)	(6)
	Full period			Post-CSPP only		
	SME Access to Bank Credit	*SME Access to Bank Credit*	*SME Access to Bank Credit*	*SME Access to Bank Credit*	*SME Access to Bank Credit*	*SME Access to Bank Credit*
Disintermediation	0.041***	0.024**	0.032**	0.028**	0.021*	0.030*
	(2.72)	(2.09)	(2.46)	(2.19)	(1.78)	(1.98)
SME size	0.042***	0.036***	0.037***	0.044***	0.035***	0.035***
	(9.89)	(8.39)	(8.34)	(7.24)	(6.72)	(6.35)
SME age	0.042***	0.045***	0.044***	0.050***	0.054***	0.052***
	(4.59)	(5.04)	(4.88)	(3.19)	(3.51)	(3.32)
SME credit quality	0.061***	0.064***	0.065***	0.054***	0.060***	0.060***
	(7.48)	(8.27)	(8.15)	(4.72)	(5.52)	(5.46)
SME profitability growth	0.036***	0.034***	0.033***	0.030***	0.028***	0.028***
	(6.08)	(6.96)	(6.40)	(3.48)	(5.00)	(4.58)
Observations	11,180	11,180	11,180	5,632	5,632	5,632
Adjusted R-squared	0.040	0.086	0.091	0.038	0.091	0.093
Wave FE	N	Y	N	N	Y	N
Industry FE	N	Y	N	N	Y	N
Country FE	N	Y	N	N	Y	N
Industry-wave FE	N	N	Y	N	N	Y
Country-wave FE	N	N	Y	N	N	Y
Industry-country FE	N	N	Y	N	N	Y

Panel B: Robustness

	(1)	(2)	(3)	(4)
	Full period	Post-CSPP only	Full period	Post-CSPP only
	Specification: Use survey weights	Specification: Use survey weights	Specification: Include SME fixed effects	Specification: Include SME fixed effects
Disintermediation	0.035**	0.031*	0.048**	0.060*
	(2.39)	(1.89)	(2.11)	(1.78)
SME size	0.038***	0.045***	-0.033	0.014
	(6.70)	(4.99)	(-0.98)	(0.31)
SME age	0.033***	0.032	-0.007	-0.013
	(2.82)	(1.58)	(-0.18)	(-0.06)
SME credit quality	0.063***	0.059***	0.022	0.017
	(6.81)	(4.53)	(1.56)	(0.51)
SME profitability growth	0.040***	0.040***	0.007	0.007
	(5.71)	(4.13)	(0.60)	(0.29)
Observations	11,180	5,632	11,180	5,632
Adjusted R-squared	0.102	0.106	0.511	0.580
Industry-wave FE	Y	Y	Y	Y
Country-wave FE	Y	Y	Y	Y
Industry-country FE	Y	Y	Y	Y

Table IV: Financial Disintermediation vs. Changing Economic Fundamentals

This table presents the results of OLS regressions of SME credit access on the intensity of the CSPP. The unit of observation is at the firm and Survey-wave level. *SME Access to Bank Credit* captures SMEs' ability to raise financing through loan applications (Panel A). This variable varies between 1 (full financing received upon application) and 0 (less than the full amount received). *Disintermediation* is a continuous variable measured as the aggregate corporate bond purchases by the ECB in the primary market within a country-SAFE industry during the corresponding wave period and deflated by the total value of all bonds outstanding in the country-SAFE industry. In Panel A, *Bond issuance* is total primary market issuances within a country-SAFE industry during the corresponding wave time period deflated by the total value of all bonds outstanding in the country-SAFE industry (columns (1) and (2)). Columns (3) and (4) present the results of the placebo tests for the main findings presented in Table III. In Panel B *Bank Loan Availability* is an indicator variable, which takes the value of one if SMEs perceive an increase in funding through the availability of new loans. *Trade Credit Availability* (*Lease Financing Availability*) is an indicator variable, which takes the value of one if SMEs perceive an increase in the availability of trade credit (lease financing). Variables are defined in Appendix A. *T*-statistics (reported in parentheses) are robust to within-country correlation and heteroscedasticity. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels.

Panel A. Main Results after Controlling for Economic Activities and Placebo Specifications

	(1)	(2)	(3)	(4)
	Controlling for Bond Issuance		Placebo Tests	
	SME Access to Bank Credit	*SME Access to Bank Credit*	*SME Access to Bank Credit*	*SME Access to Bank Credit*
Disintermediation		0.027*	-0.007	0.022
		(1.88)	(-1.66)	(1.63)
SME size	0.037***	0.037***	0.038***	0.037***
	(8.29)	(8.32)	(5.76)	(5.74)
SME age	0.044***	0.044***	0.048***	0.048***
	(4.89)	(4.88)	(5.57)	(5.58)
SME credit quality	0.065***	0.065***	0.098***	0.098***
	(8.15)	(8.15)	(11.98)	(11.97)
SME profitability growth	0.033***	0.033***	0.030***	0.030***
	(6.43)	(6.42)	(5.77)	(5.77)
Bond issuance	0.001**	0.001		
	(2.13)	(1.16)		
Observations	11,180	11,180	10,465	10,465
Adjusted R-squared	0.091	0.091	0.143	0.143
Industry-wave FE	Y	Y	Y	Y
Country-wave FE	Y	Y	Y	Y
Industry-country FE	Y	Y	Y	Y
Placebo test	None	None	Normal	Naive

Panel B. SMEs' Perceptions on Availability of Funds

	(1)	(2)	(3)
	Bank Loan Availability	*Trade Credit Availability*	*Lease Financing Availability*
Disintermediation	0.024*	0.006	0.005
	(1.70)	(0.51)	(0.22)
SME size	0.027***	0.008	0.017*
	(4.29)	(1.17)	(1.82)
SME age	-0.031**	-0.036***	-0.029*
	(-2.30)	(-2.86)	(-1.71)
SME credit quality	0.100***	0.082***	0.076***
	(11.06)	(9.04)	(6.28)
SME profitability growth	0.063***	0.033***	0.047***
	(7.24)	(4.59)	(4.78)
Observations	5,606	5,606	3,333
Adjusted R-squared	0.073	0.052	0.030
Industry-wave FE	Y	Y	Y
Country-wave FE	Y	Y	Y
Industry-country FE	Y	Y	Y

Table V: Extensive and Intensive Margins

This table presents the results of the OLS estimation of new relationship formation. Panels A and B present the results using Amadeus Bankers dataset in a first differences setting. *Debt Growth %* is the percentage change in debt over non-cash assets. *New relationship formation* is an indicator variable that takes the value of one if a firm has more lenders in 2017 and 2016 than it did in 2015 and 2014, and zero otherwise. *Disintermediation* is the total purchases by the ECB within a country-2 digit NAICS industry during the quarter deflated by the total value of all bonds outstanding in the country-2 digit NAICS industry. Panel C presents the results using a Dealogic syndicated loans sample in a DiD setting. *Log of number of new relationship formations* is the natural logarithm of the number of banks with whom a company started a borrower-lender relationship in the current quarter and did not have an active bank relationship in the prior six months. *New relationship formation* is an indicator variable that takes the value of one if a company started a new borrower-lender relationship in the current quarter with a bank with which it did not have a banking relationship in the prior six months. *New loan originations* is an indicator variable which takes the value of one if a company obtains a new loan in a given quarter and zero otherwise. *New relationship formation (main bank)* is an indicator variable that switches on only if a company signed a new loan deal in the current quarter with the main bank, defined as a bank with an important role, with whom it did not have an active main bank relationship in the prior six months. *Disintermediation* is defined at the country-NAIC 5-code level as the aggregate CSPP purchases by the ECB in the primary market within a country-5 digit NAICS in a given quarter. Variables are defined in Appendix A. *T*-statistics (reported in parentheses) are robust to within-country correlation and heteroscedasticity. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Intensive Margins

	(1)	(2)
	Debt Growth (%)	*Debt Growth (%)*
Disintermediation	0.338**	0.253**
	(2.58)	(2.39)
Firm size		-0.085*
		(-2.66)
Firm age		-0.011
		(-1.00)
Firm employment		-0.029
		(-0.23)
Firm profitability		-0.005***
		(-79.70)
Firm leverage		-0.086***
		(-10.48)
Observations	1,739	1,739
Adjusted R-squared	0.002	0.042

Panel B. Extensive Margins Based on Amadeus SME Borrowers

	(1)	(2)
	New Relationship Formation	*New Relationship Formation*
Disintermediation	0.990***	1.013***
	(2.70)	(3.40)
Firm size		-0.018
		(-0.05)
Firm age		-0.030*
		(-1.92)
Firm employment		0.195
		(1.17)
Firm profitability		-0.000
		(-1.57)
Firm leverage		0.021
		(1.01)
Observations	6,042	6,042
Adjusted R-squared	0.002	0.003

Panel C. All Dealogic Syndicated Borrowers

	(1)	(2)	(3)	(4)
	Log of Number of New Relationship Formations	*New Relationship Formation*	*New Loan Originations*	*New Relationship Formation (main bank)*
Disintermediation	0.027***	0.016***	0.014***	0.015***
	(2.63)	(2.90)	(2.59)	(2.82)
Log total loans outstanding$_{(t-1)}$	-0.012***	-0.007***	-0.004***	-0.005***
	(-9.80)	(-5.77)	(-3.19)	(-3.97)
Observations	35,505	35,505	35,505	35,505
Adjusted R-squared	0.013	0.011	0.009	0.009
Country-Qtr FE	Y	Y	Y	Y
NAICS2-Qtr FE	Y	Y	Y	Y
NAICS2-Country FE	Y	Y	Y	Y

Table VI: Effects of the CSPP on Loan Characteristics

This table presents the results of the OLS estimation of the impact of the CSPP on loan characteristics using LLD data for Panels A and B and Survey data for Panel C. *Interest Rate* corresponds to the interest rates charged on the loans (in percentage points). *Zombie Lending* is an indicator variable that switches on only if the loan's *Interest Rate* is below the sample median, and *Loss Given Default* estimate is above the sample median. Consistent with the structure of the ECB loan-level data, *Industry* is defined as one-digit Nomenclature of Economic Activities (NACE) codes and the *Region* as Nomenclature of Territorial Units for Statistics (NUTS), which vary within countries. Loan controls include *Log (Amount),* the natural logarithm of the total amount of loans offered and *Loan Maturity,* the number of months until the loan matures. Panel C presents Survey responses to the question whether interest rates on new loans changed or SMEs refused credit. *SME Interest Rate Decreased* takes the value of one if SMEs respond that their interest rates on new loans decreased in the past six months and zero otherwise. *Borrower Refused Because Interest Cost Was High* takes the value of one if the respondent SME states that it refused the offer of bank credit because the offered rate was too high. Models (1) and (3) include the full sample of observations in a DiD setting. Models (2) and (4) include a post-treatment period only. Variables are defined in Appendix A. *T*-statistics (reported in parentheses) are robust to within-ABS-Deal correlation and heteroscedasticity (Panels A and B) and within-country correlation and heteroscedasticity (Panel C). ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A. SMEs' Cost of Debt

	(1)	(2)	(3)	(4)
	Interest Rate	*Interest Rate*	*Interest Rate*	*Interest Rate*
Disintermediation	-0.096**	-0.094**	-0.035***	-0.019**
	(-2.65)	(-2.77)	(-5.21)	(-2.66)
Observations	327,452	327,452	327,452	327,452
Adjusted R-squared	0.556	0.566	0.888	0.889
Industry-time FE	Y	Y	Y	Y
Region-time FE	Y	Y	Y	Y
Industry-region FE	Y	Y	Y	Y
ABS Pool FE	N	Y	Y	Y
Borrower FE	N	N	Y	Y
Loan Controls	N	N	N	Y

Panel B. Recipients of Funds

	(1)	(2)	(3)	(4)
	Zombie Lending	*Zombie Lending*	*Zombie Lending*	*Zombie Lending*
Disintermediation	-0.115*	-0.102	-0.087***	-0.169***
	(-2.03)	(-1.60)	(-6.73)	(-5.73)
Observations	327,452	327,452	327,452	327,452
Adjusted R-squared	0.293	0.300	0.396	0.396
Industry-time FE	Y	Y	Y	Y
Region-time FE	Y	Y	Y	Y
Industry-region FE	Y	Y	Y	Y
ABS Pool FE	N	Y	Y	Y
Borrower FE	N	N	Y	Y
Loan Controls	N	N	N	Y

Panel C: SMEs' Interest Rates

	(1)	(2)	(3)	(4)
	Full period	Post-CSPP only	Full period	Post-CSPP only
	SME Interest Rate Decreased	*SME Interest Rate Decreased*	*Borrower Refused Because Interest Cost Was High*	*Borrower Refused Because Interest Cost Was High*
Disintermediation	0.039**	0.026*	-0.006**	-0.004**
	(2.63)	(1.87)	(-2.58)	(-2.06)
SME size	0.080***	0.062***	-0.004***	-0.004**
	(10.17)	(5.43)	(-4.71)	(-2.68)
SME age	0.042***	0.041***	-0.001	0.002
	(4.34)	(3.13)	(-0.61)	(0.90)
SME credit quality	0.086***	0.101***	0.000	0.002
	(7.16)	(5.39)	(0.17)	(0.75)
SME profitability growth	0.041***	0.027***	-0.000	-0.000
	(7.27)	(4.66)	(-0.32)	(-0.34)
Observations	9,558	4,881	12,587	6,233
Adjusted R-squared	0.115	0.079	0.006	0.003
Industry-wave FE	Y	Y	Y	Y
Country-wave FE	Y	Y	Y	Y
Industry-country FE	Y	Y	Y	Y

Table VII: Real effects of the CSPP on European SMEs

This table presents the results of the OLS estimation of the impact of the CSPP on SMEs using the Survey data and the responses that correspond to the purpose of obtaining new financing. *Purpose: Capital Investment* is an indicator that switches on only if the purpose of financing is fixed investment. *Purpose: Employment* is an indicator that switches on only if the purpose of financing is hiring. *Purpose: Working capital* is an indicator that switches on only if the purpose of financing is working capital. *Purpose: Refinancing* is an indicator that switches on only if the purpose of financing is refinancing. Models (1) to (4) include the full sample of observations in a DiD setting. Models (5) to (8) include a post-treatment period only. Variables are defined in Appendix A. *T*-statistics (reported in parentheses) are robust to within-country correlation and heteroscedasticity. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Full period				Post-CSPP only			
	Purpose: Capital Investment	*Purpose: Employment*	*Purpose: Working Capital*	*Purpose: Refinancing*	*Purpose: Capital Investment*	*Purpose: Employment*	*Purpose: Working Capital*	*Purpose: Refinancing*
Disintermediation	0.041***	0.027***	-0.017	-0.028***	0.043***	0.023**	-0.026**	-0.024***
	(3.00)	(2.97)	(-1.30)	(-3.70)	(4.51)	(2.32)	(-2.26)	(-3.61)
SME size	0.033***	-0.014***	0.037***	-0.008	0.030***	-0.012***	0.045***	0.000
	(5.29)	(-4.85)	(5.89)	(-1.49)	(3.44)	(-2.83)	(5.24)	(0.00)
SME age	0.014	-0.008	-0.028***	-0.002	0.015	-0.010	-0.028	-0.010
	(1.54)	(-1.31)	(-2.69)	(-0.30)	(0.99)	(-1.34)	(-1.53)	(-0.91)
SME credit quality	0.041***	0.001	-0.023***	-0.024***	0.036***	0.002	-0.016	-0.012
	(5.25)	(0.28)	(-3.32)	(-3.47)	(3.54)	(0.34)	(-1.50)	(-1.41)
SME profitability growth	0.038***	0.002	-0.010*	-0.023***	0.033***	0.006	-0.013*	-0.031***
	(6.84)	(0.47)	(-1.67)	(-5.28)	(4.19)	(1.16)	(-1.73)	(-5.25)
Observations	11,180	11,180	11,180	11,180	5,632	5,632	5,632	5,632
Adjusted R-squared	0.105	0.019	0.132	0.093	0.099	0.025	0.134	0.103
Industry-wave FE	Y	Y	Y	Y	Y	Y	Y	Y
Country-wave FE	Y	Y	Y	Y	Y	Y	Y	Y
Industry-country FE	Y	Y	Y	Y	Y	Y	Y	Y

Table VIII: Real effects of the CSPP on European Banks

This table presents the results of the OLS estimation of the impact of the CSPP on systemically important European Banks. *Affected Bank* is an indicator that switches on only if the bank has at least one large corporate relationship borrower (as per Dealogic), whose bonds are purchased under the CSPP. In Panel A, per the frequency of data provided by SNL, each observation is a bank-year, and the sample period is 2014–2017. *Post CSPP* is an indicator variable that switches on for years 2016 and 2017. *Pre CSPP* is an indicator variable that switches on for 2015. *Number of Branches (Number of Employees)* corresponds to a given bank's average annual number of branches (full-time employees). In Panel B, per the frequency of EBA Transparency Exercise, each observation is a bank-year. *SME NPLs (% of SME Loans)* corresponds to a given bank's non-performing loans in the SME sector relative to their total SME lending. *CDS Spread* is the half-yearly average of the premium charged on a bank's five-year CDS contract, presented in percentage points. *Post CSPP* is an indicator variable that switches on for 2016H2 and 2017H1, and *Pre CSPP* is an indicator variable that switches on for 2016H1. T-statistics are robust to within-bank correlation and heteroscedasticity. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Banks' Operations and Business Model

	(1)	(2)	(3)	(4)
	Log(Number of Branches)	*Log(Number of Branches)*	*Log(Number of Employees)*	*Log(Number of Employees)*
Affected Bank × Post CSPP	0.050**	0.060*	0.067***	0.083***
	(2.03)	(1.75)	(2.95)	(2.77)
Affected Bank × Pre CSPP		0.019		0.031
		(0.73)		(1.54)
Observations	271	271	271	271
Within R-squared	0.031	0.038	0.026	0.028
Cluster	Bank	Bank	Bank	Bank
Bank and Time FE	Yes	Yes	Yes	Yes

Panel B. Loan Portfolio and Credit Quality

	(1)	(2)	(3)	(4)
	SME NPLs (% of SME Loans)	*SME NPLs (% of SME Loans)*	*CDS Spreads (in pct. points)*	*CDS Spreads (in pct. points)*
Affected Bank × Post CSPP	-0.224	-0.330	0.501	1.475
	(-0.15)	(-0.21)	(0.34)	(0.88)
Affected Bank × Pre CSPP		-0.212		0.396
		(-0.58)		(0.55)
Observations	341	341	198	198
Adjusted R-squared	0.953	0.953	0.808	0.875
Controls	Y	Y	Y	Y
Bank and Time FE	Y	Y	Y	Y

Online Appendix

Table OAI: CSPP and Banks' Exposures to the SME Sector (Raw Values)

This table presents the results of the OLS estimation of the impact of the CSPP on systemically important European Banks using the EBA Transparency Exercise data, which reports banks' SME and corporate exposures. *SME Exposure (CORP Exposure)* corresponds to a given bank's SME (Corporate) exposures in billions of euros. *Affected Bank* is an indicator that switches on only if the bank has at least one large corporate relationship borrower (as per Dealogic), whose bonds are purchased under the CSPP. *Post CSPP* is an indicator variable that switches on for 2016H2 and 2017H1. *Pre CSPP* is an indicator variable that switches on for 2016H1. As denoted in the table, *T*-statistics (reported in parentheses) are robust to within-bank correlation (models 1-5) and within-country correlation (model 6) and heteroscedasticity. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	SME Exposure (€ billions)	*SME Exposure (€ billions)*	*SME Exposure (€ billions)*	*SME Exposure (€ billions)*	*SME Exposure (€ billions)*	*SME Exposure (€ billions)*
Affected Bank	3.986**	2.957*	.	.	.	.
	(2.15)	(1.81)	.	.	.	.
Affected Bank × Post CSPP	1.357**	0.842	0.872**	0.666**	0.816*	0.816**
	(2.26)	(1.41)	(2.01)	(2.35)	(1.93)	(2.27)
CORP Exposure				0.342***	0.340***	0.340***
				(6.48)	(6.45)	(7.77)
Affected Bank × Pre CSPP					0.297	0.297
					(0.84)	(1.04)
Observations	386	386	386	386	386	386
Adjusted R-squared	0.049	0.401	0.968	0.985	0.985	0.985
Cluster	Bank	Bank	Bank	Bank	Bank	Country
Time FE	Y	Y	Y	Y	Y	Y
Country FE	N	Y	N	N	N	N
Bank FE	N	N	Y	Y	Y	Y

Table OAII: CSPP and Banks' exposures to the SME sector (controlling for TLTRO)

This table presents the results of the OLS estimation of the impact of the CSPP on systemically important European Banks using the EBA Transparency Exercise data, which reports banks' SME and corporate exposures. *SME Exposure (CORP Exposure)* corresponds to a given bank's retail SME (Corporate) exposures in billions of euros. *Affected Bank* is an indicator that switches on only if the bank has at least one large corporate relationship borrower (as per Dealogic), whose bonds are purchased under the CSPP. *Post CSPP* is an indicator variable that switches on for 2016H2 and 2017H1. The models presented in this table account for the effects of the ECB's Targeted Long-Term Refinancing Operations (abbreviated as TLTRO). We define *TLTRO* as a time-invariant dummy variable at the bank level that switches on if the bank receives TLTRO funding from the ECB. The model presented in column (1) includes *TLTRO* as a control variable. In the specifications displayed in columns (2) and (3), we restrict the sample to non-TLTRO banks and TLTRO banks, respectively since *TLTRO* would not be identified in the presence of bank fixed effects. *T*-statistics (reported in parentheses) are robust to within-bank correlation and heteroscedasticity. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)
	Full sample	non-TLTRO banks only	TLTRO banks only
	SME Exposure	*SME Exposure*	*SME Exposure*
Affected Bank	-1.040*		
	(-1.87)		
Affected Bank × Post CSPP	1.036***	0.495*	0.474**
	(3.39)	(1.71)	(2.09)
CORP Exposure	0.035	0.120**	0.094*
	(1.41)	(2.52)	(1.76)
TLTRO	2.009***		
	(3.08)		
Observations	384	231	153
Adjusted R-squared	0.469	0.852	0.972
Time FE	Y	Y	Y
Country FE	Y	N	N
Bank FE	N	Y	Y

Table OAIII: CSPP and Banks' Exposures to the non-SME Loans

This table presents the results of the OLS estimation of the impact of the CSPP on systemically important European Banks using the EBA Transparency Exercise data, which reports banks' exposures to a variety of parties. Each dependent variable corresponds to a given bank's SME corresponding exposures as a percentage of total exposures. *Affected Bank* is an indicator that switches on only if the bank has at least one large corporate relationship borrower (as per Dealogic), whose bonds are purchased under the CSPP. *Post CSPP* is an indicator variable that switches on for 2016H2 and 2017H1. *Pre CSPP* is an indicator variable that switches on for 2016H1. As denoted in the table, *T*-statistics (reported in parentheses) are robust to within-bank correlation and heteroscedasticity. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)
	SME Exposure	*Corporate Exposure*	*Other Exposures*
Affected Bank × Post CSPP	0.947**	-1.043	-0.171
	(2.20)	(-1.40)	(-0.16)
Observations	386	386	386
Adjusted R-squared	0.949	0.945	0.948
Bank and Year FE	Yes	Yes	Yes

Figure OAIA. ECB Purchases in the primary market

This figure presents aggregate quarterly volumes of corporate bond purchases under the CSPP in the primary market.

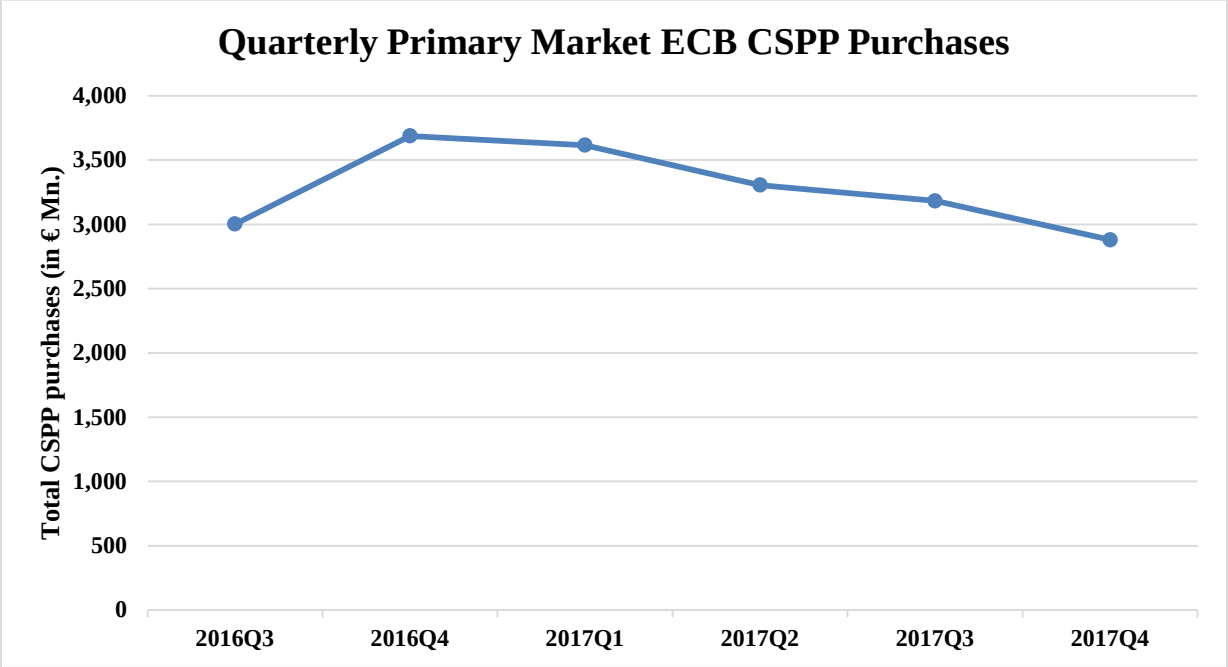

Figure OAIB. ECB Purchases in the secondary market

This figure presents aggregate quarterly volumes of corporate bond purchases under the CSPP in the secondary market.