Making room for the needy: The credit-reallocation effects of the ECB's Corporate QE *

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Abstract

We analyse how the European Central Bank's purchases of corporate bonds under its Corporate Sector Purchase Programme (CSPP) affected the financing of Spanish non-financial firms. We first document that the announcement of the CSPP in March 2016 raised significantly the firms' propensity to issue CSPP-eligible bonds. The flipside was a drop in the demand for bank loans by these firms. Nonetheless, the drop in credit given to the latter companies, which are usually large corporations, unchained a positive and significant side effect on the flow of new loans extended to firms that do not issue bonds, typically smaller. The previous credit reallocation effect of the CSPP was amplified by the ECB's Targeted Longer Term Refinancing Operations (TLTRO).

Keywords: Unconventional Monetary Policy; Corporate Sector Purchase Programme; Quantitative Easing; Portfolio Rebalancing

JEL Codes: E44, E52, E58, G2, G12, G15

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1. Introduction

The Governing Council of the European Central Bank (ECB) announced in March 2016 the launch of a corporate sector purchase programme (CSPP) as an additional leg of its quantitative easing programme, known as the Asset Purchase Programme (APP). Under the CSPP, the Eurosystem buys debt securities issued by euro area non-financial corporations with the goal of improving the pass-through of its monetary policy to the real economy. By October 2016, the market value of outstanding bonds eligible under the CSPP amounted to near 320 billion euros and the Eurosystem had already purchased almost 12% of them.

This paper analyses how the CSPP changed the financing conditions and the structure of the external financing of the non-financial corporations including not only the issuers of CSPP-eligible bonds, which are typically large companies, but also other smaller firms, which in general face tighter financial conditions (Beck et al., 2005, 2006).[1] Specifically, we analyse the existence of potential side effects of the central bank's programme on the financing conditions of firms not issuing CSPP-eligible claims. The side effects or spillovers we look at operate through the reallocation of the supply of bank loans from firms issuing CSPP-eligible paper to other companies. We focus our study in Spanish firms, for which we exploit loan-level data for the entire universe of corporate loans gathered by the Spanish central bank's credit register (Central de Información de Riesgos del Banco de España). Spain makes an interesting field to analyse the effects of the CSPP because the companies in this country were reporting tighter financial conditions than in the rest if the euro area previous to the start of the announcement of the programme than the rest of the euro area (Banco de España, 2017).

To study the direct effect of the CSPP on firms that sell their bonds to the ECB, we first estimate changes in the cost of issuing bonds faced by these firms. From the announcement of the CSPP in March 2016 until mid-April, the average yield of eligible bonds issued by Spanish non-financial corporations decreased by 44 basis points (bp). This decline represents 30% of the average yield during that period. Moreover, the effect of the programme was not limited to CSPP-eligible securities but it extended to others such as bonds issued by non-financial corporations with credit ratings below investment

[1] The CSPP was restricted to purchase non-secured bonds with a maturity higher than 6 months, issued by a non-financial corporation, with an investment grade credit rating, and a yield to maturity higher than the ECB discount rate.

grade. The effect of the program around the initiation of the CSPP purchases, in June 2016, was more modest. Still we find that the drop in the average yield of the bonds purchased by the central bank during the month after the beginning of the purchases is 11 basis points (bp) higher than the one of bonds with similar risk and maturity that had not been acquired by the Eurosystem during that month. Furthermore, the announcement of the CSPP pushed up by almost one third the probability that the firms issuing eligible bonds increase their issuances. The effect of the programme was not limited to CSPP-eligible securities but it extended, although to a lower extent, to other bonds so that the probability that firms with non-eligible bonds increase their issuances rose by 6% in the quarter following the date of announcement.

The flipside of stronger debt issuance activity is the drop in the demand for bank loans by firms issuing bonds. Nonetheless, we critically document that the contraction in banks' loans given to this last group of firms after the announcement of the CSPP had a positive side effect on the flow of new credit given to other companies that do not issue bonds, which are typically smaller and with limited access to fixed–income markets. In particular, those banks that faced a larger contraction in their loans previously given to bond-issuers increased their credit supply to firms that rely exclusively on bank loans in a significant manner. In other words, the CSPP spilled over to non–issuing firms through a reallocation of credit in the banks' loan books. This effect did not limit itself to large firms but also to medium-sized and even to some micro/small companies. In numbers, after controlling for bank and firm characteristics, we find that a drop of one euro in the credit balance of bond issuer groups led to an average increase of around 53 cents of euro in the credit balance of firms that do not issue bonds one quarter after the announcement of the CSPP. In particular, the increase in the average credit balance was worth 39, 7, and 7 cents of euro in the case of large, medium-sized and small firms, which, when expressed in terms of the firm average credit balance before the CSPP announcement, amount to 2.8%, 1.6%, and 0.7%, respectively. This reallocation of credit was not accompanied by a significant rise in the overall banks' risk exposure, given that banks suffering credit outflows from bond issuers mainly raised their flow of credit directed towards large and medium-sized firms that are relatively safer borrowers than micro/small firms (see Dietsch and Petey, 2004; or European Banking Authority, 2016). Hence, minimizing the change in the risk profile of their loans portfolio was perhaps a central motive behind the specific shape adopted by the previous credit-cascade process.

We also find evidence that the credit reallocation effect was amplified by the interaction between the CSPP and the ECB's *Targeted Long Term Refinincing Operations* (TLTRO) program. Under the TLTRO, the ECB provides financing to credit institutions for periods of up to four years at advantageous conditions to banks provided these comply with some credit expansion targets. Thus, those banks that entered in the TLTRO programme before the inception of the CSPP would face a higher pressure to replace loan cancellations by CSPP-eligible firms with new loans to other firms. Along this argument, we document that those banks that had asked for more funds under the TLTRO scheme before the announcement of the CSPP afterwards showed a higher propensity to replace loans that were given to bond-issuers by loans to non-issuers.

This paper contributes to the growing literature that analyses the effects of central banks' asset purchase programs. There is ample evidence that central bank asset purchases produce direct effects on the yield of eligible securities, as well as indirect effects on non-eligible assets.[2] The quantitative relevance of both the direct and indirect channels is documented by Altavilla et al. (2015) in the context of the ECB's overall Asset Purchase Programme (APP) during the first months of the programme. Eser and Schwaab (2016) estimated a 4-6 bp decline in Spanish sovereign bonds as a consequence of the Securities Markets Programme (SMP) between October 2008 and December 2011. Abidi et al. (2017) document for a sample of euro area corporate bonds that the CSPP led to a significant decrease in their yield spreads and a rise in issuances, especially of non-eligible bonds. The negative relationship between bond yields and issuances has been explicitly addressed and documented by Boneva and Linton (2017). Our results are consistent with previous evidence on the direct effect of this type of non-conventional monetary policy on the cost and issuance of bond securities. In addition, we offer new evidence on the effect of monetary policy on the structure of the external financing of non-financial corporations. Concretely, we provide evidence consistent with a substitution of bank loans by bonds after the announcement of the CSPP. This side effect associated to monetary policy builds on the seminal papers on the firms' capital structure

[2] See e.g. Gagnon et al. (2011), Krishnamurthy and Vissing-Jorgensen (2011), Hamilton and Wu (2012), D'Amico et al. (2012), and D'Amico and King (2013) for the US; Joyce et al. (2012) for the UK; Glick and Leduc (2012) and Christensen and Rudebusch (2012) for both the Fed and BoE announcements; Ueda (2012) for US and Japan; Hancock and Passmore (2011) for US MBS; Altavilla et al. (2015) for the APP; Eser and Schwaab (2016) for SMP, Abidi et al. (2017) for CSPP.

decisions based on the substitution between bank debt and bonds (Diamond, 1991; Rajan, 1992; Chemmanur and Fulghieri, 1994; and Bolton and Freixas, 2000).[3]

Although there is not the same level of evidence on the quantitative effect in Europe, there are some empirical results on the positive effect of central bank asset purchase programs in the US on lending (e.g., Di Maggio et al., 2016; Chakraborty et al., 2017; Kandrac and Schluschez, 2017; Rodnyansky and Darmouni, 2017). To evaluate the effectiveness of the CSPP, we have gone a step further from asset prices to look at actual quantitative spillover effects through the bank lending channel. In fact, ours is the first paper that offers evidence on the indirect effect of this type of non-conventional monetary policy operating through the credit reallocation channel analysed herein. In this way, the paper contributes to the previous literature documenting the effect of a quantitative easing program, not only in terms of asset prices but also in terms of flows of funds. Concretely, we document that the substitution of bank loans by bonds in the case of regular issuers led to a cascade effect along which banks reallocate their credit to other non-issuing firms.

Our paper is also related to some previous works that study the transmission of the LTRO to private lending through the financial sector.[4] This issue is analysed, among others, by Andrade et al. (2015), Carpinelli and Crosignani (2017), and Garcia-Posada and Marchetti (2015) who document a positive impact on lending by French, Italian and Spanish banks, respectively. Our paper contributes to this stream of the literature by providing novel evidence on the combined action of two no conventional measures, the CSPP and the TLTRO. This comprehensive analysis is only made possible thanks to the uniquely large and detailed data set we have access to, which enables us to know the real exposure of each bank to each single firm.

The remainder of paper proceeds as follows. Section 2 describes the main features of the CSPP. Section 3 studies the direct effects of the CSPP on bond yields, bond issuance, and bond-loan substitution. Section 4 analyses the bank reaction to the CSPP through credit reallocation and the interaction between the CSPP and the TLTRO II. Finally, section 5 concludes.

[3] Recent empirical evidence analyzing the firms' substitution between bank debt and bonds, from a different perspective to ours and using firm-level data, include Becker and Ivashina (2014) or Morellec et al (2014), among others.

[4] Other studies such as Daetz et al (2016) or Acharya et al (2017) go beyond the effect of ECB's unconventional monetary policy measures on lending and focus on its effect on the real economy.

2. The Corporate Sector Purchase Programme

The CSPP was announced by the Governing Council of the ECB at its March 10th, 2016 meeting, and operations started on June, 8th. The CSPP is an extension of the asset purchase programme (APP) to debt securities issued by euro area non-financial corporations.

Bonds eligible for purchase under the CSPP are the marketable instruments accepted as collateral for Eurosystem liquidity-provision operations and must be issued in euros and their credit rating must be investment grade. The maturity of these securities must be above six months and less than 31 years at the date of purchase. Additionally, the issuer must be established in the euro area and the issuer or its parent may not be a credit institution. The Eurosystem may purchase bonds issued by non-financial corporations on both the secondary and the primary markets.[5]

The Eurosystem debt holdings under the CSPP were €38,144 million at end-October 2016. Although this figure only represents 2.7% of the total purchases under the APP, it is significant given the low relative size of the non-bank private debt market of the euro area. Specifically, accumulated purchases by October 2016 reached almost 12% of the outstanding amount of eligible assets. By then, the Eurosystem had purchased 686 securities under this programme, most of them in the secondary market, issued by 198 firms, of which 13 were Spanish.

3. Direct effects of the CSPP

The aim of this section is to disentangle the direct effects of the CSPP programme on those firms whose bonds were eligible by the programme on two dimensions: the effect on bond yields and the effect on bond issuance. Regarding the latter dimension, we study the impact of CSPP on the issuances of eligible bonds from two different angles. First, we analyse the activity of bond issuers after the announcement of the programme and, second, we look at potential substitution effects in the composition of the liabilities (bonds versus bank loans) of firms selling bonds to the ECB.

[5] See ECB 2016a, which also contains the details on other specific limits and conditions of the programme.

3.1. Effect on bond yields

From the announcement of the CSPP in March 2016 until mid-April, the average yield of eligible bonds issued by Spanish non-financial corporations decreased by 44 bp (see Figure 1). This decline represents 30% of the average yield during that period. This fall in yields took place against a background in which the interest rates on other long-term debt securities, such as the Overnight Index Swap (OIS) or long-term public debt, scarcely changed. Data in Table 1 illustrate the change in the yield spread over OIS rates between the day before and the day after the announcement.[6] These data show that around the announcement date the yield spread of CSPP-eligible bonds over OIS rates decreased by 20 bp. This magnitude lies in the 99.8th percentile of the distribution of the two-day change in the average yield of investment-grade bonds for the period between January 2013 and October 2016.

< Insert Figure 1 here >

< Insert Table 1 here >

On the other hand, there was no appreciable impact around the initiation of the CSPP purchases, in June 2016, on eligible bond yields as compared to the OIS rates, suggesting that the effect of the programme had been completely factored into the bond prices by that time.[7] From mid-April 2016 onwards, the behaviour of yields on long-term debt issued by Spanish nonfinancial corporations was in line with that of the interest rates of other debt securities, such as government debt or OIS. This points towards other factors than CSPP mainly affecting the price of these securities, possibly linked to changes in macroeconomic and monetary policy expectations or in investors' risk appetite. The information in Table 1 also illustrates that the impact on the yields of bonds issued by Spanish firms was somewhat larger than that observed for comparable German and French firms and similar to that for Italian firms.

Moreover, the effect of the programme was not limited to CSPP-eligible securities but it extended to others and, in particular, to bonds issued by non-financial corporations with credit ratings below investment grade (high-yield bonds). In fact, the information in Table 1 indicates that the impact on the yield of these instruments may have been even

[6] Due to the heterogeneity of the maturities of the bond sample, the average of the OIS rates corresponding to the five and 10-year maturities was taken.
[7] The effect of the program purchases could be specific for purchased bonds. We study this conjecture in a later analysis.

higher than that on eligible bonds in absolute terms, both in Spain and in the rest of the euro area, a finding which is in line with the one in European Central Bank (2016). From the announcement of the CSPP in March 2016 until mid-April, the average yield of high-yield bonds issued by Spanish non-financial corporations decreased by 46 bp (see Figure 1). This decline represents 10% of the average yield during that period. There is also evidence that the programme may have contributed to the fall in yields of bonds issued by financial firms, although in this case the effect seems to have been small (see Table 1).

Beyond the effect of the CSPP announcement on eligible and non-eligible securities illustrated in Figure 1 and Table 1, we now try to assess formally the effect of the actual purchases on bond yields. To that aim, we use a regression analysis in which the dependent variable is the excess yield for each bond purchased under the CSPP over the average yield of a benchmark. We identify in Datastream 74 investment grade bonds that are potentially eligible given the programme conditions. Of these, 41 had been purchased by the Eurosystem in the two months after the beginning of the CSPP purchases. We construct the benchmark as a portfolio that includes eligible investment grade bonds that have not been purchased under the CSPP during our sample period. To take into account for possible heterogeneity in term premia, different benchmarks are used for three maturity groups: between one and five years, between five and ten years, and more than ten years. We also use three different time periods in this analysis corresponding to two weeks, one month, and two months before and after each bond is purchased by the first time through the CSPP. To estimate the average effect of the programme on the excess yield, we include a dummy variable ($CSPP_{it}$) that takes value one from the date the bond i was first acquired through the programme. In addition, a dummy variable (α_i) is used for each bond i to capture the fixed effect of the specific characteristics of each bond:

$$ExcessYield_{i,t} = \alpha_i + \beta \cdot CSPP_{it} + \varepsilon_{i,t} \quad (1)$$

where the coefficient β can be interpreted as the average excess yield of eligible bonds after the first time they are purchased under the program.

Results of this analysis are presented in Table 2. According to the coefficient of the CSPP variable, the average yield of the bonds purchased under the programme during the month after the beginning of the purchases dropped 11 bp more than the one of similar

eligible bonds that have not been purchased by the programme during the sample period. Relative to the average yield of these bonds during the considered interval, t. When we use windows with a different length (two weeks or two months) around the event, we find a similar effect with the magnitude of this effect increasing with the length of the window.

< Insert Table 2 here >

We also consider an alternative definition of the benchmark along which, instead of considering all investment grade bonds, we construct a benchmark with the yields of those potentially eligible bonds issued by the same issuers but that had not been purchased under the programme within the period analysed here. Results on this alternative are reported in the fourth to sixth columns of Table 2. The three columns correspond to three different time windows before and after the first time that the bond was purchased (one month, two weeks, and two months, respectively). Results are consistent with the ones obtained for the previous benchmark, but the magnitude of the coefficient suggests a stronger decrease in the yields of the bonds that were purchased under the CSPP.

Hence, although this last piece of evidence speaks in favour of certain "flow effect" following the implementation of bonds purchases by the central bank, the magnitude of the announcement effect on the yields of both eligible and non-eligible bonds is significantly larger.[8] For this reason, the subsequent analyses are performed around the date of announcement.

3.2. Effects on bond issuance

To check whether firms issuing CSPP-eligible bonds were more eager to raise their volume of new issuances following the launch of the programme, we propose an OLS regression where the dependent variable ($Bond\ Net\ Issuance_{it}$) is a dummy that equals one in case the group *i* has increased its total stock of outstanding long-term bonds in a given month *t*, and zero otherwise.[9,10] We regress this variable on a dummy that takes

[8] For previous evidence on this type of flow effects see D'Amico and King (2013) based on the Federal Reserve's 2009 program to purchase US Treasury securities.

[9] We opt for OLS because the probabilities that we are modelling are not extreme. Under these circumstances, both a linear and a logistic model fit equally well but the linear model is preferred for its ease of interpretation.

[10] We perform the analysis at group level because the decision of issuing or not is taken at the group rather than at the subsidiary level. Investment grade groups whose bonds are eligible are: Abertis, Amadeus, Cellnex, Colonial, DIA, Enagas, Endesa, Ferrovial, Gas Natural, Iberdrola, Mapfre, Prosegur, Red Eléctrica Española (REE), Redexis, Repsol, and Telefónica.

value one after the announcement of the CSPP ($CSPP_t$), on the interaction between that dummy and another one that equals one if the firm has bonds CSPP eligible and zero otherwise ($Eligible_i$), and also introduce firm fixed effects (α_i):

$$Bond\ Net\ Issuance_{i,t} = \alpha_i + \beta_1 \cdot CSPP_t + \beta_2 \cdot CSPP_t x Eligible_i + \varepsilon_{i,t} \quad (2)$$

where the sum of β_1 and β_2 can be interpreted as the probability that firms with CSPP-eligible bonds increase their stock of outstanding long-term bonds in a given month after the announcement of the CSPP. The coefficient β_1 itself represents the probability that firms with non-eligible bonds increase their outstanding stock of bonds after the announcement of the CSPP.

For this analysis, we use a sample that consists of monthly data of 94 Spanish groups (all that have issued a bond, including their subsidiaries, at any time since 2006). We use a Banco de España internal dataset containing information on all bond issuances by Spanish non-financial corporations and their domestic and foreign subsidiaries for the period 2004-2016. This dataset covers the whole universe of issuances, independently of the maturity, bond size, or issuer. We verify that all securities in Dealogic are part of our sample, which in addition contains some others that are not in Dealogic.

The results obtained from the estimation of equation (2) are shown in Table 3. The first column reports the result for the period that spans from December 2015 to June 2016 (three months before and after the month of the announcement, March 2016, which is excluded from the analysis). Results reveal an increase of new bond issuances after the public announcement of both CSPP-eligible and non-eligible bonds. The estimated coefficients suggest that the likelihood of increasing the amount of bond outstanding in a given month during the three months immediately after the announcement by those firms with eligible bonds is 29%. This likelihood is lower for the case of non-eligible bonds issuers (6%).

< Insert Table 3 here >

In column (2), we extend the sample to cover the period running from September 2015 to October 2016 and find that firms with eligible bonds exhibit a higher probability of issuing new bonds after the CSPP. The non-significant effect after the announcement of the CSPP, once the sample is extended, reveals that firms with non-eligible bonds benefited from the generalized increase of bond prices immediately after the

announcement. Later on, however, the fact that the effect of the CSPP on the prices of these bonds was of a lower magnitude than that on eligible ones (see Table 1) would explain the weak extra issuance activity of the former type of bonds.

To avoid potential biases in our results due to calendar effects, we compare bond issuance for the same firms in 2015 and 2016. Column (3) of Table 4 contains the results obtained when the pre-CSPP period is April-October 2015, whereas the post-CSPP period corresponds to the same months in 2016. Results are consistent with those obtained in column (2). Finally, in column (4) we extent the pre-CSPP period from January 2011 to February 2016 and confirm that the previous results are not driven by the choice of the pre-event period.

Bond issuance could be attractive not only to traditional issuers, but also to other companies with no issuing activity in the market even if their eventual issuances are not CSPP-eligible. In particular, of the 33 Spanish corporate groups which have issued securities since the programme was announced, 11 of them were first-time issuers, and another two had been inactive since 2011. Generally, these firms are smaller than those with a history of active issuance and, although their securities might not be CSPP eligible due to the lack of an investment-grade credit rating, the programme had an indirect beneficial effect on the yield of these firms' bonds. In this way, the CSPP would have raised the incentives of companies, previously non-active in the fixed income markets, to start issuing bonds.

The higher diversification of financing sources makes the issuers less vulnerable to potential disturbances in the lending channel. Along these lines, previous literature documents that more diversified capital structures, which do not depend exclusively on a single type of liability (i.e., bank loans), are optimal in the sense that they help to minimize the effect of potential negative shock independently on whether they occur through the banking system or the financial markets (see Tengulov, 2016; de Fiore and Uhlig, 2015; or Langfield and Pagano; 2016).

3.3. Bond-loan substitution

Besides studying the propensity to issue bonds after the CSPP, we are interested in knowing whether the funds obtained from the new issued bonds after the CSPP are used to substitute loans by bonds. To this aim, we use a regression analysis in which the

dependent variable is the credit growth rate of a group *j* with a bank *b*. We measure credit growth as the increase in the credit balance between one month before the announcement of the CSPP (February 2016) and one quarter afterwards (June 2016), divided by the average credit balance over the two months ($Credit_{j,b}$). In agreement with Becker and Ivashina (2014), we measure the loan-bond substitution effect based on a sample of groups with access to bond markets (i.e., groups, including their subsidiaries, that have issued at least a bond at any time since 2006). The main explanatory variable is a dummy variable that takes value one if the group has issued bonds during the quarter following the announcement of the CSPP and zero otherwise (*Bond_Issue*). We include bank fixed effects in the regression to control for supply effects. In addition, we use some variables related to the firm and bank-firm characteristics:

$$Credit_{j,b} = \alpha_b + \beta_1 Bond\_Issue_j + \delta G_j + \theta GB_{jb} + \varepsilon_{j,b} \quad (3),$$

where β_1 can be interpreted as the percentage change in the credit exposure of a given group *j* that obtained financing in the bond market to a given bank *b* one quarter after the announcement of the CSPP. A negative and significant coefficient would indicate the existence of a bond-loan substitution effect. G_j denotes a set of group characteristics such as profitability (ROA), size (logarithm of total assets), and risk, as captured by the leverage ratio (total liabilities over total assets).[11] Finally, we include joint group-bank characteristics (*GB*), such as the length of the bank-group relationship immediately before the CSPP announcement, measured in years.The information on loans is obtained from the Banco de España's Central Credit Register (CCR). The CCR contains information on all bank credits given to non-financial institutions above 6,000 euros, including credit lines. For each loan, we know the size of the credit instrument, and other characteristics such as the maturity, creditworthiness or collateral. We aggregate the outstanding amount of credit of each group in each bank at a monthly basis to obtain total credit (both drawn and undrawn in the case of credit lines). In addition, the dataset contains the fiscal identity of both the borrower and the lender, which enables us to construct a matched bank-group data set. The information on the net amount of outstanding bonds in a given month used to define the variable *Bond_Issue* comes from the Banco de España proprietary dataset on bond issuances.

[11] The group characteristics at a consolidated level come from the European Records of IFRS Consolidated Accounts (ERICA) database and Amadeus.

The sample consists of 29 companies including commercial banks, saving banks and credit cooperatives. Bank information is unconsolidated. Following García-Posada and Marchetti (2016), we remove financial credit establishments whose main activities are leasing, factoring and consumer credit. We also exclude foreign branches and subsidiaries. The 29 credit institutions in our sample account for 82% of the credit outstanding in the month immediately before the announcement of the CSPP.

The results in column (1) of Table 4 show that the credit balance of groups that issue bonds in the quarter following the CSPP announcement diminished, on average, by around 20%. This result supports the hypothesis that the announcement of the CSPP led to a loan-bond substitution for firms with access to the bond markets.

Finally, we perform a similar analysis based on a pre-announcement period based on the change in credit balance between November 2015 and February 2016. Results are reported in column (2) of Table 4. We observe that for the pre-announcement period the issuance of bonds is not accompanied by a cancelation of bonds. Thus, we conclude that the bond-loan substitution phenomenon observed around the announcement of the CSPP can be attributed to this program.

< Insert Table 4 here >

4. Credit-reallocation towards non-issuing firms

The previous results highlight that after the announcement of the CSPP there was an increase in the issuance activity, especially in the case of eligible bonds. Parallel to this, there was a decrease in the credit exposure of resident credit institutions to bond-issuer companies of a relevant magnitude (see Figure 2). In this section, we examine whether the CSPP indirectly contributed to raise credit flowing to non-issuers, as credit institutions that suffered outflows from issuing firms could have an incentive to increase their credit supply to other borrowers. We perform this analysis by distinguishing along the borrowers' size (section 4.1) and considering the joint effect of the ECB's CSPP and the TLTRO programmes (section 4.2). This comprehensive analysis is only made possible thanks to the uniquely large and detailed data set we have access to, which enables us to know the real exposure of each bank to each single firm.

< Insert Figure 2 here >

4.1. Effects of the CSPP on credit to non-issuers across firm-size

Bond issuance carries high fixed costs that hinder the access of small and medium sized firms to this source of funding. The substitution of bank loans by bonds in the case of regular issuers could lead to a cascade along which banks reallocate their credit to other firms that do not tap funding in the bonds market.

To analyse the effect of the CSPP on the previous potential bank credit reallocation channel, we use a regression analysis in which the dependent variable is the credit growth rate of a company *j* with a bank *b*. We measure credit growth as the increase in the credit balance one month before the announcement of the CSPP (February 2016) and one quarter afterwards (June 2016), divided by the average credit balance in both periods ($Credit_{j,b}$). The main explanatory variables are the ratio of total credit outflows from bond issuers relative to bank *b* total assets during the referred time window ($Outflows/TA_b$), and the interaction of the previous variable and several dummy variables related to the size of the company ($D.Size_j$). We consider two alternative specifications for this last variable. In the first one, $D.Size_j$ includes a dummy variable that is equal to one if the firm is a small or medium enterprise (SME) and zero otherwise. In the second one, we split this indicator variable into two dummies, one for micro/small firms and the other for medium-sized companies. In addition, we use some variables related to the characteristics of the bank and the firm:

$$Credit_{j,b} = \alpha + \beta_1 Outflows/TA_b + \beta_2 D.Size_j + \beta_3 D.Size_j x Outflows/TA_b + \delta F_j + \gamma B_b + \theta FB_{jb} + \varepsilon_{j,b} \quad (4)$$

where the coefficient β_1 can be interpreted as the percentage change in credit granted to non-issuing large firms one quarter after the announcement of the CSPP given an outflow of 1% in the credit balance of firms that are bond issuers. The coefficient β_2 can be interpreted as the change in credit after the CSPP to the specific type of SME granted by banks that do not face outflows. The sum of coefficients β_1 and β_3 can be interpreted as the change in credit to each specific type of SME after the announcement of the CSPP given a 1% outflow in the credit balance of bond issuer groups. B_j denotes a set of bank characteristics such as bank size (relative to the total amount of credit); profitability (ROA); financial strength (Tier 1 capital ratio); risk profile (share of non-performing loans); percentage of liquid assets over total assets; and business model (non-interest over

interest income). Firm variables, represented by F_j, include profitability (ROA) and risk, as captured by the version of the Altman's Z-score developed by Amat et al. (2017) for Spanish firms.[12] Finally, we include joint firm-bank characteristics, such as the length of the bank-firm relationship immediately before the CSPP announcement, measured in years.

As in section 3.3, the information on loans is obtained from the Banco de España's Central Credit Register (CCR). The CCR is merged with a second dataset that is formed by those Spanish non-financial firms that respond to the Integrated Central Balance Sheet Data Office Survey (CBI), which includes information from the accounts filed with the mercantile registries for more than 500,000 firms for December 2015. The coverage of this dataset is quite extensive and contains detailed information of the firms' balance-sheets. The CBI dataset enables us to classify the firms as SME and micro/small or medium-sized firms according to the European Commission (EC) criteria.[13]

Panel A of Table 5 contains descriptive statistics on the main characteristics of the firms in the sample.[14] We observe that the vast majority of the 145,244 non-issuing firms in the sample are SMEs and, more specifically, micro-small firms. On average, the firms in the sample exhibit a positive ROA (4.62%) and are not in the distress zone or under risk of insolvency given that its Z-score is positive.

< Insert Table 5 here >

Panel B of Table 5 contains descriptive statistics on the main characteristics of the 29 credit institutions in the sample. In view of the 5th and 95th percentiles referred to the bank relative size, we confirm that there is a high degree of heterogeneity in terms of bank size. On average, the banks in the sample exhibit a positive ROA and a Tier 1 capital ratio well above the regulatory threshold. The share of non-performing loans varies to a large extent among banks and the average is around 14%. Liquid assets represent on average around 14% of the total assets. Also, on average, interest income exceeds that coming

[12] The Z-score is obtained from the following specification: Z = -3.9 + 1.28*(Current Assets/Current Liabilities) + 6.1*(Equity/Total Assets) + 6.5*(Net Profit/Total Assets) + 4.8*(Net Profit/Equity). When the resultant Z-score is negative, then the firm is in the "distress" zone whereas the opposite occurs when it is positive.

[13] According to the EC definition, the category of SMEs includes firms which employ fewer than 250 persons and have an annual turnover that does not exceed EUR 50 million. The rest of the firms are considered as large. The SME category is further split into two categories micro/small and medium-sized firms. The former category is composed of those companies which employ fewer than 50 persons and whose annual turnover does not exceed EUR 10 million whereas the medium-sized category consists of the rest of the SMEs

[14] The measures of firm profitability (ROA) and risk (Z-score) are winsorized. We set the observations above (below) the 99% (1%) percentiles at the value of the 99% (1%) percentile.

from non-interest income activity. There is also a high degree of heterogeneity across banks in terms of the fall in credit given to issuing firms. For some banks, there are not outflows, whereas in other cases these outflows represent more than 1.6% of total assets.

Finally, Panel C reports descriptive statistics for the variables defined at the level of a firm-bank relationship. We observe that the change in the credit balance between a company and a bank one quarter after the date of the CSPP announcement is on average positive (€22,400), which contrasts with the negative change for issuing firms. Finally, we observe a high degree of variation in the duration of the firm-bank relation that, on average, lasts for 6 years.

Table 6 reports the results obtained from the estimation of equation (4) on the flow of credit to non-issuers. Coefficients for the control variables are not reported in the interest of brevity. The variable that identifies banks that faced a reduction of loans given to bond issuing firms balance (*Outflows/TA*) allows us to understand whether the disintermediation effect observed in this group of firms produced an increase in the credit supply from these banks to non-issuing large companies. In view of the estimates shown in columns (1) and (2) of Table 6, we conclude that a bank experiencing an outflow in credit previously given to bond issuers equivalent to 1% of its total assets increased its credit supply to the average company within the group of *large firms*, which do not tap financing in the bond market, by around 14% more than other banks not suffering outflows.

< Insert Table 6 here >

To check whether SMEs (or specific firm-segments within this category) increased their volume of credit obtained from banks with shrinking bond-issuers' loans portfolio as compared to larger firms, we use the interaction of SME, micro-small, and medium sized firms and the variable *Outflows/TA*. The sum of the coefficients for *SME x Outflows/TA* and *Outflows/TA* (3.64) in column (1) is positive and statistically significant, which confirms that banks suffering outflows from bond issuers increased their supply of loans to SMEs. However, the interaction coefficient associated to SMEs is negative and significant, suggesting that the amount of credit granted to SMEs was smaller than to large firms. By breaking down SMEs into medium and micro/small firms (column 2), we find that a bank facing an outflow in its credit portfolio of bond issuers of 1% of its total assets increased its credit supply to the average medium-sized firm by

8.24% more than other banks not suffering outflows. This positive side effect also extends to micro/small firms although to a lower extent. Namely, a bank suffering a 1% outflow of credit from bond issuers increases the credit supply to the average micro/small firms by 3.3% more than other bank not suffering outflows. Thus, banks that suffered a more severe loss of lending to large issuing companies increased their loans to large companies that do not issue bonds as detailed above, but also, although to a lesser extent, to medium-sized and micro/small firms.

To quantify the magnitude of the new credit granted by banks suffering outflows, we report some calculations based on column (2) of Table 6. An outflow equivalent to 0.20% of the average bank total assets (€155 million), which corresponds to the average fall in balance of each bank with large companies issuing debt a quarter after the announcement of the CSPP, is translated into a €275,410 increase in the balance of the average non-issuer large company (given an average credit balance of €9.79 million before the CSPP announcement). In aggregate terms, as each of the 29 banks in the sample gives credit to, on average, 220.4 large firms, it leads to an overall estimated increase in credit of €1,760 million to large firms that do not issue bonds.

Regarding medium-sized firms, a credit outflow of the same magnitude is translated into a €19,602 increase in the balance of the average medium-sized firm without access to financial markets (given an average credit balance of €1.2 million before the CSPP announcement). In aggregate terms, considering that each of the 29 banks in the sample gives credit to, on average, 566 medium-sized firms, it leads to an overall increase in credit of €322 million to medium-sized firms that do not issue CSPP-eligible bonds.

Finally, in the case of micro/small firms, a credit outflow of the same magnitude is translated into a €1,327 increase in the balance of the average medium-sized firm (given an average credit balance of €200,000 before the CSPP announcement). In aggregate terms, as each of the 29 banks in the sample gives credit to, on average, 8,086 medium-sized firms, it leads to an overall increase in credit of €311 million to large firms that do not have access to financial markets.

The sum of the previous estimates for the three types of firms totals €2,394 million, which amounts to almost 53% of the total outflows suffered by the banks in the sample from large issuers (i.e., €155 million per bank times the 29 banks in the sample).

In relative terms, a drop of one euro in the credit balance of bond issuer groups leads to an increase of around 39, 7, and 7 cents of euro in the credit balance of large, medium-sized and small firms without access to securities markets one quarter later the announcement of the CSPP. The increase in the credit balance of non-issuing large, medium-sized and micro/small firms represents 2.8%, 1.6%, and 0.7% of their average credit balance before the CSPP announcement, respectively.

To confirm the robustness of the previous findings, we have performed several variations of the previous estimations. First, we include firm fixed effects instead of specific firm characteristics. The use of firm fixed effects enables us to control for demand effects. Given that only firms with positive credit balance in more than one bank (either before or after the announcement) are considered in the analysis, the number of observations diminishes by more than one third, which confirms that in an important number of cases there is an exclusive relation between the bank and the firm. Results are reported in columns (3) and (4) of Table 7, which, for sake of clarity, also incorporates the baseline analysis reported in Table 6 in columns (1) and (2). The fact that the variable *Outflows/TA* is significantly higher than zero after using firm fixed effects is suggestive that this variable is indeed capturing a genuine credit supply-side shock coming from the outflows of bond issuers. The linear combination of the coefficients obtained for the variable *Outflows/TA* and its interaction with size-related dummy variables confirms that the credit supply shock was also positive, although of a lower magnitude, for smaller firms.

As a second robustness test, instead of using the whole sample of firms, we restrict our analysis to those companies that were already borrowing before the announcement of the CSPP from a given bank in the sample. Due to the definition of the dependent variable (increase in the credit balance divided by the average balance before and after the announcement), if the credit balance of a company goes from 0€ to 1€, it implies a growth rate of 200% (i.e., *1/((0+1)/2*). By removing companies without exposure previous to the announcement, we are able to discard any possible bias derived from small increases to new firms. In addition, this restriction helps to understand whether the new credit granted as a consequence of the outflows goes exclusively towards new clients or also to the existing ones. As shown in columns (5) and (6), the number of observations decreases only by 7%, suggesting that most of the firms in the analysis already had a relationship prior to March 2016 with the bank. As expected, the magnitude of the coefficients is of a

lower magnitude due to the reduction of observations with large credit balance growth (those with a 200% increase due to going from zero to positive credit). Otherwise, results are fully consistent with the ones shown in columns (1) and (2), confirming that the new credit also flows to clients with a previous relationship with the bank.

< Insert Table 7 here >

Banks differentiate between large firms and SMEs probably because the latter are riskier and could lead to higher expected costs of absorbing potential losses. Thus, the cascade effect along the firm size dimension derived from the substitution of bank loans by bonds by regular issuers could be explained by the banks' attempt to preserve their risk profile to the extent possible. Based on this conjecture, we extend the previous econometric analysis by splitting firms according to their risk instead of their size. We measure firm risk through two dummy variables that rely on different definitions of the Z-score and are denoted them by *D.Risk*. The first dummy variable relies on the Z-score for Spanish firms of Amat *et al.* (2017) and is equal to one for those firms in the "distress" zone, that is, those firms with a Z-score below zero. The second dummy variable relies on the Altman's Z-score for private firms and takes value one if the firm is in the "distress" zone.[15] The resultant econometric specification is as follows:

$$Credit_{j,b} = \alpha + \beta_1 Outflows/TA_b + \beta_2 D.Risk_j + \beta_3 D.Risk_j x Outflows/TA_b + \delta F_j + \gamma B_b + \theta FB_{jb} + \varepsilon_{j,b} \quad (5)$$

where the coefficient β_1 can be interpreted as the percentage change in credit granted to non-issuing safe firms one quarter after the announcement of the CSPP given an outflow of 1% in the credit balance of groups that are bond issuers. The coefficient β_2 can be interpreted as the change in credit after the CSPP to the firms in the "distress" zone granted by banks that do not suffer outflows. The sum of β_1 and β_2 can be interpreted as the change in credit to each firm in the "distress" zone after the announcement of the CSPP given a 1% outflow in the credit balance of bond issuers.

Column (1) of Table 8 shows the results obtained when the variable measuring the firm risk is a dummy that is equal to one in case the firm is under distress according to the Z-score specification for Spanish firms whereas the risk measure in column (2) is based on the Altman's Z–score. In view of the coefficients reported in columns (1) and

[15] The Z-score is estimated based on the specification for private firms according to which the zone of distress is the one in which the Z-score is lower than 1.23. For more details, see Altman (1968).

(2) and the linear combination of the coefficients for the interaction term (*D.Risk x Outflows/TA*) and the *Outflows/TA* variable, we conclude that banks suffering credit outflows from bond issuers exhibit a strong preference for safe borrowers to preserve the risk profile of the portfolio.

< Insert Table 8 here >

4.2. The amplifying effect of the TLTRO on the CSPP

The ECB Governing Council also announced on March 10th 2016 a second series of targeted long-term refinancing operations (known as TLTRO II). TLTRO II consist of a series of four operations to be conducted once a quarter between June 2016 and March 2017. Counterparties will be able to borrow a total amount of up to 30% of the eligible part of their outstanding loans as of 31 January 2016, net of any amount previously borrowed under the first two TLTRO operations conducted in 2014 and still outstanding at the time of the settlement of TLTRO II. These operations offered long term funding under advantageous conditions to banks to "further ease private sector credit conditions and to stimulate bank lending to the real economy". In particular, the interest rate applied to funds obtained under the TLTRO scheme is set for each operation at the rate applied in the main refinancing operations (MRO) of the ECB prevailing at the time of allotment (which is 0% since March 2016). In addition, counterparties whose eligible net lending in the period between 1 February 2016 and 31 January 2018 exceeds their benchmark are charged a lower rate for the entire term of the operation. This lower rate is linked to the interest rate on the deposit facility (DFR) prevailing at the time of the allotment of each operation (which stood at -0.4% in the four auctions conducted quarterly between June 2016 and June 2017)[16]. Specifically, counterparties will receive a maximum rate reduction equal to the difference between the MRO rate and the rate on the deposit facility applicable at the time of take-up if they exceed their benchmark stock of eligible loans by 2.5% in total as at 31 January 2018.[17] Up to this limit, the size of the decrease in the

[16] See further details in the DECISION (EU) 2016/810 OF THE EUROPEAN CENTRAL BANK of 28 April 2016 on a second series of targeted longer-term refinancing operations (ECB/2016/10). https://www.ecb.europa.eu/ecb/legal/pdf/celex_32016d0010_en_txt.pdf

[17] DECISION (EU) 2016/810 OF THE EUROPEAN CENTRAL BANK of 28 April 2016 on a second series of targeted longer-term refinancing operations (ECB/2016/10). https://www.ecb.europa.eu/ecb/legal/pdf/celex_32016d0010_en_txt.pdf

interest rate will be graduated linearly depending on the percentage by which a counterparty exceeds its benchmark stock of eligible loans.

The decrease in net lending given to bond issuers after the announcement of the CSPP could have an impact on the effective borrowing rate for those banks financing themselves through the TLTRO scheme and, hence, on their lending incentives. Given that banks will end up paying a lower interest rate if they meet their benchmark stock of eligible loans, a drop in the flow of loans after the CSPP given to issuing firms could have led banks to increase their lending to other companies.

We now investigate whether new credit flowing to non-issuing firms identified earlier was stronger in the case of those banks more exposed to TLTRO. To analyse this, we propose the following regression equation:

$$\begin{aligned} Credit_{j,b} = \alpha &+ \beta_1 D.Outflows_b + \beta_2 D.Size_j + \beta_3 TLTRO_b \\ &+ \beta_4 D.Size_j x D.Outflows_b + \beta_5 D.Size_j x TLTRO_b \\ &+ \beta_6 D.Outflows_b x TLTRO_b + \beta_7 D.Size_j x D.Outflows_b x TLTRO_b \\ &+ \delta F_j + \gamma B_b + \varphi RL_{jb} + \varepsilon_{j,b} \qquad (6) \end{aligned}$$

where the dependent variable is the same employed in the baseline analysis in equation (4). The regressor $D.Outflows_b$ is a dummy variable that is equal to one in case the bank granting the loan is in the top tercile of the distribution of individual lenders' credit outflows from non-issuing groups relative to bank total assets and zero otherwise. $TLTRO_b$ represents the amount of funds obtained under the TLTRO programme used up to January 2016 relative to the overall limit. The higher the use of available funds under TLTRO, the higher the saving in terms of borrowing rates, in case the volume of lending meets the required criteria. In addition, we use the same set of variables related to the characteristics at bank, firm, and firm-bank levels as in equation (4). Standard errors are clustered at firm size-bank (two firm sizes are considered: SMEs and large firms).

Given the nature of the triple interaction (SME, Outflows and TLTRO) in equation (6), we have opted in Table 9 to report the linear combination of the relevant coefficients, rather than their individual values (three principal effects, three double interactions, and one triple interaction). The sum of the seven coefficients β_1-β_7 can be interpreted as the effect of the dependence on TLTRO on credit to each specific segment of SMEs from banks suffering outflows; whereas the sum of coefficients $\beta_2, \beta_3,$ and β_5 represents the

effect for those that do not suffer outflows. Therefore, the difference between the two previous sums of coefficients (i.e., the sum of $\beta_1, \beta_4, \beta_6,$ and β_7) can be interpreted as the differential effect of the TLTRO on credit from banks suffering outflows as compared to the credit from banks that do not suffer outflows. The same procedure applies to large firms.

We report the information in these terms since our interest is to disentangle the effect of funds obtained through the TLTRO facility on the flow of credit directed to each type of firm (micro/small, median, and large), depending on whether the bank in question is suffering outflows after the CSPP. In order to evaluate this impact, we report the effect on a hypothetical case where the bank has used a 50% of its TLTRO limit to which it has access (i.e., we replace $TLTRO_b$ by 0.50). The sum of coefficients taking into account the firm size, existence of outflows, and use of the TLTRO resources, jointly with the standard errors of such combination and their level of significance are reported in Panel A of Table 9. We first observe that there is not a statistically significant increase in the credit from banks that used TLTRO that do not suffer outflows from firms that are bond issuers. However, for banks who both used TLTRO and suffered outflows, we observe a positive and significant effect on the credit granted for both SME and, especially, large firms. Specifically, the credit to a given large firm (SME) increases on average by 33% (12.8%) after the announcement of the CSPP if the bank has used a 50% of its TLTRO and suffers high outflows in the credit balance of bond issuers. The differential effect of the TLTRO on credit from banks suffering outflows as compared to that on credit given by banks that do not suffer outflows is significantly larger than zero both for SME (15.9%) and large firms (30.0%).

We next split the dummy variable *SME* into two additional dummy variables: micro/small and medium-sized firms; and re-estimate equation (6). Results are reported in Panel B of Table 9. As it can be seen, results are similar to the ones reported in Panel A; that is, there is not a statistically significant increase in the credit from banks that used TLTRO but do not suffer outflows, and a positive and significant effect for banks that both used TLTRO and suffered outflows. From the breakdown in three size categories, we observe that the increase in credit granted is significant in all cases, although higher for large (33.8%) and medium-sized firms (26.6%), than for micro and small ones (11.8%). The differential effect of the TLTRO on credit from banks suffering outflows as compared to credit from banks that do not suffer outflows is significantly larger than zero

both the three types of firms: micro-small (15.2%), medium-sized (26.7%) and large firms (30.1%).

< Insert Table 9 here >

5. Conclusions

In this paper, we have analysed how the corporate bonds branch of the ECB' quantitative easing programme – CSPP- has modified the financing conditions of Spanish non-financial firms. Our analysis offers new evidence on the direct and indirect effects of this type of non-conventional monetary policy operations on the cost and structure of the external financing of non-financial corporations. Specifically, we offer evidence that the CSPP not only reduced the financing costs and stimulating new bond issuances, but also gave rise to a sizeable reallocation of credit previously given to bond-issuers towards other firms outside the fixed-income market, that are typically smaller.

Our results also suggest that the previous positive impact of the CSPP on the flow of credit was enhanced by the coincidence of the programme with the ECB's TLTRO II program. Intuitively, the price-mechanism of this last program would have provided incentives to banks for avoiding large drops in their overall credit portfolios as result of large firms issuing bonds to benefit from the CSPP, hence, favouring the reallocation of credit towards non bond-issuers.

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Table 1. Change in bond yield spreads over OIS rate around the CSPP announcement and start of purchases

This table reports the spread change (in basis points) between the day before and the day after the date of the CSPP announcement (March 10, 2016) for bonds issued by non-financial corporations (NFC) and financial corporations (FC) of four EMU countries (Spain, Germany, France, and Italy). The spread is obtained as the average yield of long-term debt security issues minus the average of the OIS rates corresponding to the five- and 10-year maturities. The average yield is calculated as the average of the yields of individual bonds issued in euro by each type of corporation from 2010, with a minimum amount of €10 million and a maturity of more than five years. The weights are based on the amount issued.

	Spain	Germany	France	Italy
CSPP announcement (10.3.2016)				
NFC. Investment grade	-20	-17	-11	-21
NFC. High yield	-31	-30	-44	-55
FC. Investment grade	-11	-1	-17	-5
Start of CSPP purchases (8.6.2016)				
NFC. Investment grade	-2	-3	-2	-3
NFC. High yield	0	-2	0	-20
FC. Investment grade	1	1	2	2

Table 2: The CSPP effect over Spanish bonds yields

This table reports the effect of the programme on the daily yields of the eligible bonds obtained from the estimation of equation (1). The dependent variable in this regression analysis is the excess yield for each bond purchased by the CSPP over the average return on a benchmark. The benchmark in columns (1) – (3) corresponds to a portfolio that includes investment grade bonds that have not been part of the CSPP. Concretely, three different benchmarks are used for three maturity groups: between one and five years, between five and ten years, and more than ten years. We use three different time periods in this analysis corresponding to one month, two weeks and two months before and after each bond is acquired by the first time through the CSPP whose results are reported in columns (1), (2), and (3), respectively. Results reported in columns (4) – (6) are obtained for a different benchmark for which instead of considering all investment grade bonds we consider only those bonds issued by the same issuer but that have not been purchased by the programme yet. Columns (4), (5), and (6) correspond to three alternative window periods: one month, two weeks, and two months, respectively. Standard errors are clustered at bond and day level and reported in brackets. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	Non-purchased IG bonds			Non-purchased IG bonds issued by the same issuer		
	1-month	2-weeks	2-month	1-month	2-weeks	2-month
Purchased	-0.109***	-0.037***	-0.127***	-0.123***	-0.045***	-0.163***
	[0.018]	[0.010]	[0.020]	[0.023]	[0.015]	[0.033]
Observations	1,778	810	3,495	1,240	568	2,431
R-squared	0.962	0.995	0.907	0.994	0.998	0.990
Bono FE	YES	YES	YES	YES	YES	YES

Table 3: Effect of the CSPP announcement on bond issuance

This table provides evidence on the increase in the bond issuance after the announcement of the CSPP from the estimation of equation (2). We estimate a regression in which the dependent variable is a dummy variable that is equal to one in case a firm has increase the amount of long-term bonds outstanding in a given month and zero otherwise. This variable is regressed on a dummy variable that takes value one after the announcement of the CSPP, the interaction of that dummy and another dummy that is equal to one if bonds issued by a given firm are CSPP eligible and zero otherwise (*Eligible*), and firm fixed effects. Coefficients on column (1) are estimated on a sample that spans from December 2015 to June 2016 and consists of 94 Spanish groups (including the subsidiaries) that have issued a bond in any moment since 2006. The month corresponding to the announcement of the CSPP (March 2016) is excluded from the regression. The time period is extended in column (2) from August 2015 to October 2016. The post-CSPP period in column (3) expands from April – October 2016 whereas the pre-CSPP period spans from April – October 2015. In column (4) we extend the sample to the period from January 2011 to October 2016. Standard errors are clustered at firm level and reported in brackets. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)
CSPP x Eligible	0.227**	0.078**	0.083**	0.050*
	[0.103]	[0.036]	[0.039]	[0.028]
CSPP	0.058***	0.014	-0.002	0.014
	[0.021]	[0.011]	[0.011]	[0.012]
Firm FE	YES	YES	YES	YES
Observations	564	1,316	1,316	6,580
R-squared	0.418	0.349	0.346	0.305

Table 4: Bond-loan substitution

This table contains the results obtained from the estimation of equation (4) for a sample of non-financial groups with access to the bond markets. The dependent variable in column (1) is the change in the credit balance between a certain group *j* and a bank *b* one quarter after the date of the CSPP announcement relative to the average balance in the month prior to the announcement and one quarter later ($Credit_{j,b}$). In column (2) we use as the dependent variable the change in credit balance between November 2015 and February 2016 relative to the average balance in both dates. The main explanatory variable in both columns is a dummy variable that takes value one if the group has issued bonds during the quarter following the announcement of the CSPP and zero otherwise (Bond_Issue). In addition, we use some variables related to the characteristics of the group (profitability, size, and risk) and the group-bank (relationship lending) plus bank fixed effects. Standard errors, in brackets, are clustered at group level and reported in brackets. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)
Bond_Issue (Yes = 1 / No = 0)	-0.260**	0.066
	[0.132]	[0.088]
Bank FE	YES	YES
Firm Controls	YES	NO
Observations	485	453
R-squared	0.180	0.272

Table 5. Firm, bank, and firm-bank descriptive statistics

This table contains descriptive statistics at firm (Panel A), bank (Panel B) and firm-bank (Panel C) level. Panel A summarizes the main characteristics in terms of the size, profitability and risk of the non-issuing firms forming the sample. Panel B summarizes the main characteristics of the banks granting credit to the previous firms. Panel C includes descriptive statistics at firm-bank level. Concretely, it reports the change in the credit balance between a company and a bank one quarter after the date of the CSPP announcement and the duration of relationship lending in years.

Panel A

	Mean	SD	Median	p5	p95	# Firms
Large (%)	0.91	9.51	0	0	0	145244
SME (%)	99.09	9.51	100	100	100	145244
Micro/small (%)	96.09	19.38	100	100	100	145244
Median (%)	3.00	17.05	0	0	0	145244
ROA (%)	4.62	14.46	4.24	-17.33	27.42	145244
Z-score	0.42	6.72	0.39	-10.55	11.44	145244

Panel B

	Mean	SD	Median	p5	p95	# Banks
Relative size to total credit (%)	2.84	4.70	0.65	0.04	12.59	29
ROA (%)	0.35	0.23	0.39	-0.06	0.68	29
Tier 1 capital ratio (%)	13.89	2.63	13.58	10.51	18.68	29
Non-performing loans / Total loans (%)	5.62	3.27	5.48	1.58	14.07	29
Liquid assets / Total assets (%)	14.07	7.56	12.69	3.79	24.81	29
Non-interest to interest income	0.82	0.42	0.75	0.25	1.60	29
Outflows / Total assets (%)	0.24	0.54	0.01	0	1.63	29

Panel C

	Mean	SD	Median	p5	p95	# Obs
Change in credit balance (,000€)	22.40	2306.43	-2.00	-87.00	124.00	256986
Duration of RL (yes=1, no=0)	5.93	4.53	4.58	0.08	12.67	256986

Table 6: Effects of the CSPP on credit to non-issuers across firm-size

This table contains the results obtained from the estimation of equation (4). The dependent variable in both columns (1) and (2) is the change in the credit balance between a certain company *j* and a bank *b* one quarter after the date of the CSPP announcement relative to the average balance in the month prior to the announcement and one quarter later ($Credit_{j,b}$). The main explanatory variables in this regression analysis are: (i) the ratio of total credit outflows from bond issuers suffered by bank *b* relative to its total assets ($Outflows/TA_b$); and (ii) the interaction of the previous variable and several dummy variables ($D.Size_j$) referred to the size of the company (SME and micro/small or medium-sized). In addition, in all regressions we use variables related to the characteristics of the bank (size, profitability, risk, financial strength, liquidity, and business model), the firm (profitability and risk), and the firm-bank (relationship lending). The rows below the coefficients for each explanatory variable contain the linear combinations of the coefficients of interest, their standard errors, and their level of significance. Standard errors, in brackets, are clustered at D.Size-bank level. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)
Outflows/TA (%)	14.058***	14.063***
	[2.644]	[2.555]
SME x Outflows/TA (%)	-10.421***	
	[2.416]	
Micro-Small x Outflows/TA (%)		-10.746***
		[2.383]
Medium-Sized x Outflows/TA (%)		-5.827**
		[2.922]
SME	-0.109***	
	[0.036]	
Micro-Small		-0.114***
		[0.035]
Medium-Sized		-0.051
		[0.042]
Outflows/TA (%) + SME x Outflows/TA (%)	3.637**	
	[1.522]	
Outflows/TA (%) + Micro-Small x Outflows/TA (%)		3.318**
		[1.429]
Outflows/TA (%) + Medium-Sized x Outflows/TA (%)		8.236***
		[2.323]
Firm Control Variables	YES	YES
Bank Control Variables	YES	YES
Observations	256,986	256,986
R-squared	0.018	0.019

Table 7: Effects of CSPP on non-issuers' access to financing depending on their size. Robustness tests I

This table contains the results obtained from the estimation of equation (4) based on alternative methodologies and samples. The dependent variable and the variables of interest are the same employed and described in Table 6. In fact, columns (1) and (2) correspond to the ones in Table 6 and are included to facilitate comparisons across specifications. Results in columns (3) and (4) are a variation of equation (4) in which instead of using firm related variables, we use firm fixed effects, so only firms with positive credit balance in more than one bank (either before or after the announcement) are used in the analysis. Results in columns (5) and (6) are obtained from a sample of firms to which each bank has a positive exposure immediately before the announcement of the CSPP. Rows below coefficients for each explanatory variable contain the combined effect of the coefficients of interest, their standard errors, and their level of significance. Standard errors, in brackets, are clustered at D.Size-bank level. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Outflows/TA (%)	14.058***	14.063***	9.801**	9.803***	6.880***	6.884***
	[2.644]	[2.555]	[3.688]	[3.650]	[1.765]	[1.703]
SME x Outflows/TA (%)	-10.421***		-6.724*		-4.912***	
	[2.416]		[3.674]		[1.589]	
Micro-Small x Outflows/TA (%)		-10.746***		-7.059*		-5.143***
		[2.383]		[3.639]		[1.563]
Medium-Sized x Outflows/TA (%)		-5.827**		-4.026		-1.636
		[2.922]		[4.380]		[2.136]
SME	-0.109***				-0.058*	
	[0.036]				[0.030]	
Micro-Small		-0.114***				-0.062**
		[0.035]				[0.029]
Medium-Sized		-0.051				-0.019
		[0.042]				[0.036]
Outflows/TA (%) + SME x Outflows/TA (%)	3.637**		3.076*		1.968*	
	[1.522]		[1.663]		[1.049]	
Outflows/TA (%) + Micro-Small x Outflows/TA (%)		3.318**		2.744*		1.741*
		[1.429]		[1.579]		[0.970]
Outflows/TA (%) + Medium-Sized x Outflows/TA (%)		8.236***		5.777**		5.248***
		[2.323]		[2.879]		[1.829]
Firm Control Variables	YES	YES	NO	NO	YES	YES
Firm FE	NO	NO	YES	YES	NO	NO
Bank Control Variables	YES	YES	YES	YES	YES	YES
Observations	256,986	256,986	166,102	166,102	238,095	238,095
R-squared	0.018	0.019	0.344	0.344	0.006	0.006

Table 8: Effects of CSPP on non-issuers' access to financing depending on their risk

This table contains the results obtained from the estimation of equation (5). The dependent variable in both columns (1) and (2) is the change in the credit balance between a certain company *j* and a bank *b* one quarter after the date of the CSPP announcement relative to the average balance in the month prior to the announcement and one quarter later ($Credit_{j,b}$). The main explanatory variables in this regression analysis are: (i) the ratio of total credit outflows from bond issuers suffered by bank *b* relative to its total assets ($Outflows/TA_b$); (ii) and the interaction of the previous variable and a dummy variable referred to the risk of the company based on the Z-score. Column (1) shows the results obtained when the variable measuring the firm risk is a dummy that is equal to one in case the firm is under distress according to the Z-score specification for Spanish firms whereas the risk measure in column (2) is based on the Altman's Z–score. In addition, in all regressions we use variables related to the characteristics of the bank (size, profitability, risk, financial strength, liquidity, and business model), the firm (profitability, size, and risk), and the firm-bank (relationship lending). Standard errors, in brackets, are clustered at firm risk dummies-bank level. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)
Outflows/TA (%)	5.727***	5.540***
	[1.544]	[1.883]
Distress Zone x Outflows/TA (%)	-4.285***	-4.671***
	[1.302]	[1.466]
Distress Zone	-0.004	-0.043**
	[0.016]	[0.019]
Outflows/TA (%) + Distress Zone x Outflows/TA (%)	1.441	0.869
	[1.432]	[1.642]
Firm Control Variables	YES	YES
Bank Control Variables	YES	YES
Observations	256,069	256,069
R-squared	0.019	0.019

Table 9: The complementary effect of the TLTRO

This table contains the results obtained from the estimation of equation (6) in which the dependent variable is the change in the credit balance between a certain company *j* and a bank *b* one quarter after the date of the CSPP announcement relative to the average balance in the month prior to the announcement and one quarter later. The main explanatory variables in this regression analysis are: (i) a dummy variable that is equal to one in case the bank granting the loan is above the median of the outflows relative to total assets for the lenders to issuing firms and zero otherwise (*D.Outflows*$_b$); (ii) the amount of TLTRO used up to January 2016 relative to the limit that can be used ($TLTRO_b$), (iii) several dummy variables ($D.Size_j$) referred to the size of the company (SME and micro/small or medium-sized), and (iv) all the interaction terms resultant of the combination of the three previous variables. In addition, in all regressions we use variables related to the characteristics of the bank (size, profitability, risk, financial health, liquidity, and business model), the firm (profitability and risk), and the firm-bank (relationship lending). Given the existence of multiple interaction terms, we report the linear combination of the coefficients of interest to disentangle the effect of the banks use of the TLTRO resources on the credit granted to each type of firm (SME, micro/small, median, and large) depending on whether they are suffering outflows or not. For that aim we assume that the use of the TLTRO resources for the average bank is 50% of the limit to which it has access (i.e., we replace $TLTRO_b$ by 0.50). The linear combinations of coefficients taking into account the firm size (SME or large firms), existence of outflows and use of the TLTRO resources joint with the standard errors of such combination and their level of significance are reported in Panel A. The results for the linear combinations when SME is split in two groups: micro/small and medium-sized firms are reported in Panel B. Standard errors, in brackets, are clustered at D.Size-bank level. *, ** and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A	***D.Size = SME***	***D.Size = Large***
Effect of the dependence on TLTRO on credit from banks suffering outflows		
Outflows + ***TLTRO*** + ***D.Size*** + ***Outflows x TLTRO*** + ***Outlfows x D.Size +***	0.128**	0.338***
+ ***TLTRO x D.Size*** + ***TLTRO x D.Size x Outflows***	[0.062]	[0.097]
Effect of the dependence on TLTRO on credit from banks not suffering outflows	-0.031	0.037
TLTRO + ***D.Size*** + ***TLTRO x D.Size***	[0.039]	[0.028]
Differential effect of TLTRO on credit from banks suffering outflows	0.159***	0.300***
Outflows + ***Outflows x TLTRO*** + ***Outlfows x D.Size*** + ***TLTRO x D.Size x Outflows***	[0.045]	[0.094]

Panel B	***D.Size = Micro/Small***	***D.Size = Median***	***D.Size = Large***
Effect of the dependence on TLTRO on credit from banks suffering outflows			
Outflows + ***TLTRO*** + ***D.Size*** + ***Outflows x TLTRO*** + ***Outlfows x D.Size +***	0.118**	0.266***	0.338***
+ ***TLTRO x D.Size*** + ***TLTRO x D.Size x Outflows***	[0.059]	[0.080]	[0.094]
Effect of the dependence on TLTRO on credit from banks not suffering outflows			
TLTRO + ***D.Size*** + ***TLTRO x D.Size***	-0.034	-0.001	0.037
	[0.039]	[0.041]	[0.028]
Differential effect of TLTRO on credit from banks suffering outflows			
Outflows + ***Outflows x TLTRO*** + ***Outlfows x D.Size*** + ***TLTRO x D.Size x Outflows***	0.152***	0.267***	0.301***
	[0.043]	[0.076]	[0.092]

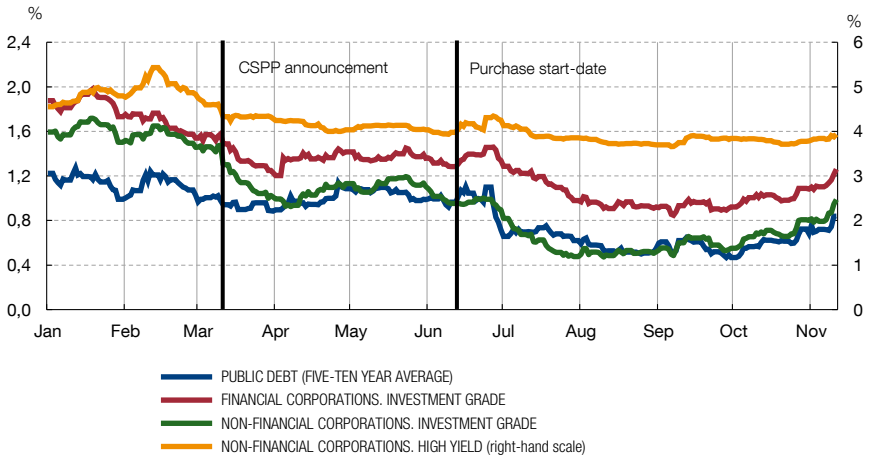

Figure 1: Average yield of Spanish long-term debt security issues.

This figure contains average bond yields for different Spanish issuers: sovereign sector, financial corporations, non-financial corporations with investment grade credit rating, and non-financial corporations with high-yield grade. The sovereign debt yield correspond to the average of five and ten year maturities whereas the average yield for the corporations is calculated as the average of the yields of individual bonds issued in euro by each type of corporation from 2010, with a minimum amount of €10 million and a maturity of more than five years. The weights are based on the amount issued.

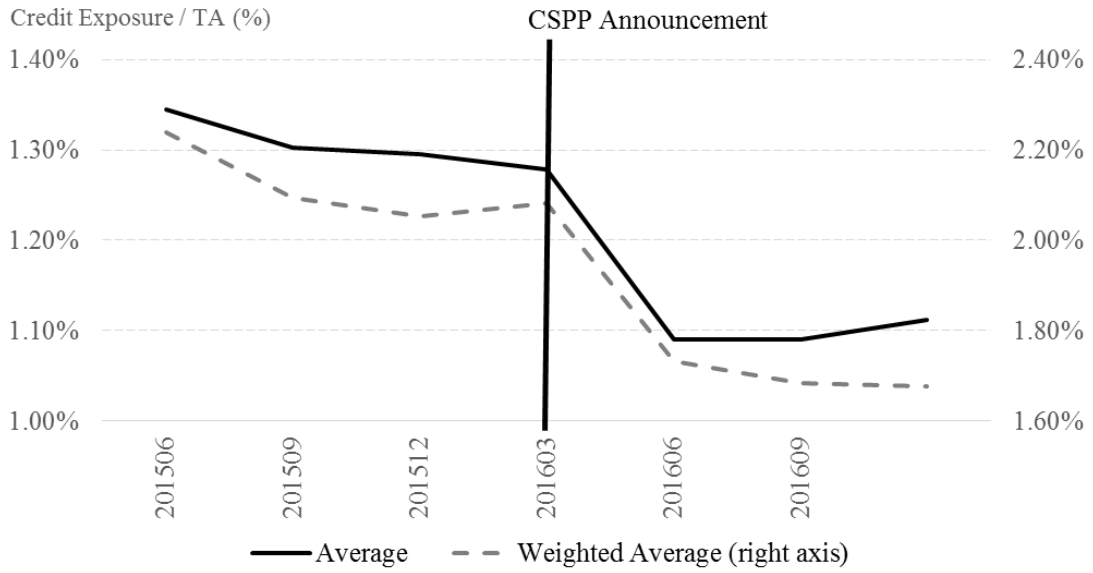

Figure 2: Relative credit exposure of resident credit institutions to debt issuer groups around and after the announcement of the CSPP. This figure summarizes the relative credit exposure of the 29 resident credit institutions used in our analysis to the non-financial groups (i.e., including subsidiaries) that are bond issuers. The exposure is measured as the average ratio of the issuer groups' total monthly credit outstanding in each credit institution relative to that bank's total assets. The solid line corresponds to the equally weighted average whereas the dashed line corresponds to the weighted average (right axis) based on weights that are proportional to the total assets of each credit institution.