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

Oscar Arce, Ricardo Gimeno, Sergio Mayordomo

First version: June 2017

This version: November 2017

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. This drop in the demand for credit by bond-issuers, 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. Specifically, we find that around 78% of the drop in loans previously given to bond issuers was redirected to other companies, which led them to raise investment. This reallocation of credit 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

* Oscar Arce (o.arce@bde.es), Ricardo Gimeno (ricardo.gimeno@bde.es) and Sergio Mayordomo (sergio.mayordomo@bde.es): Banco de España, ADG Economics and Research, C/ Alcalá 48, 28014, Madrid, Spain. We are very grateful for comments and suggestions given by Massimiliano Affinito, Henrique Basso, Diana Bonfim, Olympia Bover, Luisa Carpinelli, Ana del Río, Jordi Galí, Leonardo Gambacorta, Miguel García-Posada, Omar Rachedi, Jorge Martínez Pagés, Steven Ongena, José Luis Peydró, Tano Santos, Harald Uhlig, Ernesto Villanueva, an anonymous referee of the Banco de España Working Papers series, and seminar/conference audiences at the ECB Conference on Credit, Banking and Monetary Policy (Frankfurt), First Annual Workshop of the ESCB Research Cluster on Monetary Economics (Madrid), the Fourth joint Bank of Canada/Banco de España Workshop on "International Financial Markets" (Ottawa) and Banco de España (ADG Economics and Research). A previous version of this paper was circulated with the title: "Making Room for the Needy: The Effects of the Corporate Sector Purchase Programme on Firms Credit". The views expressed in this paper are those of the authors and do not necessarily coincide with those of the Banco de España and the Eurosystem.

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 external financing mix of the Spanish 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 of the euro area previous to the announcement of the programme (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 grade. The effect of the program around the initiation of the CSPP

[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.

purchases, in June 2016, was more modest and located mainly only on bonds actually purchased by the central bank.

Furthermore, the announcement of the CSPP pushed up by almost one third the probability that 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 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 supply 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, although to a lesser extent, 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 78 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 48, 15, and 15 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 3.3%, 1.8%, and 0.8%, 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 Refinancing*

Operations (TLTRO) program. Under the TLTRO, the ECB provides financing to credit institutions for periods of up to four years at a cost that is inversely related to the volume of new lending, provided that some credit expansion targets at the bank level are met. Thus, those banks that had taken funds under 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 with higher ECB's funds intakes 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 this type of programs 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 the 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, our results are consistent with a substitution of bank loans by bonds after the announcement of the CSPP, which reflects the kind of firms' capital structure decisions documented in different contexts by, e.g., Diamond (1991), Rajan (1992), Kashyap et al. (1993), Chemmanur and Fulghieri (1994), Bolton and Freixas (2000), and Denis and Mihov (2003), and, more recently, by Becker and Ivashina (2014) or Morellec et al. (2014).

[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.

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 United States on lending (e.g., Di Maggio et al., 2016; Chakraborty et al., 2017; Kandrac and Schluschez, 2017; Rodnyansky and Darmouni, 2017). Grosse-Rueschkamp et al. (2017) analyse the effects of the CSPP on the capital structure decisions of large European firms. We explore this question too, although our main contribution relates to the effect of the programme on the financing conditions of non-issuing large firms and SME, which are natural beneficiaries of the credit reallocation channel activated by the CSPP. In 2014, there were 22.3 million active SMEs in the non-financial business sector of the European Union (EU), employing almost 90 million people and generating more than 3.7 trillion euros of added value. The analysis of financing conditions of SME is of special relevance because they can usually only access capital through banks. Thus, we exploit a representative sample of the firm population in Spain with more than 300,000 non-issuing firms to evaluate the effectiveness of the CSPP. In so doing, our 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, both large and SME.

Our paper is also related to some previous works that study the transmission of the TLTRO to private lending through the financial sector.[3] 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.

Finally, recent empirical analyses illustrate that negative credit supply shocks affect the real economy in the context of the recent financial crisis. Specifically, Bentolila et al. (2017) find that Spanish firms heavily indebted to weak banks before the crisis exhibit a significant cut in employment. Similar conclusions can be inferred from

[3] 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.

Chodorow-Reich (2014) and Greenstone et al. (2004) for the U.S., from Acharya et al. (2016) for Europe, and from Balduzzi et al. (2017) for Italy. Contrary to previous papers, which rely on the tightening of credit conditions, our paper analyzes the effect of a positive credit supply shock on investment. We find that the reallocation of credit towards non-issuing firms led to an increase in the investment of these firms, whereas firms that substitute loans with bonds did not invest the new funds obtained but instead used them to repay loans. This results suggest that bank credit indeed flowed to the "needy".

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, its effect on firm investment, and the interaction between the CSPP and the TLTRO II. Finally, section 5 concludes.

2. The Corporate Sector Purchase Programme

The CSPP was announced by the Governing Council of the ECB at its March 10, 2016 meeting, and operations started on June, 8. 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.[4]

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

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

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.

3.1. Effect on bond yields

From the announcement of the CSPP on March 10, 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 interest rates on other long-term debt securities, such as the Overnight Index Swap (OIS) or long-term public debt, scarcely changed.

< Insert Figure 1 here >

Interestingly, the effect of the programme announcement 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). Specifically, 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), which represents 10 % of the average yield during that period.

We next analyse jointly the effect of the programme announcement, in March 2016, and of the beginning of actual bond purchases, in June of the same year, on yields through a regression analysis in which the dependent variable is the excess

yield for each eligible bond under the CSPP over the OIS rate with similar maturity. We identify in Datastream 74 investment grade bonds that were potentially eligible given the programme conditions, of which 41 had been purchased by the Eurosystem in the two months after the beginning of the CSPP purchases. The regression analysis is implemented on the time period that spans from February 10, 2016 (i.e., one month before the announcement of the CSPP) to July 8, 2016 (i.e., one month after the beginning of the purchases). To estimate the average effects of the programme announcement, the beginning of purchases, and the effective purchases, we include three dummy variables. First, a dummy variable (Ann_CSPP_t) that takes value one from the announcement date (March 10, 2016) onwards. Second, a dummy variable (Pur_CSPP_t) that is equal to one from the beginning of the purchases (June 8, 2016) onwards. Third, a dummy variable ($BPur\_CSPP_{it}$) that is equal to one after the date in which bond i was first acquired through the programme. We include the last dummy variable in our analysis to assess the effect of the actual purchases on bond yields. This variable allows us to disentangle whether the average yield of the bonds purchased under the programme during the month after the beginning of the purchases dropped more than the one of similar eligible bonds that have not been purchased. 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:

$$ExcessYield_{i,t} = \alpha_i + \beta_1 Ann\_CSPP_t + \beta_2 Pur\_CSPP_t + \beta_3 BPur\_CSPP_{it} + \varepsilon_{i,t} \quad (1)$$

where coefficient β_1 can be interpreted as the average excess yield of eligible bonds from the announcement of the program to the beginning of the purchases, whereas coefficient β_2 represents the average excess yield of eligible bonds from the beginning of the purchases to the end of the sample. Finally, coefficient β_3 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 column (1) of Table 1. The average yield of eligible bonds dropped 46 bp more than the OIS rate from the announcement of the program to the date when the purchases began. Between this last date and the end of the sample the excess yield of the eligible bonds continued decreasing but at a much lower rate (7.6 bp). During this period, those bonds that were actually purchased were the ones that exhibited a stronger decrease. In particular, the average excess yield of those bonds

purchased during the first month of the programme dropped 8.3 bp more than the one of similar eligible bonds that had not been purchased by then. Hence, although there is evidence of an effect of the program beyond that of the announcement, the effect on yields triggered by the announcement of the program is the most sizeable one. Similar results are obtained when we extend the sample period to January 10, 2016 - August 8, 2016. In fact, the decrease in the yield of purchased bonds is even higher than the one associated to eligible bonds that are not bought after the beginning of the CSPP purchases.

Hence, although these results speak in favour of certain "flow effect" following the implementation of bonds purchases by the central bank,[5] the magnitude of the announcement effect on the bond yields is significantly larger. For this reason, the subsequent analyses are performed around the date of announcement.

< Insert Table 1 here>

3.2. Effects on bond issuance

To check whether groups 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.[6,7] We regress this variable on a dummy that takes value one after the announcement of the CSPP (*CSPP*$_t$), on the interaction between that dummy and another one that equals one if the group has bonds CSPP eligible and zero otherwise (*Eligible*$_i$),[8] and also introduce group fixed effects (α_i):

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

[5] 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.

[6] We opt for OLS because the probabilities that we are modeling 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.

[7] 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.

[8] We notice that no group experienced an upgrade/downgrade changing its eligibility during the post-CSPP sample period. In addition, all bonds issued by eligible groups during our sample period are eligible.

where the sum of β_1 and β_2 can be interpreted as the probability that groups 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 groups with non-eligible bonds increase their outstanding stock of bonds after the announcement of the CSPP.

For this analysis, we use an initial sample that consists of monthly data of 94 Spanish groups (all that have issued a bond, including their subsidiaries, at any time since 2006). Six of these groups had been acquired or defaulted before the end of our sample period, so that the final sample consists of the remaining 88 issuer groups. 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 2. 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 groups with eligible bonds is 31 %. This likelihood is lower for the case of non-eligible bonds issuers (6 %).

< Insert Table 2 here >

In column (2), we extend the sample to cover the period running from September 2015 to October 2016 and find that groups 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 groups 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 Figure 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 groups in 2015 and 2016. Column (3) of Table 2 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). In column (4), we extent the pre-CSPP period from January 2006 to February 2016 and confirm that the previous results are not driven by the choice of the pre-event period. Finally, in column (5) we exclude those groups that were inactive before the CSPP announcement and confirm that our results are not driven by these new issuers.

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 groups 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 groups' 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.

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. For this purpose, 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 in these 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, which have issued at least a bond at any time since 2006). The main explanatory variable is the group's growth of the net amount of bonds outstanding during the quarter

following the announcement of the CSPP (*Bond_NetAmt_Outs*$_j$). Consistently with the variable *Credit*$_{j,b}$, *Bond_NetAmt_Outs*$_j$ is defined as the increase in the net amount of bonds outstanding in February 2016 and June 2016, divided by the average net amount outstanding in these two months. We include bank fixed effects in the regression to control for supply effects. In addition, we use some variables related to the group and bank-group characteristics:

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

where β_1 can be interpreted as the percentage change in the credit exposure of a given group *j* to a given bank *b* one quarter after the announcement of the CSPP for each 1 % increase in the amount of bond outstanding of that group. 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).[9] 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). Four out of the 88 issuer groups employed in the previous analysis did not have loans from credit institutions during the sample period, hence the sample employed in this analysis consists of the other 84 issuer groups. 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_NetAmt_Outs* comes from the Banco de España proprietary dataset on bond issuances.

The other dimension of the sample consists of the 29 financial institutions including commercial banks, saving banks and credit cooperatives in Spain. Following

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

García-Posada and Marchetti (2016), this set of banks does not include financial credit establishments whose main activities are leasing, factoring and consumer credit. We also exclude foreign branches and subsidiaries. The remaining 29 credit institutions in our sample account for 82 % of the credit outstanding to Spanish non-financial corporations in the month immediately before the announcement of the CSPP.

The results in column (1) of Table 3 show that for each 1 % that increases the net amount of bond outstanding in the quarter following the CSPP announcement, the credit balance of groups diminished, on average, by around 0.44 %. This result supports the hypothesis that the announcement of the CSPP led to a loan-bond substitution for groups with access to the bond markets.[10] Bond issuers could obtain funding from banks abroad but our interest is to identify the channel through which domestic banks reallocate credit to local smaller firms that rely almost exclusively on their credit.

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 3. We observe that for the pre-announcement period the issuance of bonds is not accompanied by a cancelation of loans. Thus, we attribute the bond-loan substitution phenomenon observed around the announcement of the CSPP to this program. Given that there are not outflows induced by debt issuance before March 2016, we perform our analysis on the reallocation of credit towards non-issuing firms in the post-March 2016 period.

< Insert Table 3 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 loan 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

[10] Loan cancelations can occur through early redemptions, non-renewals or regular payments.

the ECB's CSPP and the TLTRO programmes (section 4.2). This analysis is only made possible thanks to the uniquely large and detailed data set exploited herein, which enables us to know the 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.

Our identification strategy exploits cross-sectional differences in the level of banks' credit outflows from bond issuers after the announcement of the CSPP.[11] Thus, to analyse the effect of this programme on the previous potential 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 these two months ($Credit_{j,b}$). The main explanatory variable is the ratio of total credit outflows from bond issuers relative to bank *b* total assets during the referred time window ($Outflows/TA_b$). In addition, we use some variables related to the characteristics of the bank and the firm:

$$Credit_{j,b} = \alpha + \beta Outflows/TA_b + \delta F_j + \gamma B_b + \theta FB_{jb} + \varepsilon_{j,b} \qquad (4)$$

where coefficient β can be interpreted as the percentage change in credit granted to non-issuing firms one quarter after the announcement of the CSPP given an outflow of 1 % in the credit balance of firms that are bond issuers. 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

[11] Some recent papers that study the real effects of credit supply shocks exploiting cross-sectional differences in lenders characteristics include Greenstone et al. (2014) and Chodorow-Reich (2014) and Bentolila et al. (2017), among others.

over interest income). Firm variables, represented by F_j, include profitability (ROA) risk, as captured by the version of the Altman's Z-score developed by Amat et al. (2017) for Spanish firms,[12] and size (dummy variable that equals one if the firm is an SME). 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] After merging the CBI and the CRR and restricting the sample to non-bond issuers with credit exposure to any of the 29 credit institutions used in our study, either the month before or the quarter after the CSPP announcement, we end up with 303,915 firms and 523,738 firm-bank observations.

Panel A of Table 4 contains descriptive statistics on the main characteristics of the firms in the sample.[14] We observe that the vast majority of the 303,915 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 (4.48 %) and are not in the distress zone or under risk of insolvency given that its Z-score is positive.

< Insert Table 4 here >

Panel B of Table 4 contains descriptive statistics on the main characteristics of the 29 credit institutions in the sample. In view of the 5^{th} and 95^{th} percentiles referred to the bank relative size, we confirm that there is a high degree of heterogeneity in terms

[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.

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 5.6 %. Liquid assets represent on average around 14 % of the total assets. Also, on average, interest income exceeds that coming 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 around 1.5 % 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 (€15,470), 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.

Column (1) of Table 5 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. In view of the coefficient associated to the variable *Outflows/TA*, 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 non-issuing company by around 4.4 % more than other banks not suffering outflows. To quantify the magnitude of the new credit granted by banks suffering outflows, we report some calculations based on column (1). An outflow equivalent to 0.20 % of the average bank total assets (€155 million), which corresponds to the average fall in the outstanding credit given to bond issuers a quarter after the announcement of the CSPP, gives rise a €2,900 increase in the balance of the average non-issuer company (given an average credit balance of €331,000 before the CSPP announcement). This increase in the credit balance of non-issuing firms represents 0.9 % of their average credit balance before the CSPP announcement.

Column (2) represents a variation with respect to column (1) in which we include firm fixed effects instead of specific firm characteristics. The use of firm fixed effects enables us to ensure that we have not left out any relevant variable related to the demand side and that we are effectively controlling 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. The fact that the variable *Outflows/TA* is significantly higher than zero after using firm fixed effects suggests that this variable is indeed capturing a genuine credit supply-side shock coming from the outflows of bond issuers.

The CRR also contains information on the exposure of each bank to each group through debt securities. One may argue that besides the channel associated to the credit outflows of bond issuers, the CSPP could affect the bank credit supply to non-issuer firms through a second channel that builds on the potential bond sales by banks. These could enjoy capital gains and strengthen their liquidity position by selling bonds after the announcement of the CSPP and exploiting the rise in their price documented before. Then, extra capital and/or liquidity could affect ultimately to the credit supply in a way that is not directly related to the disintermediation effect generated by large bond issuers. To account for this possibility, we analyze whether the banks' holdings of bonds fall after the announcement and the beginning of the purchases of the CSPP and do not find significant variation. In addition, we augment the specification in equation (4) with a variable that measures the percentage change in each bank's portfolio of fixed income securities from February 2016 to June 2016 and find that the effect associated to this variable is not statistically different from zero. For this reason, we discard the need of relying on this alternative outflow measure.

Non-issuing firms are not a homogenous group of firms in terms of their size among other features; neither, consequently, in terms of their access to credit. For this reason, we extend equation (4) such that the main explanatory variables are the ratio $Outflows/TA_b$ and its interaction with 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:

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

where 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. 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.

Columns (3) and (4) of Table 5 report the results obtained from the estimation of equation (5) on the flow of credit to non-issuers depending on their size. In view of the estimates of the coefficient on the variable *Outflows/TA*, 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 16.5 % more than other banks not suffering outflows.

< Insert Table 5 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* (4.09) in column (3) 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 in the case of large firms. By breaking down SMEs into medium and micro/small firms (column 4), 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 8.8 % 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 3.8 % 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 (4) of Table 5. An outflow equivalent to 0.20 % of the average bank total assets (€155 million) is translated into a €176,631 increase in the balance of the average non-issuer large company (given an average credit balance of €5.34 million before the CSPP announcement). In aggregate terms, as each of the 29 banks in the sample gives credit to, on average, 419 large firms, it leads to an overall estimated increase in credit of €2,148 million to large firms that do not issue bonds.

Regarding medium-sized firms, a credit outflow of the same magnitude is translated into a €19,650 increase in the balance of the average medium-sized firm without access to financial markets (given an average credit balance of €1.1 million before the CSPP announcement). In aggregate terms, considering that each of the 29 banks in the sample gives credit to, on average, 1,121 medium-sized firms, it leads to an overall increase in credit of €639 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 €1,388 increase in the balance of the average medium-sized firm (given an average credit balance of €184,000 before the CSPP announcement). In aggregate terms, as each of the 29 banks in the sample gives credit to, on average, 16,522 medium-sized firms, it leads to an overall increase in credit of €665 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 €3,451 million, which amounts to almost 78 % 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 48, 15, and 15 cents of euro in the credit balance of non-issuing large, medium-sized and small firms 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 3.3 %, 1.8 %, and 0.8 % of their average credit balance before the CSPP announcement, respectively.

To confirm the robustness of the baseline findings, we next perform several variations of the previous estimations. First, 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 construction 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. Results are reported in column (2) of Table 6, which, for sake of clarity, also incorporates, in column (1), the baseline analysis reported in Table 5, column (4). As shown in column (2), the number of observations decreases only by 9 %, suggesting that most firms in the analysis already had a relationship with the bank prior to March 2016. 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 column (1), confirming that the new credit also flows to clients with a previous relationship with the bank.

< Insert Table 6 here >

As a second robustness test, we use an alternative dependent variable: the difference between the logarithm of the credit balance of firm *j* with a bank *b* (in euros plus one, to deal with zeros) one month before the announcement of the CSPP and the logarithm of the credit balance one quarter afterwards. Note that this variable spans between -18.42 and 19.97, which explains the higher coefficients associated to our variable of interest. As shown in column (3) of Table 6, the new definition of the dependent variable yields results that are consistent with the ones obtained in the baseline analysis.

The end of the sample period used to study the reallocation of credit is June 2016, which is the month in which the bond purchases begin. We extend the sample period up to September 2016 to study the effect of the program two quarters after the announcement, in order to have a sample that also includes a quarter after the beginning of the purchases. The results are reported in column (4) of Table 6. We observe that two quarters after the announcement of the program the reallocation of

credit towards micro-small and medium-sized firms is even more sizeable. This suggests that contrary to what we observe with non-issuing large firms, the reallocation of credit towards SMEs is not immediate but, instead, gradual over time.

The results reported in column (5) of Table 6 are obtained from a variation of the baseline analysis in which the measure of credit outflows from bond issuers corresponds to the change in the credit balance one month following the announcement of the CSPP. Thus, we restrict the length of the interval used to measure the outflows, which in the baseline analysis extends up to one quarter after the announcement. Although the magnitude of the effect is lower than in the baseline analysis, the results are fully consistent with the baseline ones.

In a final attempt to confirm the robustness of our results in regard to the credit reallocation channel, we measure the credit outflows from bond issuers that are exclusively due to the loan-bond substitution effect. To this aim, based on the estimates of equation (3), we estimate the change of credit that is due to the variation in the outstanding amount of bonds (in net terms) and then use this variable instead of $Outflows/TA_b$ in equation (5). The results are reported in column (6) of Table 6 and confirm those reported in the baseline analysis.

The previous results in Tables 5 and 6 illustrate the credit reallocation channel for a sample of non-issuing firms. Finally, we confirm that this channel is not active when we restrict our analysis to the sample of bond issuers. This analysis helps to confirm the loan-bond substitution effect that was documented before. For this purpose, we estimate equation (4) for the sample of bond issuers and find that there is not a significant effect of the variable $Outflows/TA_b$ on the dependent variable (see column 7 of Table 6). In other words, a given bank suffering outflows from bond issuers does not give more credit to other bond issuers, given that the latter are likely to prefer raising funds through the bond market.

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 reflect 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 (denoted *Distress_Zone*). 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:

$$Credit_{j,b} = \alpha + \beta_1 Outflows/TA_b + \beta_2 Distress\_Zone_j + \beta_3 D.Risk_j x Outflows/TA_b + \delta F_j + \gamma B_b + \theta FB_{jb} + \varepsilon_{j,b} \quad (6)$$

where 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. 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 7 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 (2) and the linear combination of the coefficients for the interaction term (*Distress_Zone 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 7 here >

4.2. The amplifying effect of the TLTRO on the credit reallocation channel

Between 2014 and 2016, the ECB launched two series of targeted longer-term refinancing operations (TLTROs) to provide financing to euro area credit institutions with a maturity of up to four years. The goal of these operations was to "further ease

[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).

private sector credit conditions and to stimulate bank lending to the real economy". The first series of eight operations (TLTRO-I) was announced in June 2014 and it was followed by a second series of four operations announced on March 10, 2016, coinciding with the CSPP announcement, and to be conducted once a quarter between June 2016 and March 2017 (TLTRO-II). Under TLTRO-II, banks were able to borrow a total amount of up to 30 % of the eligible part of their outstanding loans as of January 31, 2016, net of any amount previously borrowed under the previous TLTRO-I scheme and still outstanding at the time of the settlement of TLTRO II.

Moreover, banks were given the opportunity to repay funds borrowed under TLTRO-I early and switch to TLTRO-II funds. In fact, as detailed in ECB (2017) the first TLTRO-II operation (settled in June 2016) attracted bids amounting to the outstanding volume of funds taken under TLTRO-I, hence suggesting that the vast majority of these funds were transferred to the TLTRO-II scheme. This shift of funds between the two TLTRO programmes was attractive because the second programme lengthened the maturity of funding provided by the ECB and lowered its cost.

In particular, the interest rate applied to funds obtained under the TLTRO-II 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 February 1, 2016 and January 31, 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 by January 31, 2018.[17] Up to this limit, the size of the decrease in the interest rate will be graduated linearly depending on the percentage by which a counterparty exceeds its benchmark stock of eligible loans.

[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

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

To check for this possibility, we next investigate whether banks relying more on TLTRO increased their lending to non-issuing firms to a higher extent than banks less dependent on TLTRO funding, for given a drop in the flow of loans to issuing firms after the CSPP. We proxy the degree of reliance on TLTRO funds at the time of the CSPP announcement of a given bank b by means of the amount of funds obtained under the TLTRO programme used up to January 2016 relative to the bank-specific limit ($TLTRO_b$). We consider that a bank b faces a high volume of credit outflows if it is in the top quartile of the distribution of individual lenders' credit outflows from issuer groups relative to bank total assets ($D.Outflows_b$).[18] We propose the following regression equation to analyse the potential differential effect of TLTRO funding on the credit reallocation process triggered by the CSPP:

$$Credit_{j,b} = \alpha + \beta_1 D.Outflows_b + \beta_2 TLTRO_b + \beta_3 D.Outflows_b x TLTRO_b + \delta F_j + \gamma B_b + \varphi RL_{jb} + \varepsilon_{j,b} \quad (7)$$

where the dependent variable is the same employed in the baseline analysis in equation (4). 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 bank and firm levels.

In Table 8, we report the linear combination of the relevant coefficients, rather than their individual values. The sum of the three coefficients β_1-β_3 can be interpreted as the effect of the dependence on TLTRO on credit to non-issuing firms from banks suffering outflows; whereas the coefficients β_1 measures the variation in credit for those banks that suffer outflows but do not use TLTRO funds. Therefore, the difference between the two previous sums of coefficients (i.e., the sum of β_2 and β_3) can be

[18] The banks in the top quartirle of the distribution and so, classified as those suffering high outflows, represent 30 % of the assets of all the banks in our sample and 95 % of the total outflows.

interpreted as the differential effect of the TLTRO on credit from banks suffering outflows as compared to the credit from banks that do not use TLTRO funds.

We report the information in these terms since our interest is to disentangle the effect of the credit outflows after the CSPP on the flow of credit directed to non-issuing firms depending on the amount of funds obtained through the TLTRO facility. In order to evaluate this impact, we report the effect on a hypothetical case in which there are two types of banks that have suffered high credit outflows form bond issuers but one has used a 50 % of its TLTRO limit to which it has access (i.e., we replace $TLTRO_b$ by 0.50) and the other has not used TLTRO funds. The sum of coefficients taking into account the 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 Table 8. Consistently with previous results, we first observe that there is a statistically significant increase in the credit from banks that suffer credit outflows independently on whether they take funds under the TLTRO or not. However, the magnitude of the coefficient for those banks that used a 50 % of its TLTRO limit almost doubles that of the banks that would have not relied on this funding source. Specifically, the credit to a given firm increases on average by 14.8 % 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. This increase is much lower (7 %) for a bank that suffers high outflows but did not use the TLTRO funds. The differential effect of the TLTRO on credit from banks suffering outflows is significantly larger than zero (7.8 %). These results are consistent with the hypothesis that the reallocation of credit documented before was amplified by the ECB's Targeted Longer Term Refinancing Operations (TLTRO).

< Insert Table 8 here >

4.3. Credit reallocation and investment

We finally study whether the reallocation of credit towards non-issuing firms had real economic effects. For that aim, we regress the investment in fixed assets over total assets (Inv/TA_{it}) on the increase of credit that can be attributed to the reallocation of the supply of bank loans from issuing firms to other non-issuing companies. Firstly, we obtain the growth in credit attributed to this channel from the estimation of equation (5) for the three types of firms. For large firms, it is obtained as the product of the estimated

coefficient $\hat{\beta}_1$ times the variable *Outflows/TA*$_b$, whereas for medium-sized and micro-small firms, it is derived as the sum of the previous product and the corresponding size dummy times *Outflows/TA*$_b$ (i.e., $\hat{\beta}_1$*Outflows/TA*$_b$ + $\hat{\beta}_3$*D.Median x Outflows/TA*$_b$ for medium-sized firms). Secondly, we multiply this growth rate by the volume of credit that each firm had from each bank to obtain the variation of credit in euros and, thirdly, we aggregate over all bank loans given to the same firm to obtain the total new credit that each firm obtained through this reallocation channel. Finally, we compute the growth rate that the flow of reallocated credit obtained in this way implies to the average credit balance of the firm. Once we have these two variables, we conduct a regression analysis that is performed on a two period sample corresponding to the first and second quarters of 2016:

$$Inv/TA_{it} = \delta \widehat{Credit}_{\iota t} + \gamma_i + \varphi_t + \epsilon_{it} \quad (8)$$

where Inv/TA_{it} refers to the investment in fixed assets over total assets. Investment in fixed assets is defined as the gross fixed capital formation minus the consumption of fixed capital. $\widehat{Credit}_{\iota t}$ is the percentage change in credit reallocated to a given firm *i* by banks suffering credit outflows from bond issuers during the first quarter after the CSPP announcement. This variable is equal to zero in 2016Q1, and takes the corresponding increase in 2016Q2. Parameters γ_i and φ_t refer to firm and time fixed effects. Given that $\widehat{Credit}_{\iota t}$ is a generated regressor, we use bootstrapped standard errors (1,000 repetitions) also clustered at firm level.

For a proper evaluation of the effects of the CSPP on investment, and to limit the effect of potential confounding events, we study the variation of investment just around the announcement of the programme. For this reason, we need quarterly information on firm's balance-sheet. This information is not available for the whole sample of firms used in our study, but we have detailed information for several hundreds of firms on a quarterly basis from a subset of the Central Balance Sheet Data Office Survey. These firms are mainly large and medium sized firms. Thus, our sample consists of 519 large and medium-sized non-issuing firms that are not subsidiaries of issuer groups employed in the previous analyses, and for which we observe their balance-sheets in the two quarters under study.

The results obtained from the estimation of equation (8) for this sample of firms are reported in columns (1) - (3) of Table 9. The first column refers to the effect of the

credit reallocation on the investment on non-issuing firms whereas the second one shows the growth rate of cash holdings of these firms, which are measured as cash plus deposits over total assets. Finally, the third column refers to the results obtained when we use the ratio of dividends over total assets as the dependent variable.

In view of column (1), we conclude that the reallocation of credit towards non-issuing firms led to an increase in the investment of these firms. Specifically, the investment ratio of a given non-issuing firm increases around 0.1 percentage points for each 1 % increase in the credit reallocated to that firm by banks suffering outflows from bond issuers. Taking into account that the average increase in credit to non-issuing firms in our sample through the reallocation channel identified herein was 3.8 %, the rise in investment represents almost 20 % of the average investment over total assets at March 2016. We have replicated the previous analysis, using the cash and dividends as the dependent variable variables in columns (2) and (3), respectively, instead of investment, and we found that these firms neither increase their level of cash nor distribute dividends to shareholders in a significant way.

The same information is available for 33 issuing groups. In this case, we estimate a variation of equation (8) in which, instead of using the credit growth ($\widehat{Credit}_{it}$), we exploit the growth of the net amount of bonds outstanding after the announcement of the CSPP ($Bond\_NetAmt\_Outs$) as in equation (3). In this case, given that there are not generated regressors, instead of using bootstrap, we cluster the standard errors at the firm level. As shown in columns (4) - (6) of Table 9, the bond issuing groups tend to repay previous loans and do not invest the new funds obtained through the sale of new bonds. Likewise, this group of firms do not seem to raise their level of cash holdings or the volume of distributed dividends either.

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 did not only reduce the financing costs and stimulated 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. Furthermore, the reallocation of credit towards non-issuing firms led to an increase in the investment of these firms.

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. The price-mechanism of this last program would have provided strong 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.

References

Abidi, N., Miquel Flores, I., and Eterovic, N. A. (2017) Who Benefits from the ECB's Corporate Sector Purchase Programme? A Difference-in-Discontinuities Approach, SSRN Working Paper 2914911.

Acharya, V. V., Eisert, T., Eufinger, C., and Hirsch, C. W. (2017) Whatever it takes: The real effects of unconventional monetary policy, NYU Working Paper.

Altavilla, C., Carboni, G., and Motto, R. (2015) Asset purchase programmes and financial markets: lessons from the euro area. ECB working paper n. 1864.

Altman, E. I. (1968) Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy. *Journal of Finance* 23, 589-609.

Amat, O., Manini, R., and Renart, M. A. (2017) Credit Concession through credit scoring: Analysis and application proposal. *Intangible Capital* 13, 51-70.

Andrade, P., C. Cahn, H. Fraisse, and J.-S. Mesonnier (2015) Can the Provision of Long-Term Liquidity Help to Avoid Credit Crunch? Evidence from the Eurosystem's LTROs. Working Papers 540, Banque de France.

Banco de España (2017) *Annual report 2016*. Banco de España, Madrid (Spain).

Beck, T., Demirgüç-Kunt, A. and Maksimovic, V. (2005) Financial and Legal Constraints to Growth: Does Firm Size Matter? *Journal of Finance* 60(1), 137-177.

Beck, T., Demirgüç-Kunt, A., Laeven, L. and Maksimovic, V. (2006) The determinants of financing obstacles. *Journal of International Money and Finance* 25(6), 932-952.

Becker, B, and Ivashina, V. (2014) Cyclicality of Credit Supply: Firm level evidence. *Journal of Monetary Economics* 62, 76-93.

Bentolila, S., Jansen, M., and Jiménez G. (2017) When Credit Dries Up: Job Losses in the Great Recession. *Journal of the European Economic Association, forthcoming*.

Bolton, P. and Freixas, X. (1999) Equity, Bonds and Bank Debt: Capital Structure and Financial Market Equilibrium under Asymmetric Information. *Journal of Political Economy* 108, 324-351.

Boneva, L., and Linton, O. (2017) A discrete-choice model for large heterogeneous panels with interactive fixed effects with an application to the determinants of corporate bond issuance. *Journal of Applied Econometrics*, forthcoming.

Carpinelli, L., and Crosignani, M. (2017) The Effect of Central Bank Liquidity Injections on Bank Credit Supply. FEDS Working Paper No. 2017-038.

Chakraborty, I., Goldstein, I., and MacKinlay, A. (2017) Monetary Stimulus and Bank Lending. Working Paper.

Chemmanur, T., and Fulghieri, P. (1994) Reputation, Renegotiation, and the Choice between Bank Loans and Publically Traded Debt. *Review of Financial Studies* 7, 475-506.

Chodorow-Reich, G. (2014) The Employment Effects of Credit Market Disruptions: Firm-level Evidence from the 2008-09 Financial Crisis. *Quarterly Journal of Economics* 129, 1-59.

Christensen, J. H. E., and Rudebusch, G. D. (2012) The response of interest rates to US and UK Quantitative Easing. *The Economic Journal* 122, 385-414.

Daetz, S. L., Subrahmanyam, M. G., Tang, D. Y., and Wang, S. Q. (2016) Did ECB Liquidity Injections Help The Real Economy. Working Paper.

D'Amico, S., English, W., López-Salido, D., and Nelson, E. (2012) The Federal Reserve's Large Scale Asset Purchase programmes: Rationale and effects. *The Economic Journal* 122, 415-446.

D'Amico, S., and King, T. B. (2013) Flow and stock effects of large-scale treasury purchases: Evidence on the importance of local supply. *Journal of Financial Economics* 108, 425-448.

Denis, D. J., and Mihov, V. T. (2003) The choice among bank debt, non-bank private debt, and public debt: evidence from new corporate borrowings. *Journal of Financial Economics* 70, 3-28.

Diamond, D., (1991) Monitoring and Reputation: The Choice between Bank Loans and Directly Placed Debt. *Journal of Political Economy* 99, 688-721.

Dietsch, M., and Petey, J. (2004) Should SME exposures be treated as retail or corporate exposures? A comparative analysis of default probabilities and asset

correlations in French and German SMEs. *Journal of Banking and Finance* 28, 773-788.

Di Maggio, M., Kermani, A., and Palmer, C. (2016) How Quantitative Easing Works: Evidence on the Refinancing Channel. *NBER Working Paper* No. 22638.

Eser, F., and Schwaab, B. (2016) Evaluating the impact of unconventional monetary policy measures: Empirical evidence from the ECB's Securities Markets Programme. *Journal of Financial Economics* 119, 147-167.

European Central Bank (2016a) *Decision (EU) 2016/948 of the European Central Bank, 1 June 2016 on the implementation of the corporate sector purchase programme* (ECB/2016/16).

European Central Bank (2016b) The corporate bond market and the ECB's corporate sector purchase programme, Box 2, *Economic Bulletin*, No 5/2016.

European Central Bank (2017) The targeted longer-term refinancing operations: an overview of the take-up and their impact on bank intermediation, Box 5, *Economic Bulletin*, No 3/2017.

Gagnon, J., Raskin, M., Remache, J., and Sack, B. (2011) Large-scale asset purchases by the Federal Reserve: did they work? *International Journal of Central Banking* 7(1), 3-43.

García-Posada, M., and Marchetti, M. (2016) The bank lending channel of unconventional monetary policy: The impact of the VLTROs on credit supply in Spain. *Economic Modelling* 58, 427-441.

Glick, R., and Leduc, S. (2012) Central bank announcements of asset purchases and the impact on global financial and commodity markets. *Journal of International Money and Finance* 31, 2078-2101.

Greenstone, M. Mas, A., and Nguyen, H.-L. (2014) Do Credit Market Shocks affect the Real Economy? Quasi-Experimental Evidence from the Great Recession and 'Normal' Economic Times. *NBER Working Paper* No. 20704.

Hancock, D., and Passmore, W. (2011) Did the Federal Reserve's MBS purchase program lower mortgage rates? *Journal of Monetary Economics* 58, 498-514.

Joyce, M.A.S., Lasaosa, A., Stevens, I., and Tong, M. (2011) The financial market impact of quantitative easing in the United Kingdom. *International Journal of Central Banking* 7(3), 113-162.

Kandrac, J., and Schluschez, B. (2017) Quantitative easing and bank risk taking: evidence from lending. Working Paper.

Kashyap, A. K., Stein, J. C., and Wilcox, D. W. (1993) Monetary Policy and Credit Conditions: Evidence from the Composition of External Finance. *American Economic Review* 83, 78–98.

Morellec, E., Valta, P. and Zhdanov, A. (2014) Financing Investment: The Choice Between Bonds and Bank Loans. *Management Science* 61, 2580-2602.

Rajan, R.G., (1992) Insiders and Outsiders: The Choice between Informed and Arms-Length Debt. *Journal of Finance* 47, 1367-1400.

Rodnyansky, A., and Darmouni,O. (2017) The Effects of Quantitative Easing on Bank Lending Behavior. *Review of Financial Studies*, forthcoming.

Ueda, K. (2012) Deleveraging and Monetary Policy: Japan since the 1990s and the United States Since 2007. *The Journal of Economic Perspectives* 26(3), 177-201.

Table 1: 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 is the excess yield for each eligible bond under the CSPP over the OIS rate with similar maturity. The regression analysis in column (1) is implemented on the time period that spans from February 10, 2016 (i.e., one month before the announcement of the CSPP) to July 8, 2016 (i.e., one month after the beginning of the purchases). The excess yield is regressed on three dummy variables: (i) Ann_CSPP_t, which takes value one from the announcement date onwards; (ii) Pur_CSPP_t, which is equal to one from the beginning of the purchases (June 8, 2016) onwards; and (iii) $BPur\_CSPP_{it}$, which is equal to one after the date in which the bond *i* was first acquired through the programme. In addition, the regression includes bond fixed effects. In column (2) we extend the sample period to January 10, 2016 – August 8, 2016. Standard errors are clustered at bond and day levels and reported in brackets. *, ** and *** indicate statistical significance at the 10 %, 5 %, and 1 % levels, respectively.

	(1)	(2)
Ann_CSPP	-0.460***	-0.457***
	[0.063]	[0.068]
Pur_CSPP	-0.076***	-0.101***
	[0.020]	[0.030]
BPur_CSPP	-0.083**	-0.222**
	[0.041]	[0.064]
Bond FE	YES	YES
Observations	6,928	9,730
R-squared	0.877	0.838

Table 2: 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 88 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 2006 to October 2016. Finally, in column (5) we exclude those groups that were inactive before the CSPP announcement. 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)	(5)
CSPP x Eligible	0.245**	0.082**	0.075*	0.076**	0.256**
	[0.109]	[0.038]	[0.042]	[0.037]	[0.109]
CSPP	0.062***	0.017	0.002	0.041***	0.052**
	[0.023]	[0.011]	[0.011]	[0.013]	[0.025]
Firm FE	YES	YES	YES	YES	YES
Observations	528	1,232	1,232	11,352	462
R-squared	0.424	0.358	0.350	0.239	0.443

Table 3: Bond-loan substitution

This table contains the results obtained from the estimation of equation (3) 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 the group's growth of the net amount of bonds outstanding during the quarter following the announcement of the CSPP (*Bond_NetAmt_Outs*). 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_NetAmt_Outs	-0.438***	-0.040
	[0.135]	[0.025]
Bank FE	YES	YES
Firm Controls	YES	YES
Observations	600	560
R-squared	0.213	0.281

Table 4. 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 (%)	0.84	9.11	0	0	0	303,915
SME (%)	99.16	9.11	100	100	100	303,915
Micro/small (%)	96.37	18.69	100	100	100	303,915
Median (%)	2.79	16.46	0	0	0	303,915
ROA (%)	4.48	17.02	4.40	-21.28	29.76	303,915
Z-score	0.39	7.23	0.43	-11.67	12.07	303,915

Panel B

	Mean	SD	Median	p5	p95	# Banks
Relative size to total credit (%)	2.87	4.57	0.77	0.03	12.15	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 (%)	0.25	0.52	0.00	0	1.44	29

Panel C

	Mean	SD	Median	p5	p95	# Obs
Change in credit balance (,000€)	15.47	2395.79	-2.00	-84.00	116.00	523,738
Relative change in credit balance (%)	0.45	84.34	-2.63	-200.00	200.00	523,738
Duration of RL (yes=1, no=0)	5.63	4.54	4.08	0.00	12.67	523,723

Table 5: Effects of the CSPP on credit to non-issuers across firm-size

This table contains the results obtained from the estimation of equations (4) and (5). The dependent variable in columns (1) - (4) is the change in the credit balance between a certain firm *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 these regression analyses 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 columns (1), (3) and (4) 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). In column (2) we use bank and firm-bank related variables but we use firm fixed effects instead of firm related variables such that only firms with positive credit balance in more than one bank (either before or after the announcement) are used in the analysis. 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 firm and bank levels in columns (1) and (2) and at D.Size-bank level in columns (3) and (4). *, ** and *** indicate statistical significance at the 10 %, 5 %, and 1 % levels, respectively.

	(1)	(2)	(3)	(4)
Outflows/TA (%)	4.380**	3.494**	16.547***	16.551***
	[1.842]	[1.568]	[2.889]	[2.790]
SME x Outflows/TA (%)			-12.454***	
			[2.662]	
Micro-Small x Outflows/TA (%)				-12.779***
				[2.630]
Medium-Sized x Outflows/TA (%)				-7.715**
				[3.150]
SME	-0.122***		-0.089***	
	[0.027]		[0.031]	
Micro-Small				-0.094***
				[0.031]
Medium-Sized				-0.030
				[0.038]
Outflows/TA (%) +			4.094**	
+ SME x Outflows/TA (%)			[1.774]	
Outflows/TA (%) +				3.772**
+ Micro-Small x Outflows/TA (%)				[1.670]
Outflows/TA (%) +				8.835***
+ Medium-Sized x Outflows/TA (%)				[2.569]
Firm Control Variables	YES	YES	YES	YES
Bank Control Variables	YES	YES	YES	YES
Observations	523,723	329,152	523,723	523,723
R-squared	0.022	0.364	0.022	0.023

Table 6: Effects of CSPP on non-issuers' access to financing depending on their size. Robustness tests

This table contains the results obtained from the estimation of equation (5) based on alternative variables and samples. The dependent variable is the same employed and described in Table 5. In fact, column (1) in this table corresponds to column (4) in Table 5 and is included to facilitate comparisons across specifications. Results in column (2) are obtained from a sample of firms to which each bank has a positive exposure immediately before the announcement of the CSPP. In column (3) we use an alternative dependent variable: the difference between the logarithm of the credit balance of firm *j* with a bank *b* one month before the announcement of the CSPP and the logarithm of the credit balance one quarter afterwards. We extend the sample period up to September 2016 in column (4) whereas in column (5) the measure of credit outflows from bond issuers corresponds to the variation in the credit balance one month after the announcement of the CSPP. The credit outflows in column (6) come from the estimates of equation (3) and they represent the variation of credit that is due to the variation in the bond net amount outstanding. Finally, the results in column (7) are obtained for the sample of bond issuers. 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)	(7)
Outflows/TA (%)	16.551***	7.185***	98.140***	27.580***	12.229***	54.123***	10.635
	[2.790]	[1.994]	[15.876]	[7.981]	[2.318]	[14.612]	[7.856]
Micro-Small x Outflows/TA (%)	-12.779***	-5.165***	-82.990***	-12.333**	-9.374***	-33.889**	
	[2.630]	[1.890]	[15.291]	[6.046]	[2.157]	[15.847]	
Medium-Sized x Outflows/TA (%)	-7.715**	-1.132	-52.655***	-7.870	-6.144**	-20.781	
	[3.150]	[2.291]	[17.647]	[6.679]	[2.586]	[16.620]	
Micro-Small	-0.094***	-0.060**	-0.198	-0.119*	-0.102***	-0.085**	
	[0.031]	[0.027]	[0.142]	[0.071]	[0.033]	[0.038]	
Medium-Sized	-0.030	-0.011	-0.024	-0.041	-0.033	-0.024	
	[0.038]	[0.032]	[0.166]	[0.075]	[0.041]	[0.045]	
Outflows/TA (%) + Micro-Small x Outflows/TA (%)	3.772**	2.020**	15.150**	15.246*	2.855**	20.234***	
	[1.670]	[1.013]	[7.276]	[7.950]	[1.316]	[7.596]	
Outflows/TA (%) + Medium-Sized x Outflows/TA (%)	8.835***	6.053***	45.486***	19.710**	6.085***	33.342***	
	[2.569]	[1.754]	[12.119]	[7.875]	[2.090]	[9.712]	
Firm Control Variables	YES	YES	YES	YES	YES	YES	YES
Bank Control Variables	YES	YES	YES	YES	YES	YES	YES
Observations	523,723	482,071	523,723	530,086	523,702	523,132	600
R-squared	0.023	0.006	0.022	0.045	0.023	0.023	0.091

Table 7: Effects of CSPP on non-issuers' access to financing depending on their risk

This table contains the results obtained from the estimation of equation (6). The dependent variable in both columns (1) and (2) is the change in the credit balance between a certain firm *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 (%)	5.057***	4.635**
	[1.458]	[1.760]
Distress Zone x Outflows/TA (%)	-4.068***	-3.745***
	[1.127]	[1.255]
Distress Zone	-0.017	-0.050***
	[0.016]	[0.018]
Outflows/TA (%) + Distress Zone x Outflows/TA (%)	0.989	0.890
	[1.287]	[1.457]
Firm Control Variables	YES	YES
Bank Control Variables	YES	YES
Observations	523,265	523,265
R-squared	0.023	0.023

Table 8: The complementary effect of the TLTRO

This table contains the results obtained from the estimation of equation (7) 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 in the top quartile 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 ($TLTRO_b$), and (iii) the interaction term resultant of the combination of the two 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). We report the linear combination of the coefficients of interest to disentangle the effect of the credit outflows after the CSPP on the flow of credit directed non-issuing firms depending on the amount of funds obtained through the TLTRO facility. 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 existence of outflows and use of the TLTRO resources joint with the standard errors of such combination and their level of significance are reported below. Standard errors, in brackets, are clustered at firm and bank level. *, ** and *** indicate statistical significance at the 10 %, 5 %, and 1 % levels, respectively.

Effect from banks suffering outflows that do not use TLTRO funds	
Outflows	0.070*
	[0.042]
Effect of the dependence on TLTRO on credit from banks suffering outflows	
Outflows + TLTRO + ***Outflows x TLTRO***	0.148***
	[0.056]
Differential effect of TLTRO on credit from banks suffering outflows	
TLTRO + ***Outflows x TLTRO***	0.078**
	[0.033]

Table 9. The effect of the CSPP on investment, cash holdings, and dividends

Columns (1) – (3) of this table contain the results obtained from the estimation of equation (8) for a sample of non-issuing firms. The dependent variable in column (1) is the investment in fixed assets relative to total assets whereas the dependent variables in columns (2) and (3) are the growth rate of cash holdings and the dividends over total assets, respectively. Given that the explanatory variable of interest is a generated regressor, we use bootstrapped standard errors that are also clustered at firm level. In columns (4) – (6) we estimate a variation of equation (8) on issuing groups and instead of using the credit growth, we use the growth of the net amount of bonds outstanding after the announcement of the program (*Bond_NetAmt_Outs*) to study its effect on investment (column (4)), cash holdings (column (5)), and dividends (column (6)). In this case, given that there are not generated regressors, instead of using bootstrap, we cluster the standard errors at firm level. *, ** and *** indicate statistical significance at the 10 %, 5 %, and 1 % levels, respectively.

	Non-issuers			Issuers		
	Investment	Cash	Dividends	Investment	Cash	Dividends
	(1)	(2)	(3)	(4)	(5)	(6)
Credit	0.085*	0.960	0.000			
	[0.046]	[2.816]	[0.009]			
Bond_Net_Amt_Outs				0.001	0.105	0.000
				[0.001]	[0.154]	[0.002]
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,038	1,038	1,038	66	66	66
R-squared	0.618	0.365	0.534	0.898	0.405	0.422

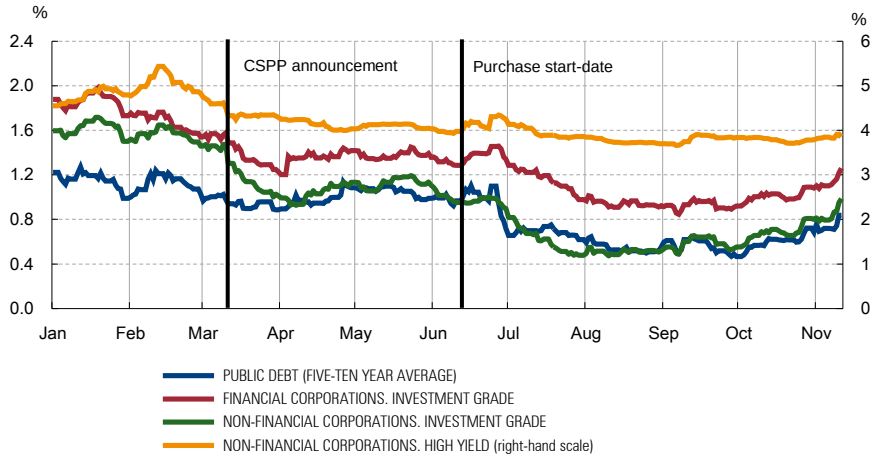

Figure 1: Average yield of Spanish long-term debt security issues.

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.

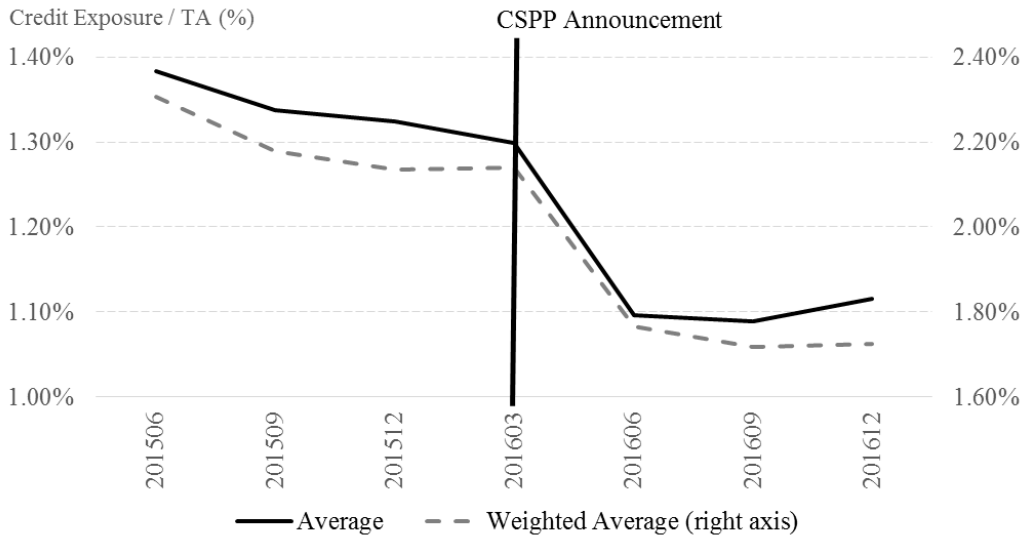

Figure 2: Relative credit exposure of resident credit institutions to debt issuer groups around and after the announcement of the CSPP. This figure summarizes the relative credit exposure of the 29 resident credit institutions used in our analysis to the non-financial groups (i.e., including subsidiaries) 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.