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

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Abstract

We analyse how the ECB's purchases of corporate bonds under its Corporate Sector Purchase Programme (CSPP) affected the financing of Spanish firms. We first document that the announcement of the CSPP in March 2016 raised the firms' propensity to issue bonds. The flipside was a drop in the demand for bank loans by bond issuers. Around 75% of the drop in loans previously given to debt issuers was redirected to other smaller non-bond issuing firms, which led them to raise investment. We document that although the ECB's Targeted Longer Term Refinancing Operations (TLTRO) did not cause the previous reallocation of credit, they contributed to amplify the effect of the CSPP.

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

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

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"Let me again underline that the CSPP benefits not only to large companies with direct access to the bond market, but also smaller companies, as favourable bond market conditions have positive spillover effects to small and medium-sized enterprises (SMEs) through various channels. For instance, the fact that large corporations rely more on funding from bond markets leaves more space in the balance sheet of banks to provide loans to SMEs."

Letter from Mr. Mario Draghi (ECB President) to several Members of the European Parliament (June, 2017)

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 (QE) 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] In the spirit of the passage from Draghi (2017) quoted above, 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. Spain makes an interesting field to analyse the effects of the CSPP because the companies in this country were reporting tighter

[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.

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 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 the issuances of firms with eligible bonds. The effect of the programme also reached firms with non-eligible bonds, although to a lower extent. 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. Our detailed credit register dataset allows us to identify properly the previous credit reallocation channel, as it contains information to measure the real credit outflows suffered by each individual bank. We document that 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 75 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 45, 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 3.1%, 1.8%, and 0.8%, respectively.

Interestingly, the previous 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 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.

A series of robustness tests enables us to confirm that the credit reallocation that we identify is not demand driven and works through the CSPP. In particular, we discard that the credit reallocation takes place through a second channel that builds on the potential corporate or sovereign bond sales by banks through the QE programs.

We also find evidence that the credit reallocation effect was not caused by the ECB's *Targeted Longer Term Refinancing Operations* (TLTRO) program, although it was amplified by the interaction between the two programs. 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. However, the credit reallocation of those banks suffering credit outflows occurs independently of whether they took funds under the TLTRO or not.

This paper contributes to the growing literature that analyses the effects of central banks' asset purchase programs. There is ample evidence consistent with the so called signalling channel according to which 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

[2] See Krishnamurthy and Vissing-Jorgensen (2011) for a detailed description of the channels through which QE affects interest rates. Additional references on the effect of QE on interest rates include:

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 relative cost of funding through bonds and loans, and 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).

Although there is not the same level of evidence on the quantitative effect of unconventional monetary policy measures, 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 Schlusche, 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.[3] In 2014, there were 22.3 million active SMEs in the non-financial business sector of the European

Gagnon et al. (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.

[3] Balloch (2018) finds evidence that is consistent with the reallocation of credit towards SMEs based on the bond market liberalization that took place in Japan during 1980s and enabled firms to issue bonds. New issuers used those funds to pay back bank debt which led banks to increase lending to small and medium enterprises.

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

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 Chodorow-Reich (2014) and Greenstone et al. (2014) 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, Foley-Fisher et al. (2016) and Luck and Zimmermann (2018) analyse the positive effect of unconventional monetary policy on employment and investment. Along these lines, 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

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

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 as compared to loan rates, and the bond-loan substitution. Section 4 analyses the bank reaction to the CSPP through credit reallocation. Section 5 illustrates the effects on credit reallocation derived from the interaction between the CSPP and the TLTRO II. Section 6 documents the effect of credit reallocation on firms' investment. Finally, section 7 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.[5]

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

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

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 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 38 bp (see Figure 1).[6] This decline represents 24 % 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 long-term public debt or the Overnight Index Swap (OIS), scarcely changed, while the loan rates decreased to a much lower extent.

< 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 65 bp (see Figure 1), which represents 22 % of the average yield during that period.

We next analyse jointly the effects of the programme announcement, in March 2016, and of the beginning of actual bond purchases, three months later, on yields through a regression analysis in which the dependent variable is the excess yield for each eligible bond under the CSPP over the loan rate with similar maturity. [7,8] The

[6] The bond yields correspond to a constant maturity between 5 and 10 years and are obtained by means of a matrix pricing of individual bond yields obtained from Datastream. Given that bond issuers are large corporations, we use the interest rate on new loans of over €1 million with a maturity between 5 and 10 years. The information on loan rates comes from a proprietary supervisory data available at the Banco de España at bank and month level for several buckets of maturities and so, we obtain a weighted average of the loan rates whose maturity is within the previous range using the amount of new loans granted by each bank as the weights.

[7] To compare each individual bond with a loan that has a comparable maturity, we consider four maturity buckets for loans: between 1 and 3 years, between 3 and 5 years, between 5 and 10 years, and more than years. We then obtain the weighted average of the loan rates within each bucket using the amount of new loans granted by each bank as the weights.

use of the loan rates as a benchmark helps us to isolate the effects of the other programmes implemented by the ECB that could have directly affected to both loan and bond rates.

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 January 10, 2016 (i.e., two months before the announcement of the CSPP) to August 8, 2016 (i.e., two months 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 since the date in which bond i was first acquired through the programme until the end of the sample period. 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 51 bp more than the interest rate of loans with similar

[8] Because of the use of the benchmark, which is common to the bonds used in this analysis, we do not use time fixed effects.

maturity from the announcement of the program to the date when the purchases began. Between this last date and the end of the sample the decrease of the excess yield of the eligible bonds is not significantly different from zero. During this period, those bonds that were actually purchased were the ones that exhibited a stronger decrease as compared to loan rates. In particular, the average excess yield of those bonds purchased during the first two month of the programme dropped 39 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.

In column (2) of Table 1 we extend the sample with bonds with high yield rating category that were not eligible under the CSPP program. We document that the announcement of the CSPP not only contributed to a decrease of eligible but also non-eligible bonds. In fact, the average yield of non-eligible bonds dropped 1.08 pp more than the interest rate of loans with similar maturity from the announcement of the program to the date when the purchases began. The effect associated to the beginning of the purchases is not statically different from zero.

Hence, although these results speak in favour of certain "flow effect" following the implementation of bonds purchases by the central bank,[9] the magnitude of the announcement effect on the bond yields is significantly larger for both eligible and non-eligible bonds. For this reason, the subsequent analyses are performed around the date of announcement.

< Insert Table 1 here>

3.2. Bond-loan substitution

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

[9] 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.

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 decrease in the cost of funding via bonds documented in the previous section raised the relative attractiveness of bond issuance by Spanish non-financial corporations. Figure 2 shows than in the period April-September 2016, the gross amount issued by firms with eligible bonds increased by 87 % with respect to that in the same months of 2015 and stood above the levels of 2014. Firms with non-eligible bonds also raise their volume of issuances relative to the two preceding years. Moreover, bond issuance was attractive not only to traditional issuers, but also to other companies with no issuing activity in the market, and even for issuers whose bonds were 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.

< Insert Figure 2 here >

Hence, a natural question is whether the funds obtained from the new issued bonds after the CSPP announcement led to a fall in the demand for bank loans by bond-issuers. 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 ($Credit_{j,b}$). As in 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 amount of bonds outstanding during the quarter following the announcement of the CSPP ($Bond\_Amt\_Outs_j$). This variable exhibits a large degree of variation as it ranges between -7.52% (5^{th} percentile) and 126.73% (95^{th} percentile) with a mean value of 52.66%, which indicates a strong increase, on average, in the amount outstanding. Negative values correspond to firms for which the amount of the bonds maturing over

this period exceeds the one of bonds issued. Consistently with the variable $Credit_{j,b}$, $Bond\_Amt\_Outs_j$ is defined as the increase in the amount of bonds outstanding in February 2016 and June 2016, divided by the average amount outstanding in these two months. We include bank fixed effects (α_b) in the regression to control for supply effects. In addition, we use some variables related to the group and bank-group characteristics:

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

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).[10] 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 to obtain Figure 2 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 amount of outstanding bonds in a given month used to define the variable *Bond_Amt_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

[10] 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 2 show that for each 1 % that increases the amount of bond outstanding in the quarter following the CSPP announcement, the credit balance of groups in a given bank 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.[11]

To confirm that this substitution effect is driven by bond issuance instead of by virtue of bond maturing, we perform a variation of equation (3) in which we use the variation in gross issuances instead of the amount outstanding. Results reported in column (2) of Table 2 confirm that the substitution effect is driven by issuance.

In equation (3) we use bank fixed-effects to deal with supply effect and to guarantee that the loan-bond substitution is driven by the demand. To further confirm that the previous effect is demand driven, we estimate a variation of equation (3) in which instead of using the credit drawn and undrawn to obtain the change in the outstanding amount of credit we use just the credit drawn. One could expect that demand bank credit should be mostly reflected in credit drawn. Results for the alternative definition of credit are reported in column (3) and are fully consistent with those in column (1).

Finally, we re-estimate equation (3) for three different pre-announcement periods as a placebo test to further confirm the exclusive role of the CSPP on the loan-bond substitution. We first perform a placebo test based on the change in credit balance and amount of bond outstanding between November 2015 and February 2016. The second placebo test is based on the variations in loans and bonds around the announcement of the PSPP (i.e., January 2015 – April 2015). Finally, we repeat the same analysis around the announcement of the TLTRO I (i.e., June 2014 – September 2014). Results obtained from the three previous analyses are reported in columns (4), (5) and (6) of Table 2, respectively. We observe that for any of the three pre-

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

announcement periods, 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 2 here >

The decrease in the credit exposure of resident credit institutions to bond-issuer companies is of a relevant magnitude (see Figure 3) and amounts to 0.2% of total assets, on average, one quarter after the announcement of the program. Said differently, the outflows are equivalent to 0.5% of the total portfolio of credit and 15% of the total average exposure before the announcement of the CSPP. Importantly, these sizeable magnitudes do not depend on the number of issuers but on the total credit outflows suffered by banks.[12] In total, 16 out of 29 banks used in our analysis suffered credit outflows. In addition, the credit outflows relative to total assets presents a high degree of dispersion since it spans from 0 (5^{th} percentile) to 1.44 % (95^{th} percentile).

4. Credit-reallocation towards non-issuing firms

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 on the sample of non-issuers (section 4.1), and also by distinguishing along the borrowers' size (sections 4.2, and 4.3) and risk (section 4.4). 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 3 here >

[12] Although there are only 13 firms whose bonds are potentially eligible by the CSPP, we consider all bond issuers to conduct the following analysis given the positive effects of the programme on the cost of funding of non-eligible firms too and, hence, on their potential willingness to issue bonds.

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

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 reoptimize the composition of their loans supply and reallocate more funds 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.[13] 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_b denotes a set of bank characteristics such as bank size (relative to the total amount of credit); profitability (ROA); financial strength (Tier 1 capital ratio); risk profile (share of non-performing loans); percentage of liquid assets over total assets; and business model (non-interest over interest income). Firm variables, represented by F_j, include profitability (ROA) risk, as captured by the version of the Altman's Z-score developed by Amat et al. (2017) for Spanish firms,[14] and size (dummy variable that equals one if the firm is an

[13] 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.

[14] 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.

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.[15] 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 3 contains descriptive statistics on the main characteristics of the firms in the sample.[16] 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 3 here >

Panel B of Table 3 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 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

[15] 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

[16] 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.

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.

To confirm that the variation in credit is due to the effects of the program on banks' credit portfolios and not to other bank characteristics, in Table 4 we conduct a mean test on several bank characteristics immediately before the announcement of the CSPP and compare these characteristics for two groups of banks depending on whether they suffer high or low credit outflows. In the first set of columns, we separate banks depending on whether they suffer credit outflows or not whereas in the second set of columns, we consider that a given bank 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.[17] We find that the difference between the mean of each bank characteristic, used as control in equation (4) and summarized in Panel B of Table 3, for banks with high versus those with low credit outflows; is not statistically different from zero, independently on the method used to separate banks with low and high outflows. It confirms that the cross-sectional variation in the outflows is due to the program as opposed to some bank characteristics.

Finally, Panel C of Table 3 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.

< Insert Table 5 here >

[17] The banks in the top quartile 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.

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.

Although the previous method serves to disentangle demand from supply effects, it restricts the sample of firms to those borrowing from multiple banks. However, single-relationship firms could be among the most affected by bank-loan supply shocks. In fact, Degryse et al (2017) show that in order to capture the potential effects of credit supply shocks it is crucial to include the single-relationship firms in the identification of these shocks. For this reason, in column (3) of Table 5 we propose a regression analysis based on that of Degryse et al (2017) that replaces firm fixed effects with industry-location-size (ILS) fixed effects. Thus, we define industry bins based on two-digit NACE classification codes, location bins are based on two-digit postal codes (i.e., at province level), and the size bins are based on the following three types of firms: micro-small, medium, and large firms. As shown in column (3), this method allows us to control by the demand effects and, at the same time, to use almost the entire sample of firms. The coefficient is identical to that reported in column (1), but we prefer to use this specification as the baseline analysis to deal with firms' credit demand.

To quantify the magnitude of the new credit granted by banks suffering outflows, we report some calculations based on column (3) of Table 5. 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.[18]

[18] To illustrate the relevance of the real credit outflows suffered by each individual bank to measure the bank's incentives to reallocate credit after the CSPP, we repeat the same analysis using instead the

We use firm and ILS fixed-effects to deal with the demand effect and to guarantee that the variation in credit is driven by the supply of banks suffering credit outflows. To confirm that the effect is supply driven, we estimate a variation of equation (4) in which instead of using credit drawn and undrawn to obtain the change in the outstanding amount of credit, we use just the credit undrawn. One could expect that the supply of bank credit could be mostly reflected in the credit committed but undrawn. Results for the new definition of credit are reported in column (4). The number of observations is lower than in the baseline analysis because we exclude firms with zero undrawn credit in the pre- and post-event periods. The results are consistent with the existence of a supply effect coming from banks suffering outflows.[19]

The CCR 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, in column (5) of Table 5 we augment the specification in equation (4) with a variable that measures the variation in each bank's portfolio of fixed income securities over total assets from February 2016 to June 2016 and find that the effect associated to this variable is not statistically different from zero whereas the one associated to our measure of outflows remains positive and significant. For this reason, we discard the need of relying on this alternative outflow measure.

There could be other events affecting the supply of credit such as the sales of sovereign bonds conducted by banks through the Public Sector Purchase Programme. However, we find that the holdings of sovereign bonds by the banks in our sample, and

exposure of each bank to bond issuers prior to the CSPP announcement relative to the total credit portfolio. The implicit assumption behind this alternative specification is that banks with a larger exposure to bond issuers before the CSPP should reallocate more credit afterwards. However, we find a non-significant coefficient associated to this variable.

[19] If include firms for which the amount of undrawn credit is zero before and after the announcement of the CSPP and assign a value of zero to the variation of undrawn credit, we still obtain a positive and significant coefficient at any standard level of significance for the variable credit outflows over total assets.

especially by those suffering outflows, remained unchanged around the period of analysis. In addition, the fact that sovereign bond prices remain flat during this period (the associated yields decrease just 1 bp a quarter after the announcement of the program) rules out the possibility that a potential increase in sovereign bond prices may have recapitalized the banks with substantial sovereign bond holdings, thereby increasing their capacity to lend to SMEs.

In column (6) we redefine the explanatory variable of interest as the ratio of total credit outflows suffered by a given bank from bond issuers whose fixed-income securities have been effectively purchased through the CSPP relative to its total assets. This enables us to tie more directly credit reallocation to the CSPP. Results are fully consistent with those obtained when we consider total credit outflows from all bond issuers.

In the previous section we have documented that the decrease in bond yields following the CSPP announcement leads to a higher bond issuance activity through which firms substitute loans with the newly issued bonds. We now corroborate that the credit reallocation that we identify works precisely through the CSPP. For that aim, we perform a new analysis in which, instead of using the total credit outflows from bond issuers, we rely on the outflows that are exclusively due to the loan-bond substitution effect. The former type of outflows is obtained from the estimated coefficients in equation (3), which enable us to quantify the change of credit that is due to the variation in the outstanding amount of bonds (in net terms). The estimated outflows are then used instead of $Outflows/TA_b$ in equation (4). The results, which are reported in column (7) of Table 5, confirm those of the baseline analysis and corroborate the genuine role of the CSPP in the credit reallocation channel explored in this paper.

The results in Table 5 illustrate the credit reallocation channel for a sample of non-issuing firms. We next repeat this analysis using instead the sample of bond issuers and find that the reallocation channel is not active in this case (see column 8 of Table 5). In other words, a given bank suffering outflows from bond issuers does not extend more credit to other bond issuers. The non-significant coefficient suggests that the supply of credit to this type of firms does not suffer any significant change and the bond-loan substitution previously documented was purely demand driven. Thus, this last result confirms that the dominant force within the group of bond-issuers was the loan-bond substitution effect documented earlier.

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

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:

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

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. The sum of coefficients β_1 and β_2 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. Coefficient α_{ils} denotes the industry, location, and size fixed effects. The use of these fixed effects is based on the assumption that firms belonging to the same industry-location-size group in the period under analysis change their loan demand in the same way.

Columns (1) and (2) of Table 6 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 15.6 % more than other banks not suffering outflows.

< Insert Table 6 here >

To check whether SMEs (or specific firm-segments within this category) increased their volume of credit obtained from banks with shrinking bond-issuers' loans portfolio as compared to larger firms, we use the interaction of SME, micro-small, and medium sized firms and the variable *Outflows/TA*. The sum of the coefficients for *SME x Outflows/TA* and *Outflows/TA* (4.09) in column (1) is positive and statistically significant, which confirms that banks suffering outflows from bond issuers increased their supply of loans to SMEs.

The proprietary supervisory data available at the Banco de España include information on the average interest rates charged by each bank to loans with a size below one million euros, which we assume that correspond primarily to loans granted to SMEs and, hence, non-bond issuers. Unfortunately, for the case loans above one million euros, we may not establish a parallel hypothesis to distinguish between loans granted to bond-issuers and non-bond issuers. Hence, we restrict our attention to small loans and analyze the impact of the rise in the credit supply faced by SMEs on loan rates. In particular, we use this information to perform a test of means that compares the variation one quarter after the announcement of the CSPP (i.e., between March and June 2016) in the small loan rates charged by banks depending on whether they suffer credit outflows. We document that banks suffering outflows charge lower rates, presumably, to SMEs. Specifically, the average rate charged by banks suffering outflows decreases 34 bp from March to June 2016. This fall is significantly larger than the one applied by banks that do not suffer outflows (15 bp).

In column 2 of Table 6 we break down SMEs into medium and micro/small firms and 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 8.9 % 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.

A natural question follows out of the previous result: Why did banks that reallocated their flow of credit towards no-bond issuers not serve that much credit to

these firms prior to the CSPP? In mind we have the monopolistic competition environment described in Spence (1976), where the presence of fixed costs (marketing, administration, etc.) restrict the optimal variety of products and quantity (loans and their volume) that a profit-maximising firm (bank) supplies to its customers (firms). This factor might explain why some firms would face some form of credit restriction before the CSPP. Afterwards, as a bank suffers a negative shock on its demand for loans by large bond-issuers, it would find optimal to redirect part of its spare lending capacity to other firms.

To quantify the magnitude of the new credit granted by banks suffering outflows, we report some calculations based on column (2) of Table 6. An outflow equivalent to 0.20 % of the average bank total assets (€155 million) is translated into a €166,686 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 €2,027 million to large firms that do not issue bonds.

Regarding medium-sized firms, a credit outflow of the same magnitude is translated into a €19,725 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 €641 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 €1,383 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 €663 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 €3,331 million, which amounts to almost 75 % 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).

The relatively large amount of credit reallocated in such a short period of time (one quarter) has to be interpreted in a context of low interest rates and intermediation margins that provide strong incentives to banks to reallocate credit swiftly in order to mitigate the negative impact of outflows on their profitability. In relative terms, a drop of one euro in the credit balance of bond issuer groups leads to an increase of around 45, 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 3.1 %, 1.8 %, and 0.8 % of their average credit balance before the CSPP announcement, respectively.

4.3. Some robustness tests

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 7, which, for sake of clarity, also incorporates, in column (1), the baseline analysis reported in Table 6, column (2). 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 7 here >

In column (3) of Table 7 we use a binary indicator of banks suffering credit outflows that is equal to one if the outflows suffered by a given bank are in the top quartile of the distribution of individual lender's credit outflows from issuer groups relative to bank total assets. We document that a bank suffering high outflows increased its credit supply by more than 13.4 % to large firms that do not issue bonds and 8.3 % and 4.6 % to medium-sized and micro-small firms, respectively.

As a third 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 (4) of Table 7, 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 (5) of Table 7. 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 (6) of Table 7 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. This shorter horizon isolates, even more, our results from the effect of events such as the Brexit referendum or the one associated to potential changes in the overall economic conditions faced by the Spanish firms. Although the magnitude of the effect is lower than in the baseline analysis, the results are fully consistent with the baseline ones.

4.4. Effects of the CSPP on credit to non-issuers by firm-risk

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.[20] The resultant econometric specification is as follows:

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

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. The sum of β_1 and β_2 can be interpreted as the change in credit to each firm in the "distress" zone after the announcement of the CSPP, given a 1 % outflow in the credit balance of bond issuers.

Column (1) of Table 8 shows the results obtained when the variable measuring the firm risk is a dummy that is equal to one in case the firm is under distress according to the Z-score specification for Spanish firms whereas the risk measure in column (2) is based on the Altman's Z–score. In view of the coefficients reported in columns (1) and (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. We notice that this last motive could have been exacerbated magnified in a context of scarce and expensive bank

[20] 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).

capital as the one prevailing in the euro area during the period under analysis (see ECB, 2016c).

< Insert Table 8 here >

5. 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 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)[21]. 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.[22] 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.

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. In fact, this analysis also enables us to discard that the increase in the supply of credit to non-issuing firms is solely due to the announcement of the TLTRO II at the same date. 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 ($D.Outflows_b$). We propose the following regression equation to analyse the potential differential effect of TLTRO funding on the credit reallocation process triggered by the CSPP:

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

[21] 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

[22] 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

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.

Column (1) of Panel A in Table 9 contains the results obtained from the estimation of equation (7). We observe that those banks suffering credit outflows extend more credit to non-issuing firms with independence on their use of TLTRO funds. Thus, although the TLTRO helped to amplify the effect of the CSPP, this result confirms the validity of the credit reallocation channel and illustrate that the increase in the credit supply to non-issuing firms was not caused by the TLTRO.

It might be also argued that the increase in credit supply after the announcement of the CSPP could be due to the specific amount funds used from the TLTRO II. Results in column (6) of Table 7 seem to reject this hypothesis given that we find evidence of credit reallocation even one month after the announcement of the CSPP (i.e., two months before the first auction). However, we elaborate further on this issue and extend the specification in equation (7) with an additional regressor: the total amount of funds taken by a given bank from the TLTRO II in the first auction (June 2016) over total assets. Results reported in column (2) of Panel A confirm the validity of the credit reallocation channel after taking into account not only the effect associated to the TLTRO II but also the amount of funds taken by each specific bank from this program in the first auction. Of course, as expected, the funds taken from the TLTRO II also exert a positive impact on credit supply.

In Panel B of Table 9, 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 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 to disentangle the effect of the credit outflows after the CSPP on the flow of credit directed to non-issuing firms depending

on the volume of TLTRO's intakes. 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 that capture the presence of outflows and the TLTRO's intakes, jointly with the standard errors of such combination and their level of significance are reported in Panel B. 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 took TLTRO funds or not. However, the magnitude of the coefficient for the prototype bank that used a 50 % of its TLTRO limit is significantly higher than that of a bank that would have not relied on this funding source. Specifically, the credit to a given firm increases on average by 16.7 % 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 rate of growth reaches 9.1 % in the case of 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 (7.6 %).

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). Importantly, the significant increase in the credit from banks that suffer credit outflows but do not take funds under the TLTRO confirms the existence of the previous credit reallocation channel, in the sense that the rise in the credit supply to non-issuing firms was not caused by the TLTRO.

< Insert Table 9 here >

6. 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:

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

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 10. 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.

< Insert Table 10 here >

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 amount of bonds outstanding after the announcement of the CSPP ($Bond\_Amt\_Outs$) 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 10, 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.

7. 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 not driven by the coincidence of this programme with the ECB's TLTRO II program. If fact, if anything, the impact of the CSPP was enhanced by the TLTRO II program. In particular, 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.

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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 loan rate with similar maturity. The regression analysis in column (1) is implemented on the time period that spans from January 10, 2016 (i.e., two months before the announcement of the CSPP) to August 8, 2016 (i.e., two months 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 until the end of the sample period. In addition, the regression includes bond fixed effects. In column (2) we extend the sample with bonds with high yield rating category that were not eligible under the CSPP program. 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	-0.513***	-0.513***
	[0.079]	[0.079]
Pur_CSPP	-0.055	-0.055
	[0.037]	[0.037]
Ann_CSPP x *HY*		-0.570***
		[0.149]
Pur_CSPP x *HY*		-0.112
		[0.069]
BPur_CSPP	-0.389***	-0.389***
	[0.076]	[0.076]
Bond FE	YES	YES
Observations	9,729	13,141
R-squared	0.740	0.771

Table 2: 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 columns (1) and (2) 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 ($Credit_{j,b}$). The main explanatory variable in column (1) is the group's growth of the amount of bonds outstanding during the quarter following the announcement of the CSPP (*Bond_Amt_Outs*) whereas in column (2) we use the growth in the gross issuances (*Bond_Gross_Iss*) instead of the amount outstanding. In column (3) we use an alternative dependent variable that is obtained from the amount of credit drawn instead of considering both drawn an undrawn credit as in columns (1) and (2). In columns (4) – (5) we re-estimate equation (3) for three different pre-announcement periods. In column (4) we use the change in credit balance and the amount of bonds outstanding between November 2015 and February 2016. In columns (5) and (6) we repeat the same analysis around the announcement of the PSPP (i.e., January 2015 – April 2015) and the TLTRO I (i.e., June 2014 – September 2014), respectively. In addition, in all regressions 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)	(3)	(4)	(5)	(6)
Bond_Amt_Outs	-0.438***		-0.388***	-0.040	0.108	0.054
	[0.135]		[0.136]	[0.025]	[0.078]	[0.033]
Bond_Gross_Iss		-0.418***				
		[0.140]				
Bank FE	YES	YES	YES	YES	YES	YES
Firm Controls	YES	YES	YES	YES	YES	YES
Observations	600	600	600	560	592	601
R-squared	0.213	0.203	0.223	0.281	0.065	0.113

Table 3. 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 4. Characteristics of banks depending on their credit outflows

This table contains a mean test based on several bank characteristics immediately before the announcement of the CSPP. In particular, we consider the self-explained bank characteristics that are contained in the first column, whose descriptive statistics are reported in Panel B of Table 3 and that are used as controls in equation (4). We compare these characteristics for two groups of banks depending on whether they suffer high or low credit outflows. In the first set of columns, we separate banks depending on whether they suffer credit outflows or not and report the difference between these two columns and the associated standard errors in the adjacent column. In the second set of columns, we consider that a given bank 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. *, **, and *** indicate whether the difference of the means is statistically different from zero at the 10 %, 5 %, and 1 % levels, respectively.

	High outflows if higher than zero			High outflows if top quartile		
	Low Outflows	High Outflows	Diff	Low Outflows	High Outflows	Diff
Log(TA)	16.637	17.364	-0.727	16.944	17.285	-0.341
			(0.613)			(0.697)
ROA (%)	0.390	0.316	0.074	0.356	0.331	0.025
			(0.087)			(0.098)
NPL (%)	5.187	5.977	-0.790	5.285	6.508	-1.223
			(1.232)			(1.361)
Tier 1 capital ratio (%)	14.401	12.556	1.845	14.224	12.848	1.376
			(1.053)			(1.130)
Liq. Assets / TA (%)	14.275	13.912	0.363	13.098	16.640	-3.542
			(2.873)			(3.125)
Non-interest over interest income	0.777	0.846	-0.069	0.757	0.969	-0.212
			(0.160)			(0.173)

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

This table contains the results obtained from the estimation of equation (4). The dependent variable in all columns but column (4) is the change in the credit balance (both drawn an undrawn) 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 dependent variable in column (4) is defined based just on credit undrawn. The main explanatory variable in all columns but columns (6) and (7) is the ratio of total credit outflows from bond issuers suffered by bank *b* relative to its total assets ($Outflows/TA_b$). The explanatory variable of interest in column (6) is the ratio of total credit outflows suffered by bank *b* from bond issuers whose bonds have been effectively purchased through the CSPP relative to bank *b* total assets. The outflows in column (7) come from the estimates of equation (3) and they represent the variation of credit that is due to the variation in the bond amount outstanding. In column (1) we use additional explanatory 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 the same 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. In columns (3) – (7) we add industry-location-size fixed effects to the specification in equation (4). In column (5) we augment the specification in column (3) with a variable that measures the variation in each bank's portfolio of fixed income securities over total assets from February 2016 to June 2016. Finally, the results in column (8) are obtained for the sample of bond issuers. Standard errors, in brackets, are clustered at firm and bank levels. *, ** and *** indicate statistical significance at the 10 %, 5 %, and 1 % levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Outflows/TA (%)	4.380**	3.494**	4.353**	10.298***	5.713**	9.790**	22.481***	10.635
	[1.842]	[1.568]	[1.726]	[3.151]	[2.131]	[2.612]	[7.301]	[7.856]
FI Outflows/TA (%)					-12.914			
					[8.934]			
Firm Control Variables	YES	YES	YES	YES	YES	YES	YES	YES
Bank Control Variables	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	NO	YES	NO	NO	NO	NO	NO	NO
Industry-Province-Size FE	NO	NO	YES	YES	YES	YES	YES	YES
Observations	523,723	329,152	523,307	523,307	523,307	523,307	522,736	600
R-squared	0.022	0.364	0.039	0.027	0.039	0.038	0.039	0.091

Table 6: 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) - (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 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). The rest of explanatory variables are 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) plus industry-location-size fixed effects. The rows below the coefficients for each explanatory variable contain the linear combinations of the coefficients of interest, their standard errors, and their level of significance. Standard errors, in brackets, are clustered at D.Size-bank level. *, ** and *** indicate statistical significance at the 10 %, 5 %, and 1 % levels, respectively.

	(1)	(2)
Outflows/TA (%)	15.608***	15.619***
	[2.924]	[2.866]
SME x Outflows/TA (%)	-11.523***	
	[2.772]	
Micro-Small x Outflows/TA (%)		-11.860***
		[2.765]
Medium-Sized x Outflows/TA (%)		-6.750**
		[3.226]
Outflows/TA (%) +	4.085**	
+ SME x Outflows/TA (%)	[1.670]	
Outflows/TA (%) +		3.758**
+ Micro-Small x Outflows/TA (%)		[1.603]
Outflows/TA (%) +		8.869***
+ Medium-Sized x Outflows/TA (%)		[2.425]
Firm Control Variables	YES	YES
Bank Control Variables	YES	YES
Industry-Province-Size FE	NO	YES
Observations	523,307	523,307
R-squared	0.039	0.039

Table 7: Effects of the CSPP on credit to non-issuers across firm-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 6. In fact, column (1) in this table corresponds to column (2) in Table 6 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 a binary indicator of banks suffering credit outflows that is equal to one if the outflows suffered by a given bank are in the top quartile of the distribution of individual lender's credit outflows from issuer groups relative to bank total assets. In column (4) 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 (5) whereas in column (6) the measure of credit outflows from bond issuers corresponds to the variation in the credit balance one month after the announcement of the CSPP. Rows below coefficients for each explanatory variable contain the combined effect of the coefficients of interest, their standard errors, and their level of significance. Standard errors, in brackets, are clustered at D.Size-bank level. *, ** and *** indicate statistical significance at the 10 %, 5 %, and 1 % levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Outflows/TA (%)	15.619***	6.753***	0.134**	93.308***	26.794***	11.614***
	[2.866]	[1.750]	[0.055]	[16.092]	[7.854]	[2.218]
Micro-Small x Outflows/TA (%)	-11.860***	-4.652***	-0.087*	-78.170***	-11.211*	-8.744***
	[2.765]	[1.653]	[0.050]	[15.671]	[6.053]	[2.095]
Medium-Sized x Outflows/TA (%)	-6.750**	-0.385	-0.051	-47.553***	-6.995	-5.504**
	[3.226]	[1.994]	[0.060]	[17.893]	[6.621]	[2.505]
Outflows/TA (%) + Micro-Small x Outflows/TA (%)	3.758**	2.100**	0.046*	15.138**	15.583**	2.870**
	[1.603]	[0.969]	[0.028]	[7.032]	[7.682]	[1.269]
Outflows/TA (%) + Medium-Sized x Outflows/TA (%)	8.869***	6.368***	0.083*	45.754***	19.799**	6.111***
	[2.425]	[1.590]	[0.045]	[11.587]	[7.638]	[1.982]
Firm Control Variables	YES	YES	YES	YES	YES	YES
Bank Control Variables	YES	YES	YES	YES	YES	YES
Industry-Province-Size FE	YES	YES	YES	YES	YES	YES
Observations	523,307	481,605	523,307	523,307	529,665	523,286
R-squared	0.039	0.023	0.039	0.038	0.061	0.039

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

This table contains the results obtained from the estimation of equation (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 ($Outflows/TA_b$); and (ii) 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) plus industry-location-size fixed effects. 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 (%)	6.687***	6.398***
	[1.639]	[1.997]
Distress Zone x Outflows/TA (%)	-5.144***	-5.224***
	[1.452]	[1.608]
Outflows/TA (%) + Distress Zone x Outflows/TA (%)	1.543	1.174
	[1.720]	[1.922]
Firm Control Variables	YES	YES
Bank Control Variables	YES	YES
Industry-Province-Risk FE	YES	YES
Observations	522,770	522,770
R-squared	0.039	0.040

Table 9: The complementary effect of the TLTRO

Panel A of 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 column (2) we extend the baseline specification in column (1) that comes from the estimation of equation (7) with an additional regressor: the total amount of funds taken from the TLTRO II in the first auction (June 2016) over total assets. In addition, in both 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) plus industry-location-size fixed effects. In Panel B, we report the linear combination of the coefficients of interest reported in column (1) of Panel A 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.

Panel A

	(1)	(2)
Outflows	0.091***	0.090***
	[0.032]	[0.032]
TLTRO	-0.099	-0.075
	[0.062]	[0.050]
Outflows x TLTRO	0.252***	0.251***
	[0.085]	[0.083]
TLTRO II / TA		1.819**
		[0.688]
Firm Control Variables	YES	YES
Bank Control Variables	YES	YES
Industry-Province-Risk FE	YES	YES
Observations	523,307	523,307
R-squared	0.200	0.201

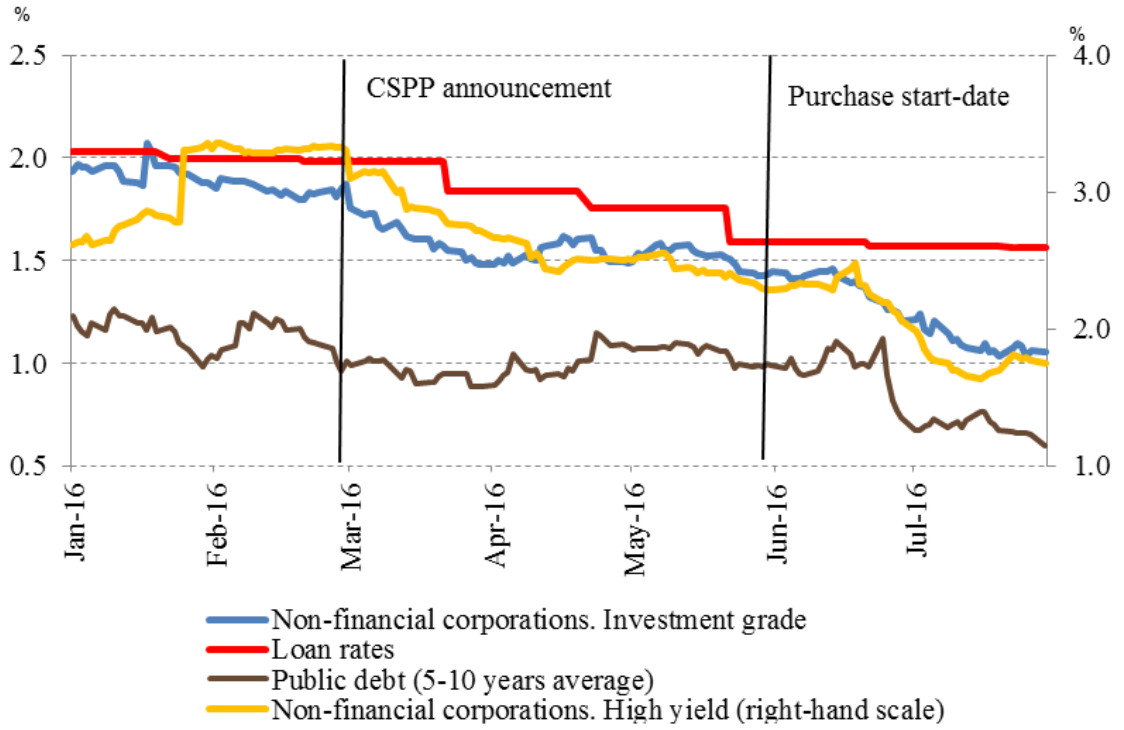
Panel B

Effect from banks suffering outflows that do not use TLTRO funds	
Outflows	0.091***
	[0.032]
Effect of the dependence on TLTRO on credit from banks suffering outflows	
Outflows + ***TLTRO*** + ***Outflows x TLTRO***	0.167***
	[0.048]
Differential effect of TLTRO on credit from banks suffering outflows	
TLTRO + ***Outflows x TLTRO***	0.076**
	[0.030]

Table 10. 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 amount of bonds outstanding after the announcement of the program (*Bond_Amt_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	0.088*	1.061	0.000			
	[0.050]	[2.938]	[0.009]			
Bond_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



Source: Banco de España, Datastream and own calculations

Figure 1: Average long-term yields of non-financial Spanish corporations versus loan rates.

This figure contains average bond yields for two types of Spanish non-financial corporations: those with investment grade credit rating and those with high-yield grade. The bond yields correspond to a constant maturity between 5 and 10 years. In addition, we depict the evolution of loan rates. Given that bond issuers are large corporations, we use the interest rate on new loans of over €1 million with a maturity between 5 and 10 years. The information on loan rates is available at bank and month level and so, we obtain a weighted average of the loan rates whose maturity is within the previous range using the amount of new loans granted by each bank as the weights. The sovereign debt yield corresponds to the average of five and ten year maturities.

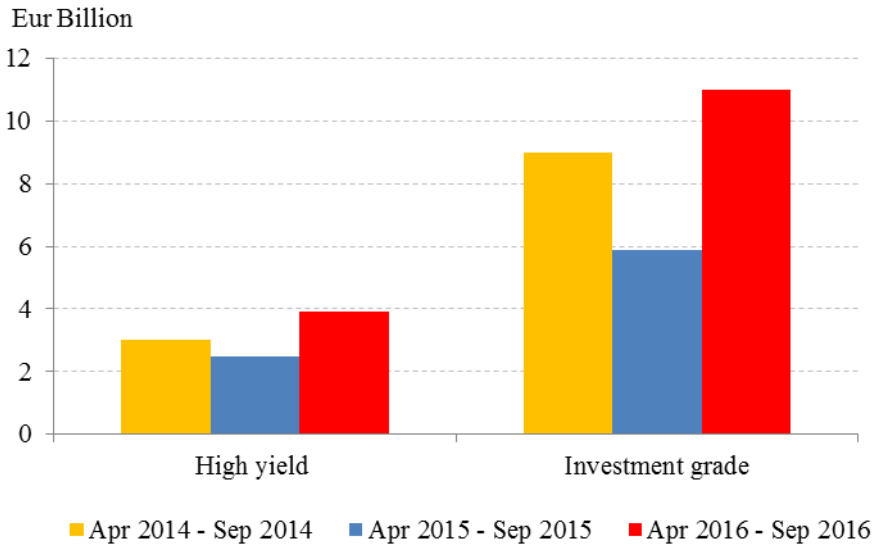


Figure 2: Total gross bond issuance by Spanish non-financial institutions (includes issues of resident and non-resident subsidiaries)

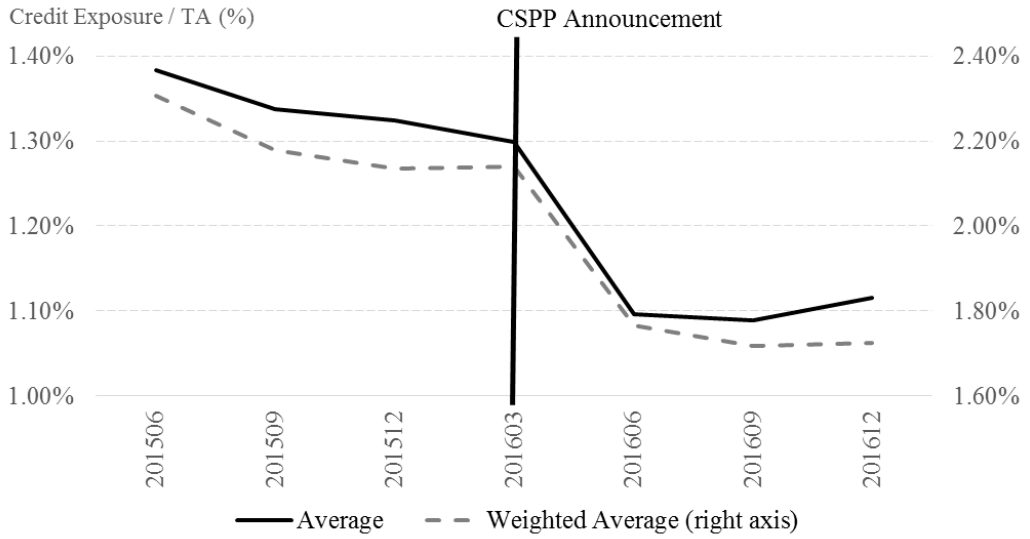


Figure 3: Relative credit exposure of resident credit institutions to debt issuer groups around and after the announcement of the CSPP. This figure summarizes the relative credit exposure of the 29 resident credit institutions used in our analysis to the non-financial groups (i.e., including subsidiaries) 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.