

Cutting Out the Middleman – The ECB as Corporate Bond Investor *

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Abstract

The European Central Bank's Corporate Sector Purchase Programme (CSPP), launched in June 2016, increased the supply and lowered the cost of capital for eligible, i.e., investment grade, Eurozone firms through direct corporate bond purchases. We document a significant increase in bond debt for eligible firms. In particular eligible firms of lower credit quality change the composition of credit from bank-based to market-based funding, without affecting investment decisions. High credit quality firms increase payouts to shareholders and acquisition activity. Mergers announced by eligible firms after the introduction of the CSPP have lower announcement returns. Finally, we find evidence consistent with positive spillovers to firms that do not have access to bond financing. Banks with a high share of CSPP-eligible firms increase lending particularly to private but not public firms after introduction of the CSPP.

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“Likewise, the credit easing components of our expanded asset purchase programme (APP), namely the asset-backed securities (ABSPP), covered bond (CBPP3) and corporate sector (CSPP) purchase programmes, further boost the pass-through of our monetary policy by directly lowering the financing costs for crucial actors in our economy. [...] the CSPP directly lowers the cost and improves the availability of market-based funding for non-financial corporations.

Mario Draghi, ECB President,
Brussels, 26 September 2016

The Eurozone has experienced almost a decade of low growth after two consecutive crises. Despite various interventions by the European Central Bank (ECB), which were supposed to ease borrowing conditions and increase the credit supply for the real economy, the transmission channel of monetary policy is still impaired. All ECB interventions targeted banks, e.g., by providing cheap long-term funding or by purchasing assets to stabilize banks’ balance sheets.¹ In March 2016, the ECB initiated a new asset purchase program to increase the effectiveness of its monetary policy. Under this program, the ECB, as the only central bank at that time, started to directly purchase *corporate* bonds to improve the availability of funding for non-financial firms in the Eurozone, bypassing the banking sector.

In this paper, we investigate how direct corporate bond purchases by central banks affect the availability and composition of credit for eligible firms, i.e., firms whose bonds might be part of the purchase program. We further examine potential *indirect* effects. If eligible firms shift from bank to bond financing this might relax the balance sheet constraints of banks with positive spillover effects into loan markets. Corporate bond purchases might therefore indirectly improve the transmission of monetary policy in the Eurozone via the bank-lending channel.²

¹ For example, Daetz et al. (2016) investigate the impact of the Long-Term-Refinancing Operations (LTROs) in 2011 and 2012 on bank-firm borrowing and their economic activity. Acharya et al. (2017) and Ferrando et al. (2016) study a similar question focusing on the Outright Monetary Transactions Programme (OMT). Heider et al. (2017) study the effect of negative rates on bank risk taking.

² The idea behind the bank-lending channel of monetary policy was developed in Bernanke and Blinder (1988). Consistent evidence was documented in, for example, Bernanke and Blinder (1992), Kashyap et al. (1993), Kashyap and Stein (1995, 2000) and Kishan and Opiela (2000). We discuss the more recent literature – related to the U.S. financial crisis and the European sovereign debt crisis – in our literature review in more detail.

The setting of our paper is the introduction of the Corporate Sector Purchase Programme (CSPP) in June 2016, in which the ECB started monthly purchases of eligible corporate debt in the Eurozone. During the June 2016 to July 2017 period, total ECB purchases of eligible corporate debt from Eurozone firms exceeded €100 billion.³ Corporate debt is CSPP-eligible if it has an investment grade credit rating as well as satisfying a set of further criteria, which we describe in detail below. We argue that corporate bond purchases are reasonably exogenous to the individual firm as the eligibility criteria were set by the ECB and, instead of targeting underperforming firms that are more likely to be credit constrained, eligibility criteria were set to include only high-quality investment-grade rated firms.

Standard macroeconomic theory suggests that central bank asset purchases have no real effect on the macro-economy (Woodford, 2012). In a frictionless economy, central bank purchases represent a simple reallocation of assets from private investors to the central bank. The present values of expected future cash flows of these assets and, consequently, their prices, remain unaffected. The recent literature discusses two channels how central bank asset purchases can affect the economy. The first channel is called a “portfolio balance channel”. Asset purchases have a narrow effect on that asset because investors (such as banks) are capital constrained and assets trade in a narrow and segmented market (Vayanos and Villa, 2009; Cúrida and Woodford, 2010; Gertler and Karadi, 2010; and He and Krishnamurthy, 2013). Spillovers are possible to the extent that an increase in asset prices reduce investors’ capital constraints, which affects other asset prices or because of broader macroeconomic spillovers. Krishnamurthy and Vissing-Jorgensen (2013) also suggest that premia due to the scarcity of assets can be attenuated if central banks purchase these assets.

The second channel is the “signaling channel”. Announcements of asset purchases might be viewed as a signal regarding the central bank’s intentions over the path of short-term

³ The national central banks that conduct the purchases on behalf of the ECB disclose on an individual bond (ISIN) basis which bonds have been purchased during this period. We provide detailed analysis w.r.t issuers, industry, rating categories as well as other bond and issuer characteristics in an Online Appendix.

interest rates (Krishnamurthy and Vissing-Jorgensen, 2011). In the context of the CSPP, these channels suggest that ECB corporate bond purchases affect both quantities and prices of corporate bonds and thus have important effects on the economy.⁴

Using the universe of publicly listed firms in S&P Capital IQ, we identify the effect of the CSPP on firms' financing and investment behavior using a difference-in-differences (DiD) framework. Our treatment group consists of all Eurozone firms with an investment grade rating. Our control group comprises non-eligible firms that have access to public debt. That is, all unrated and non-investment grade-rated Eurozone firms with public debt outstanding in the pre-CSPP period. Our sample period is Q1 2015 to Q1 2017; the post-CSPP period begins in Q2 2016, as the program was announced in March 2016. We include a large set of controls and fixed effects in all our estimations to control for possible demand shocks that might affect a firm's funding and investment choices. In particular, we control for unobservable time-invariant factors at the firm level by including firm fixed effects. We control for time-varying effects at the industry and country level by including, industry x quarter and country x quarter fixed effects. We further perform a series of robustness tests to rule out that our results are driven by factors unrelated to the CSPP.

In the first part of the paper, we investigate the impact of the introduction of the CSPP on eligible firms' funding choices. These firms increase their bond debt to asset ratio by 1.5 percentage points (pp) relative to non-eligible firms and relative to the period before the CSPP. This corresponds to a 10% increase in bond leverage relative to the unconditional mean. Moreover, eligible firms increase their *total* debt by 1.2 pp. We further find heterogeneous responses *within* the set of eligible firms. Given ongoing sovereign bond purchases by the ECB as well as a potential substitutability between bonds of firms at the upper end of the rating

⁴ We document significant cumulative yield spread changes for bonds of eligible vs. non-eligible firms around the announcement of the CSPP program. During a 10-day window around the announcement, yield spreads of eligible firms dropped by about 11%, which is substantially larger than the drop of spreads of non-eligible firms (around 6%). These results suggest substantial price effect of the CSPP on corporate bonds of eligible firms as well as spillovers into other assets.

spectrum and sovereign bonds from the investors' perspective (e.g. Foley-Fisher et al., 2016 and Badoer and James, 2016), (very) low credit risk firms might have been less constrained even before the start of the CSPP relative to, e.g., BBB rated firms. Consistent with this conjecture, we find that BBB rated firms increase their bond debt-to-asset ratio relative to AAA-A rated firms (+1.6 pp vs +1.2 pp). Interestingly, BBB rated firms merely restructure their debt capital structure in response to CSPP and substitute bank debt – in particular term loans (-1.1 pp) – with bond debt, leaving the overall leverage level unchanged. AAA-rated firms, in contrast, increase their leverage.

We then investigate the effect of the CSPP and the associated lower funding costs on investment and payout decisions of eligible firms. We find no effect for BBB rated firms, i.e., these firms restructure their debt capital structure in response to CSPP without an effect on their investment decisions. AAA-A rated firms, in contrast, significantly increase their acquisition activity and conduct more share repurchases consistent with their overall increase in leverage. The economic magnitude of these effects is large. AAA-A rated firms increase their cash acquisition-to-asset ratio by 0.34 pp, which is also large relative to the sample mean. Further, AAA-A rated firm are about 3.7 pp more likely to announce a share repurchase program post CSPP (the unconditional probability in the pre-event period is 1.2%). We document that the increased acquisition activity fueled by the CSPP is unlikely to have benefitted the acquiring firms' shareholders. In particular, treated firms experience significantly lower announcement returns for acquisitions announced in the post-CSPP period relative to the pre-event period and relative to the control group. This effect cannot be explained by differences in acquirer or deal characteristics and is robust to controlling for firm, industry x quarter, and country x quarter fixed effects.

Overall, the findings are consistent with the idea that both BBB and AAA-A rated firms already faced only limited financial constraints even before the CSPP introduction. Riskier (BBB rated) firms, which are ex ante more bank dependent, substitute bank funding with

market-based funding post CSPP announcement, without any effects on corporate investment policies. AAA-A rated firms that already relied more on market-based funding relative to bank-based funding, respond to a further lowering of the cost of financing induced by the CSPP by increasing merger activity and payouts to shareholders.

We conduct several robustness tests that support the idea that the announcement of the CSPP *caused* a change in the composition of credit of eligible firms. First, we perform a parametric test of the parallel trend assumption and show that there is no pre-CSPP trend in bond financing for eligible vs. non-eligible firms. Second, we address concerns that the increase in bond debt relative to bank debt is driven by firm specific demand for bond financing unrelated to the CSPP. For instance, an expansion in the demand for bond financing could be due to a general strengthening of the economy which disproportionately affected lower risk firms.⁵ If this is the case, we would expect a gradual increase in bond-to-asset ratios if we move from riskier to safer firms. If, however, the CSPP is changing the composition of credit, we expect to see a discontinuity at the investment-grade rating boundary that separates eligible from non-eligible firms, which is strongly supported by our results. Third, we also address concerns that treatment and control group firms are not comparable as eligible firms are larger, more profitable, and generally have a higher share of bond debt to total assets compared to non-eligible firms. We use a matched sample approach, i.e., a nearest neighbor matching, to choose for each treated firm the control firm that is closest in terms of observable characteristics in the pre-treatment period. Our results remain virtually unchanged.⁶ Fourth, we use the introduction of the PSPP in January 2015 as a placebo event and confirm that this event had no effect of the bond financing of CSPP eligible firms. Fifth, we use an alternative matched control group

⁵ For example, according to Diamond (1991), Rajan (1992), Chemmanur and Fulghieri (1994), and Bolton and Freixas (2000) the advantage of bank debt is a result of banks' ability to monitor. During economic upswings, the need for monitoring is lower for example because projects are of higher quality, with larger collateral and lower uncertainty about cash flow, which might result in higher demand for bond debt.

⁶ We do not use a matching procedure throughout as a restrictive nearest neighbor matching significantly reduces the sample size and we aim at presenting results for the largest possible set of firms affected by CSPP.

comprised of investment-grade European firms that are not in the Eurozone. These firms are arguably more comparable, e.g., in terms of size and credit quality. Again, we get very similar results. Sixth, our results are robust to defining CSPP eligibility using *issue* ratings of bonds issued pre-CSPP instead of using the issuer rating. Overall, all of our tests support our hypothesis that the CSPP announcement affects the composition of debt of eligible firms.

In the second part of the paper, we focus on a set of firms that is only indirectly affected by the CSPP program as they have no eligible bonds outstanding. The potential indirect effects of CSPP are summarized in an excerpt from the March 2016 ECB meeting minutes:

“It was also noted that the purchases could have important spillover effects on the financing conditions of SMEs in the light of international evidence indicating that the banking sector redirected lending to SMEs when large companies’ bond issuance substituted for bank borrowing.”

ECB Minutes March 2016 meeting

Suppose that some banks extend a large fraction of loans to firms whose bonds are now eligible for purchases under the CSPP program. If these firms switch from bank to bond financing these banks might have balance sheet capacity to increase lending to other, non-eligible, firms. We use the Thomson Reuter LPC Dealscan database to construct proxies related to the exposure of banks to eligible firms in the 2010 to 2014 period (before the CSPP) and to calculate which firms receive a loan in a quarter during our sample period. We match the Dealscan data to data from the Bureau van Dijk’s Amadeus database and split the sample into private and public firms. We use private firms as a proxy for non-eligible firms, as these firms don’t usually have access to public bonds. We find that private firms have a 3pp higher likelihood to issue a loan in any quarter after the announcement of the CSPP when borrowing from a bank with high exposure to eligible firms – this is an almost 50% increase compared to the unconditional likelihood of issuing a loan, which in our panel is about 6.3%. We do not find similar results in the subsample of public firms.

In the final part of the paper, we study how loan market spillovers affect investment decisions of private firms. Even though data for private firms after CSPP is hardly available at this point in time, we use a subset of private firms for which we have data and find evidence for effects of CSPP on capital expenditures of firms. More precisely, we find that the 2014-2015 downward trend in capital expenditures is attenuated for private firms who borrow from banks that have large exposures to firms who switch from bank to bond financing.

We make several contributions relative to the existing literature. There is a recent small but growing literature that analyzes real economic effects of QE in the U.S. Chakraborty et al. (2017) find that U.S. Federal Reserve (Fed) purchases of mortgage-backed securities (MBS) increased banks' issuances of MBS crowding out commercial lending with negative real effects. Effects of treasury bond purchases – consistent with Krishnamurthy and Vissing-Jorgensen (2013) – were largely insignificant. Rodnyanski and Darmouni (2016) investigate general lending patterns following the Fed's MBS purchases with a focus on mortgage lending. Di Maggio et al. (2016) find that the MBS purchases increased refinancing and eventually equity extraction and consumption. Kandrak and Schulsche (2016) find that reserve accumulation of the Fed increased lending and risk-taking behavior of banks. All papers investigate asset purchases that directly affect banks' portfolios. Our approach is different. Corporate bond purchases affect firms directly and have an indirect – but important – effect on bank lending.

Further, our paper ties into a far more general literature of the effects of (unconventional) monetary policy on the economy in the euro area (for example, Acharya et al., 2017a, Acharya et al., 2017b, Carpellini and Crosigniani, 2015, Daetz et al., 2016, Ferrando et al., 2017). In summary, these papers suggest that LTRO and OMT increase bank lending activity, for example because of an increase in the value of banks' sovereign bonds.⁷ We, on the contrary, consider a novel channel where lending spillovers are caused by a substitution of

⁷ Acharya et al., 2017c, Eser and Schwaab, 2013, Krishnamurthy et al., 2015, and Szczerbowicz, 2015 study the effect the ECB's unconventional monetary policy measures on sovereign and corporate bond and CDS spreads.

loan through bond financing of some firms, which facilitates bank lending to other firms that have no access to public debt markets and were arguably financially constrained.

Two other papers investigate aspects of CSPP and complement our findings. Abidi et al. (2017) find that bond yield spreads declined after the introduction of the CSPP, in particular for non-eligible bonds close to the investment grade boundary. Consistent with our findings, Arce et al. (2017) document an increase in bond issuance volume for eligible firms and an increase in lending to non-bond issuing firms using a sample of Spanish firms. We investigate more broadly the effects of the CSPP across the euro area and document an effect of the program on eligible firms' (debt) capital structure decisions. Importantly, we investigate real economic effects such as investment, payout and acquisition activities of these firms. In passing, we also contribute to the debate as to the differential effect of purchasing different asset classes through central banks.

1. Institutional Framework and Methodology

1.1. Institutional framework

In this section, we briefly review the development of the ECB's unconventional monetary policy operations, and describe, in more detail, the CSPP, which is the focus of this paper. As a response to the global financial crisis (2008-2009) and the European sovereign debt crisis (which started in the fall of 2010), the ECB introduced a series of unconventional policy measures including, for example, the provision of liquidity provision to the banking sector (e.g. through Long-Term Refinancing Operations (LTRO)) and an Asset Purchase Programme (APP).⁸

The ECB introduced the APP in 2009 purchasing limited amounts of covered bonds and – starting in 2014 – also asset-backed securities. In early 2015, the ECB expanded both the

⁸ Acharya et al. (2017) discuss the role of the ECB as lender of last resort versus buyer of last resort contrasting the LTRO interventions and the Outright Monetary Transactions Program (OMT).

scope and size of the APP to include large-scale purchases of government bonds with a combined monthly purchase volume of €60 billion – a roughly six-fold increase compared to before.⁹ Given the still anemic recovery of the European economy, a realized inflation below the ECB's target inflation rate of 2%, as well as a dwindling supply of government bonds eligible for purchases, the ECB further expanded its APP on March 10th, 2016. On that day, the ECB announced to increase the monthly purchase volume to €80 billion, and, more importantly, an extension of its purchase universe to include issuers from the corporate sector (CSPP). The composition of different assets in the overall APP purchase amount (capped at €80 billion per month) is at the discretion of the ECB. Further details on the CSPP were announced on April 21st 2016 and the CSPP was first implemented on June 8th 2016, with a minimum duration until March 2017. Several eligibility criteria and implementation guidelines regarding the type of corporate debt the ECB can purchase were set:

- The issuer has to be incorporated in the Eurozone¹⁰ and itself or its ultimate parent cannot be a credit institution or investment firm and the issuer cannot be a public undertaking, i.e., government-sponsored enterprise.
- The security has to have a minimum maturity of 6 months and a maximum maturity of less than 31 years at the time of purchase. Assets purchased under the programme are held until maturity and the principal is reinvested.
- An issue has to have a minimum credit rating of BBB-/Baa3/BBBL, i.e., investment grade, from at least one of the four agencies, Standard & Poor's, Moody's, Fitch Ratings or DBRS. In the event of a downgrade, the ECB is not required to sell its holdings.

⁹ The APP was not supposed to be terminated before September 2016 corresponding to a minimum total purchase volume of more than €1 trillion.

¹⁰ This definition implies that bonds from a Eurozone-incorporated issuer are eligible, even if it has an ultimate parent incorporated outside the Eurozone.

- An eligible security has to be denominated in EUR and has to have a yield to maturity larger than the ECB's deposit facility rate (which was -0.4% at the time of announcement).
- Securities can be purchased both in primary as well as in secondary markets. The purchase volume is not published ex-ante, though cumulative holdings are published ex-post.¹¹
- As a component of the APP, the CSPP was set to last until at least March 2017 contributing to the overall APP monthly volume of EUR 80 billion. In January 2017, the APP was extended to at least December 2017, however, with a reduced monthly volume of EUR 60 billion from April 2017 onwards.

While no exact ex-ante purchase volumes are announced, overall ex-post CSPP purchase volumes are published: Figure 1 plots the cumulated monthly purchases of corporate debt under the CSPP. During the June 2016 to July 2017 period, the ECB purchased more than €100 billion eligible corporate bonds from Eurozone firms. The ECB purchases are sizable with respect to the overall bond market. An outstanding issuance volume of these corporate debt instruments of about €600 billion suggests that the ECB holds about 17% of the total issuance volume.¹²

[Figure 1 here]

1.2. Empirical Design

We estimate the impact of the CSPP on the capital structure of non-financial firms using a difference-in-difference (DiD) methodology. The treatment group comprises all firms that are

¹¹ See ECB (2017) [<https://www.ecb.europa.eu/mopo/implement/omt/html/index.en.html>]

¹² The ECB publishes a list of ISINs of all bonds it has purchased via its national central banks. Moreover, we obtain a list of all corporate bonds that have been issued by European firms since 2000 from Dealogic, together with the issuer identity, issuer and issue ratings as well as other bond characteristics. We match both lists and obtain a rich set of information related to the bonds that have been purchased by the ECB. Importantly, we have the time stamp of the bond issuances, i.e., we know whether the ECB has purchased existing bonds in the secondary market and to what extent eligible firms have issued bonds since the start of the CSPP. We provide a detailed analysis of bonds purchased under the CSPP in an Online Appendix.

eligible under the CSPP, i.e., firms incorporated in Eurozone countries with a rating of BBB- or better already *before* the CSPP announcement (investment grade firms). The treatment group is clearly defined by the CSPP eligibility criteria. However, defining an appropriate control group of non-eligible but otherwise similar firms, which is required to estimate a causal effect of the CSPP, is challenging. In the main body of the paper we use non-eligible, i.e., non-rated or non-investment grade-rated, public firms, that are incorporated in Eurozone countries, as our control group. To account for systematic differences between treated and control firms we remove control firms that do not have public debt outstanding in any of the four quarters prior to the CSPP announcement, i.e., Q1 2015 – Q4 2015, from the set of potential control firms as these firms may not have bond-market access.¹³ We further saturate our models using a large set of controls and fixed effects to account for remaining systematic differences between treated and control firms, as described in more detail below.

To empirically implement our identification strategy and test how CSPP affects firms' financial constraints, we run the following standard DiD specification:

$$\text{Leverage}_{i,t} = \alpha_i + \alpha_{kt} + \alpha_{ct} + \beta_1 \text{Post}_t + \beta_2 \text{Treated}_i + \beta_3 \text{Post} \times \text{Treated}_{i,t} + \theta' Y_{i,t-1} + \varepsilon_{i,t} \quad (1)$$

where *Leverage* can take the following form: (1) the ratio of bond debt to total assets (*Bond Debt/Assets*), (2) the ratio of term loans to total assets (*Term Loans/Assets*), (3) the ratio of (drawn) credit lines to total assets (*Revolving Credit/Assets*), and (4) the ratio of total debt to total assets (*Total Debt/Assets*) of firm *i* at time *t*. *Post* is a dummy variable that equals one in the period after the CSPP announcement, i.e., Q2 2016 – Q1 2017, and zero otherwise. *Treated*

¹³ We retain non-rated firms with public debt in the control sample. The number of unrated European firms that issue bonds has increased significantly in the recent years. In particular, also large financially sound non-rated firms, such as Sixt, Adidas, Prada and Air France, have tapped the bond market but refrained from obtaining a rating, potentially due to the associated costs and given their already well-known profiles. According to UniCredit Credit Reseach, Prada, for instance, compares well to investment grade rated peers in terms of credit metrics. See https://www.research.unicredit.eu/DocsKey/credit_docs_2015_145888.ashx?EXT=pdf&KEY=n03ZZLYZf51731xHdbTjmj51LyBDKF1nFsc0YSMk26c=.

is a dummy variable that equals one if the firm is part of the treatment sample, and zero otherwise. Y is a set of firm characteristics that determine a firm's demand for debt: we include firm size measured as the natural logarithm of total assets, firm profitability, which we measure as EBITDA over total assets, tangible assets of the firm, and the market-to-book ratio; see e.g. Sufi, 2009, Faulkender and Petersen, 2006. All control variables enter our regression with a 1-quarter lag. We further include firm fixed effects (a_i), industry x quarter fixed effects ($a_{k,t}$), and country x quarter fixed effects ($a_{c,t}$). Our coefficient of interest, β_3 captures our treatment effect and shows the effect of CSPP on a firm's capital structure. In all tests, we cluster standard errors at the firm level, i.e., the level of treatment (Bertrand et al., 2003).

2. Data

In this section, we describe our data sources and provide descriptive statistics of our main variables.

2.1. Sample selection

We obtain quarterly data for all public firms that are incorporated in Eurozone countries from Compustat Global, which we supplement with debt structure information from S&P's Capital IQ.¹⁴ We restrict the sample period to Q1 2015 to Q1 2017.¹⁵ Given that CSPP was announced in Q1 2016, our sample comprises four quarters prior and four quarters after the announcement. We exclude financial firms (SIC codes 6000-6999) and firm-quarters with missing key financial information. This leaves us with 2,281 unique Eurozone firms. Next, we exclude firms that do not have public debt outstanding in the pre-CSPP period, which reduces our sample to 890 unique firms out of which 115 firms have an investment grade rating according to S&P

¹⁴ In some of the robustness tests we further use information on public European firms incorporated in non-Eurozone countries.

¹⁵ We do, however, use information from Q4 2015 to calculate changes and lagged variables.

(treatment sample).¹⁶ These 115 investment grade firms represent only about 13% of the total sample in terms of number of firms but account for almost half (46%) of the total revenue of the sample in Q4 2015.

Important for our analysis, Capital IQ reports information on debt composition and decomposes total debt into seven distinct, mutually exclusive types: commercial paper, (drawn) credit lines, term loans, senior bonds and notes, subordinated bonds and notes, capital leases, and other debt.¹⁷ This enables us to separately analyze a potential effect of CSPP on the different debt components, in particular on bank versus bond financing. We define bond debt as commercial paper, senior bonds and notes, and subordinated bonds and notes. Bank debt is defined as (drawn) credit lines and term loans (analyzed separately in most specifications). Total debt is defined as the sum of all individual debt components.

Finally, we supplement the sample with information on stock repurchase announcements obtained from Bureau van Dijk's Zephyr database, as this information is not available in Compustat Global (Hong, Wang, and Yu, 2008).

2.2. Descriptive statistics

Table 1 reports summary statistics for our final sample over the period before the announcement of the CSPP, i.e., Q1 2015 to Q1 2016, distinguishing between treated and control firms. All variables are winsorized at the 1st and 99th percentile.¹⁸

The average leverage ratio for treated firms is 30%, comprising mainly of bond debt: the average bond debt to assets ratio is 20%, while the average bank debt to assets ratio is 6%. The average leverage ratio for the control group is 36%, i.e., somewhat higher compared to the treated sample. Control firms, on average, have a lower fraction of bond debt compared to

¹⁶ We defined the credit rating to be a firm fixed effect. In particular, we use the last available rating information *before* the CSPP announcement in March 2016 to ensure that the treatment status is not affected by the event (e.g., firms may choose to obtain a rating or reduce risk to achieve investment grade status post CSPP).

¹⁷ Some firms only report information in half-year frequency. For these firms gaps in the time series are filled using the value of the previous quarter.

¹⁸ Appendix B.1 shows descriptive statistics for the full sample.

treated firms (15% vs. 20%) and a higher share of term loans (14% vs. 6%). Treated firms are, on average, larger compared to control firms ($\ln(\text{Assets})$ 10 vs. 6.2). Further, treated firms have a lower fraction of tangible to total assets (0.29 vs. 0.26). Treated firms are also, on average, more profitable and are more likely to repurchase shares compared to control group firms. We address the potential concern that observable differences between treatment and control firms affect our results in Section 3.2. The other firm characteristics do not differ significantly between the treatment and control sample.

[Table 1 here]

2.3. Corporate bond yields

Before we investigate the effect of the introduction of the CSPP on the composition of credit of eligible firms, we first analyze corporate bond yields around the announcement of the program. We hypothesize that eligible firms increase bond financing as firms take advantage of a low-yield environment. We thus expect to see a substantial decline in corporate bond yields around the announcement of the CSPP.

We obtain bond-level information for our sample firms from Dealogic and categorize bonds as eligible or non-eligible based on the criteria described in Section 1.1. We obtain data on daily yield spreads¹⁹ from Thomson Reuters Datastream. In order not to overweigh firms with a high number of bonds outstanding, we consider only one time series per firm, using a (face value) weighted average across all outstanding issues of the firm. If the bond ratings are not identical across issues, we use the rating of the most recent issue.²⁰ We plot the cumulative percentage change in bond spreads around the CSPP announcement on March 10th 2016 for Eurozone non-financial firms of different rating categories in Figure 2.

¹⁹ We obtain corporate bond yield spreads, i.e. the spread of bond yields over the yields of government bonds of the same maturity. The main reason is that at the same day as the CSPP announcement, the ECB also announced an expansion of its Public Sector Purchase Programme. This affected the risk-free rate and likely would have decreased corporate bond yields even in the absence of the CSPP. By analyzing the spread over government bonds, we are better able to isolate the effect of the CSPP.

²⁰ Using the best rating instead gives comparable results.

[Figure 2 here]

Panel A of Figure 2 plots the change in yield spreads for eligible vs. non-eligible firms with public bonds outstanding. We find a substantial decrease in bond spreads around the announcement of the CSPP for both group of firms, although the decline in yields is substantially larger for eligible firms, consistent with our hypothesis. The cumulative change in spreads over a [-3,+7] day window is about 11% for eligible (which corresponds to a reduction of about 13 basis points) and 6% for non-eligible firms. The effect on non-eligible firms suggests that there might be spillovers from the CSPP that indirectly affects also non-eligible firms. Panel B of Figure 2 splits the group of eligible firms into high-quality AAA-A rated and riskier BBB rated firms. Firms in both groups benefit from a similar reduction in corporate bond yields around the announcement.

3. How does the CSPP affect financing decisions of eligible firms in the Eurozone?

3.1. Baseline results

In a first step, we analyze the impact of the ECB's CSPP on financing decisions of non-financial Eurozone firms. In particular, we test whether eligible firms increase their bond issuance activity following the CSPP announcement in Q1 2016 and whether this leads to an overall increase in leverage (or whether firms substitute other debt with bond debt leaving the overall leverage ratio unchanged). We employ the DiD design described in Section 1.2 and estimate equation (1) using OLS regressions. The results are presented in Table 2.

[Table 2 here]

In columns (1) and (2) of Table 2, we show the results using *Bond Debt/Assets* as dependent variable. We start with the specification that only includes control variables (column (1)) and firm fixed effects and then further saturate the model with industry x quarter and

country x quarter fixed effects (column (2)).²¹ These fixed effects account for shocks at a narrowly defined industry group (2-digit SIC codes) in each quarter and shocks at the country-quarter level that might affect a firm's choice of bond debt.

The most saturated model (column (2)) shows that the share of bond debt to assets increased post CSPP announcement by 1.5 pp for treated relative to control group firms and relative to the pre-CSPP announcement period, i.e., investment grade Eurozone firms, relative to non-eligible Eurozone firms. This effect is not only statistically significant, it is also economically meaningful: given an average share of bond-to-assets of 16% in our sample,²² the CSPP announcement increases bond-to-assets by about 10% relative to the unconditional mean.

We report the results using *Term Loans/Assets (Revolving Credit/Assets)* in columns (3) to (4) (columns (5) to (6)). We find no evidence that eligible firms significantly reduce bank debt after the announcement of the CSPP. Columns (7) to (8) report the results using *Total Debt/Assets* as dependent variable. Eligible firms increase their leverage by about 1.2 pp relative to non-eligible firms after the announcement of the CSPP. This effect is only statistically significant at the 10% level; however, the effect is economically meaningful. An increase in debt-to-asset ratios of 1.2 pp corresponds to an increase in leverage of about 3% relative to the unconditional mean. Overall, firms respond to the reduction in corporate bond yields and increase bond financing in the quarters after the CSPP has been announced in Q1 2016.

Given ongoing sovereign bond purchases by the ECB as well as a potential substitutability between bonds of firms at the upper end of the rating spectrum and sovereign bonds from the investors' perspective (e.g. Foley-Fisher et al., 2016 and Badoer and James, 2016), (very) low credit risk firms might have been less constrained even before the start of the CSPP relative to, e.g., BBB rated firms. We account for this in our empirical analysis and

²¹ We obtain similar results if we run the regression without any controls and fixed effects. We do not report this specification to save space.

²² See Appendix B.1.

include the interaction terms *AAA-A Rating (0/1) x Post (0/1)* and *BBB Rating (0/1) x Post (0/1)* as treatment group and run the same specification as in equation (1). The results are reported in Table 3.

[Table 3 here]

Consistent with differences in financial constraints, we find some indications that the bond debt increase following the CSPP announcement is larger for BBB rated firms (columns 1-2). In particular, BBB rated firms increase their *Bond Debt/Assets* ratio by 1.6 pp post CSPP relative to the control group, while AAA-A rated firms experience an increase in bond debt by 1.2 pp. The difference between both groups, however, is not statistically significant. The results reported in columns (3) and (4) suggest that BBB rated firms significantly decrease their *Term Loans/Asset* ratio post CSPP. AAA-A rated firms, in contrast, do not change their percentage of term loan financing post CSPP and the difference between both groups is highly statistically significant. This indicates that BBB-rated firms seem to respond to CSPP by changing their debt capital structure, i.e., they substitute bank with bond debt. We find no evidence that AAA-A or BBB rated firms change their percentage of credit line financing in their capital structure post CSPP (columns (5) to (6)). This is consistent with the view that credit lines and term loans are fundamentally different. Credit lines usually provide short-term sources of contingent liquidity (as a form of liquidity insurance), while term loans provide long-term immediate funding to borrowers. Hence, in contrast to term loans, credit lines and bonds are not close substitutes (see e.g. Berg, Saunders, Steffen, and Streit, 2017). It is therefore unsurprising that BBB rated firms seem to rely less on term loans following an increase in their *Bond Debt/Asset* ratio but do not decrease their credit line financing. Columns (7) and (8) of Table 2 confirm that the overall leverage ratio does not increase significantly for BBB rated firms post CSPP. That is, these firms only seem to adjust debt composition. AAA-A rated firms, in contrast, significantly increase their total debt post CSPP (+ 2.1 pp).

3.2. Identification

3.2.1. Parallel trend assumption

A causal interpretation of the effect of CSPP relies on the parallel trend of treatment and control group before the treatment with respect to their capital structure decision. We thus perform the following parametric test of the parallel trend assumption. We include a series of dummy variables in our regression model to trace out the quarter-by-quarter (i.e., time-series) effects of CSPP on leverage:

$$\text{Bond Debt/Assets}_{i,t} = a_i + a_{kt} + a_{ct} + \beta_1 \text{Treated}_i * \text{Q1 2015} + \beta_2 \text{Treated}_i * \text{Q2 2015} + \dots + \beta_8 \text{Treated}_i * \text{Q1 2017} + \gamma' X_{i,t-1} + \varepsilon_{i,t}. \quad (2)$$

$\text{Treated}_i * \text{Quarter}$ equals one for treated firms, and zero for control firms. We exclude Q1 2016, thus estimating the dynamic effect of CSPP on firm leverage relative to the CSPP announcement quarter. We control for firm, industry x quarter, and country x quarter fixed effects. We further include a vector of firm-level controls (X), which we have used throughout our analysis to control for the heterogeneity in firm characteristics (cf. Section 1.2).

[Figure 3 here]

Figure 3, illustrates that there is no significant pre-trend in bond issuance activity before the CSPP announcement in Q1 2016. All coefficients are statistically insignificant at conventional levels in the period prior to the CSPP announcement. Following the CSPP announcement the bond to asset ratio starts to increase significantly for treated relative to control firms, and the effect is highly statistically significant.

3.2.2. Bond-financing at the investment-grade boundary

A second concern is related to our treatment group definition, which is along the investment grade boundary. An increase in bond issuances for investment-grade relative to non-investment grade rated firms could occur because the former are less risky and need less monitoring, and, consequently, are more likely to issue bonds also after the announcement of the CSPP. Even though we have controlled for firm risk in our regression specification not only through our

control variables but also using firm fixed effects and further controlled for shocks at a (narrowly defined) industry-quarter and country-quarter level, we revisit this argument here in this subsection with additional tests.

If borrower risk is driving our results, we would expect to observe a gradual decline in bond-to-total asset ratios across the rating categories. However, if treated firms increase bond debt relative to non-eligible firms, we expect to see a discontinuity as to the effect on bond-to-total asset ratios at the investment-grade boundary. We thus augment our specification and interact *Post* (0/1) with indicator variables for each of the following rating categories: AAA-A, BBB, BB, B or unrated. In other words, the treatment effect is characterized through the interaction terms *AAA-A Rating (0/1) x Post (0/1)* and *BBB Rating (0/1) x Post (0/1)*. The interaction term *Not Rated (0/1) x Post (0/1)* is the omitted group.

$$\begin{aligned} \text{Bond Debt/Assets}_{i,t} = & a_i + a_{kt} + a_{ct} + \beta_1 \text{AAA to A}_i * \text{Post}_t + \beta_2 \text{BBB}_i * \text{Post}_t + \beta_3 \text{BB}_i * \text{Post}_t \\ & + \beta_4 \text{B}_i * \text{Post}_t + \gamma' X_{i,t-1} + \varepsilon_{i,t} \end{aligned} \quad (3)$$

Our focus is on comparing β_2 and β_3 , i.e. the effect at the investment-grade boundary. The regression results are reported in Panel A of Table 4.

[Table 4 here]

Similar to above, we start with the specification that only includes control variables and firm fixed effects (column (1)) and then further saturate the model with industry x quarter and country x quarter fixed effects (column (2)). Comparing BBB and BB firms along the investment-grade rating boundary, we find that the coefficient drops significantly when we move from a BBB to a BB or B rated firms and the difference between the BBB and the BB coefficient is highly statistically significant. The difference between AAA-A and BBB rated firms, in contrast, is not statistically significant (see also Section 3.1). As expected, we do not find any effect in the control group, neither BB or B rated firms react to the announcement of

the CSPP program differently compared with unrated firms. In other words, these results are consistent with an effect of the CSPP on treatment relative to control group firms.²³

3.2.3. *Matched control group*

The descriptive statistics reported in Table 1 indicate that treatment and control firms differ along several dimensions. In particular, treated firms are larger, more profitable, and generally have a higher share of bond debt-to-total assets compared to non-eligible firms. For robustness, we run our regression specification using a matched control group. A nearest neighbor matching is used to choose a control firm that is closest in terms of size, profitability, bond debt, and bank debt, to each treated firm in the pre-treatment period. The maximum permitted difference in the probability of receiving treatment (being eligible under CSPP) between matched subjects is 1%. We report descriptive statistics regarding the quality of the match in Appendix B.3 and confirm that there are no remaining differences in the matching variables between the treated and control group over the pre-CSPP period.²⁴ The matched sample results are reported in Panel B of Table 4. The results are economically even stronger using a matched sample relative to our baseline results, indicating that our results are not driven by observable differences between treated and control firms.²⁵

3.2.4. *Alternative control group: non-Eurozone firms*

For robustness, in particular to rule out that our results are driven by any remaining differences in credit quality between treated and control firms, we further construct an alternative control

²³ A further potential concern is that CSPP eligibility is defined at the *issue* level, i.e., using issue level ratings by S&P, Moody's, Fitch, and DBRS (cf. Section 1.1). We use the *issuer* rating by S&P as this leaves us with the largest sample possible. The implicit assumption is that the issuer rating is positively correlated with issue ratings and that credit ratings are positively correlated across rating agencies (both assumptions generally seem reasonable). Our results are robust to using *issue* level rating information by the three main rating agencies (S&P, Moody's, Fitch) instead of the issuer rating by S&P. See Appendix B.5 for details.

²⁴ Note that a matched sample approach results in a significantly reduced sample size as many treated firms do not have a control firm that is comparable in terms of size. Hence, we report the matched sample results for robustness but use an unmatched broader sample – controlling for observable difference between treated and control firms and saturating the models with a large set of fixed effects – in the rest of the paper.

²⁵ The magnitude of the effect remains unchanged but the coefficient is not statistically significant when including county x quarter and industry x quarter fixed effect. However, it is unsurprising that due to the significantly smaller sample size as result of the restrictive matching procedure the power of the test is reduced.

group, which is comprised of European investment grade-rated firms that are incorporated in countries outside of the Eurozone. Again, we further match firms based on size, profitability, bond debt, and bank debt, as described in Section 3.2.3. Appendix B.4 documents that eligible firms increase their bond to asset ratio also relative to investment grade firms incorporated outside of the Eurozone.

There are two potential concerns with using investment grade non-Eurozone firms as control group: (i) also non-Eurozone firms could be eligible under CSPP if they raise funds through a Eurozone subsidiary and (ii) non-Eurozone investment grade firms may also have indirectly benefitted from CSPP if investor demand shifts to investment grade bonds issued by non-Eurozone firms after the ECB purchases of Eurozone investment grade debt. Hence, we additionally report results using non-rated European firms incorporated outside of the Eurozone as control group (again matched to treatment firms based on size, profitability, bond debt, and bank debt). Consistent with the conjecture that also non-Eurozone investment grade firms may have benefitted from CSPP, the results are even stronger in this specification.

3.2.5. Placebo test: PSPP announcement in January 2015

In March 2016, the ECB not only announced the introduction of the CSPP but also an extension of the public-sector purchase program (PSPP). A potential concern might be that our results are driven by the increase in ECB's government bond purchases but not by corporate bond purchases. Government bond prices might be affected through the same channels (the portfolio rebalancing channel and the signaling channel) as described in the context of corporate bond prices above. (Long-term) Government bond purchases might reduce interest rate risk (i.e. duration risk), which increases government bond prices and thereby lead to a higher valuation of assets on bank balance sheets. This, in turn, increases a bank's capacity to lend.

We conduct a placebo test to address this concern. In particular, we analyze changes in bond debt financing of CSPP eligible firms around the introduction of the PSPP in January 2015. We restrict the sample period to Q1 2014 - Q4 2015 and define a new dummy variable,

Post, that equals one after the PSPP announcement in Q1 2015, and zero otherwise. The results are reported in Panel C of Table 4. We find no evidence that CSPP eligible firms reacted to the PSPP announcement in 2015, giving us confidence that our results are in fact driven by the ECB corporate bond purchases and not by the PSPP extension in Q1 2016, which was even substantially smaller in size compared with the initiation of the program in January 2015. Our results are consistent with Krishnamurthy and Vissing-Jorgensen (2013) who show that Fed purchases of U.S. treasury bonds significantly raised treasury bond prices, but had limited spillover effects for private sector bond yields.

4. Does CSPP affect the investment decisions of eligible firms?

Our earlier results show that eligible firms increase bond debt relative to bank debt which is associated with a decrease in borrowing costs. These firms might response by taking advantage of profitable investment opportunities (Becker and Ivashina, 2015). Alternatively, in the absence of growth opportunities, they might increase cash holdings or, for example, payouts (Bates et al., 2009).

4.1. Investment policies for treatment versus control firms

In a next set of tests, we explore the effects of CSPP on investments, acquisitions, and firm payout policies. In particular, we run a DiD specification similar to equation (1):

$$Z_{i,t} = a_i + a_{kt} + a_{ct} + \beta_1 Post_t + \beta_2 Treated_i + \beta_3 Post \times Treated_{i,t} + \theta' X_{i,t-1} + \varepsilon_{i,t} \quad (4)$$

where Z can take the following form: (1) change in cash to total asset ($\Delta Cash/Assets$), (2) capital expenditures scaled by total assets ($CAPEX/Assets$), (3) cash acquisitions scaled by total assets ($Acq./Assets$), or (4) a dummy variable that equals one if firm i announces a share repurchase at time t , and zero otherwise (*Share Rep. (0/1)*). Total assets are lagged by one quarter. We control for the same set of firm characteristics, X , as described above and further include lagged

leverage. We control for firm, industry x quarter, and country x quarter fixed effects. The coefficient of interest is β_3 , which captures the treatment effect, i.e., the effect of the CSPP on corporate investment and payout policies. The baseline results are reported in Table 5.

[Table 5 here]

We find no evidence supporting the view that treated firm reacted to the implementation of the CSPP by changing their investment or payout policy. However, our earlier results indicated that there is significant heterogeneity in the response to the CSPP within the treatment group. Hence, in a next step, we study how firms and their investment and payout policies differ in the cross-section of eligible firms. In particular, we again differentiate between AAA-A and BBB rated firms by including the interaction terms *AAA-A Rating (0/1) x Post (0/1)* and *BBB Rating (0/1) x Post (0/1)* in the estimation. The results are reported in Table 6.

[Table 6 here]

We still find no statistically significant effect of the CSPP on investment and payout policies of BBB rated firms. Together with our earlier results this indicates that BBB rated firms merely respond to the CSPP by restructuring their debt capital structure, i.e., they issue bond debt and repay bank debt. In contrast, we find significant effects of the CSPP on the investment and payout policy of AAA-A rated firms, which is consistent with an overall leverage increase for this group as documented in Section 3.1. High-quality AAA-A rated firms increase their acquisition-to-asset ratio post CSPP (columns (5) and (6) of Table 6). The coefficient on the interaction term suggests an increase of the acquisition-to-asset ratio by 0.34pp (column (6)), which is economically significant given that the pre-CSPP sample mean is 0.3pp. The difference between the coefficient for AAA-A rated firms and BBB rated firms is highly statistically significant, indicating that AAA-A rated firms increase acquisition activity not only relative to the control group but also relative to BBB rated firms.

Further, AAA-A rated firms are about 3.6pp more likely to announce a share repurchase program post CSPP relative to the control group. This effect is highly economically meaningful

give the unconditional probability of observing a share repurchase announcement in the sample of only 1.2% (pre CSPP). Again, the difference between the coefficient for AAA-A-rated firms and BBB rated firms is highly statistically significant, indicating that AAA-A rated firms increase share repurchases relative to both the control group and BBB-rated firms. Overall, our results suggest that AAA-A-rated firms and firms close to the investment-grade boundary behave very differently in terms of investments as a response to the CSPP program.

4.2. Acquiring firm announcement returns: pre- vs. post-CSPP

The results presented in the preceding section show that (AAA-A rated) treated firms increase their acquisition activity post CSPP announcement. A natural question is if acquisitions that are fueled by the CSPP increase shareholder value. An alleviation of financial constraints and/or a reduction in the cost of capital due to the CSPP could enable firms to invest in (additional) positive NPV deals. On the other hand, a further increase in the availability of cheap debt for firms that already faced only limited financial constraints could, in the absence of profitable investment opportunities, induce managers squander corporate resources (e.g. Jensen, 1986, Harford, 1999).

We investigate this question by examining the shareholder responses to acquisition announcements of treated and control firms before and after the introduction of the CSPP. We obtain information on acquisition announcement dates for our sample of treated and control firms from the Bureau van Dijk's Zephyr database for the Q1 2015 to Q1 2017 period. For each acquisition, we calculate abnormal returns using standard event study methodology. That is, we calibrate a market model over a 250 (trading) day pre-event estimation window [-290,-40]. We then regress the stock return of firm i on trading day t on a market return proxy (Eurostoxx600). We use this model to predict returns for a [-5,+3] event window around the acquisition announcement and calculate abnormal returns as the simple difference between actual and predicted returns.

[Figure 4 here]

Figure 4 shows the cumulative abnormal returns for the event window, separately for treated and control group firms and separately for the pre- and the post-CSPP period. The shareholder reactions to acquisition announcements are similar in the pre- and in the post-CSPP period for control firms. Treated firms, however, experience lower announcement returns for deals announced in the post-CSPP period relative to the pre-CSPP period. Interestingly, treated firms have overall lower abnormal returns compared to control firms (both in the pre- and in the post-CSPP period), potentially due to differences in the types of acquisitions these firms engage in.

We next analyze announcement returns of the CSPP in a multivariate setting. We regress 3-day CARs on a treatment dummy, a post-CSPP dummy, an interaction term capturing the difference-in-difference effect (*treatment x post*) and a set of standard deal and acquirer controls and fixed effects.²⁶ Consistent with our earlier analyses, we restrict the sample to acquirers that have public debt outstanding in the pre-CSPP period. We report the results in Table 7.

[Table 7 here]

The results indicate that treated firms experience an about 0.7pp *lower* cumulative abnormal return for acquisitions announced post CSPP, relative to control firms and relative to the time before the CSPP introduction (column (1) and (2)). The coefficient of *Treated (0/1)* is positive, indicating that the lower announcement returns for deals announced by treated versus control firms documented in Figure 4 can be explained by acquirer and deal characteristics. The finding that treated firms experience lower announcement returns post-CSPP relative to the control group prevails even if we include industry x quarter and country x quarter fixed effects (column (3)) and firm fixed effects (column (4)).²⁷ In column (5), we further control for Deal

²⁶ Deal characteristics comprise Public Target (0/1), Same 2-Digit SIC (0/1), Cross Border (0/1), Buyer Controls (0/1), Stock Payment (0/1), Cash Payment (0/1), Debt Payment (0/1). Acquirer characteristics comprise Size, Leverage, Profitability, Tangibility, and MTB.

²⁷ The effect is (just) not statistically significant when firm fixed effects are included in column 4. Note, however, that this effectively limits the variation to repeated acquirers, i.e., the small subset of firms that conduct acquisitions both in the pre- and in the post-CSPP period. The economic magnitude of the coefficient is similar compared to the specification without firm fixed effects.

Value/Assets. The results continue to hold despite the significant drop in the number of observations as for a large fraction of (in particular, recently announced) deals information on the deal value is not (yet) available in the Zephyr database.

Interestingly, we do not find that AAA-A rated firms experience a larger drop in announcement returns post-CSPP compared to BBB rated firms (untabulated). That is, in particular AAA-A rated firms increase their overall acquisition activity post CSPP but *conditional on conducting an acquisition* both AAA-A and BBB rated firms experience lower announcement returns after the introduction of the ECB's bond buying program relative to the control group. Overall, our results do not support the notion that the additional acquisition activity that is fueled by the ECB's bond buying program is value improving for the acquiring firms' shareholders.

5. Do banks increase supply of loans to non-eligible firms?

Our previous results suggest that CSPP eligible firms increase bond issuance and decrease bank loans relative to the control group, public Eurozone firms that are not eligible, and relative to the time before the CSPP announcement. However, non-eligible firms could potentially indirectly benefit from CSPP as well. In a next step, we investigate possible spillovers from eligible to non-eligible firms in the loan market. The idea is intuitive. Suppose that some banks extend a large fraction of loans to firms whose bonds are now eligible for purchases under the CSPP program. If these firms switch from bank to bond financing, as indicated by our previous findings, these banks might have balance sheet capacity available to increase lending to other, non-eligible, firms.

5.1. Methodology

To analyze this question, we augment our dataset with information from the Bureau Van Dijk Amadeus database, which provides comprehensive coverage of both public and private European firms. We expect to find spillover effects of the CSPP in the loan market mainly for

private firms as this group of firms is unlikely to be directly affected by the CSPP and typically most relying on bank debt as external financing source. We obtain loan-level data from the Thomson Reuters LPC Dealscan database, which provides comprehensive coverage of the European syndicated loan market, to identify bank-lending relationships. Firm i has a lending relationship with bank b if the firm obtained at least one loan during the 2010 to 2014 period in which bank b acted as lead arranger.²⁸ We define bank-lending relationships over the 2010 to 2014 period as our sample spans the Q1 2015 to Q4 2016 period. That is, we fix bank-lending relationships *before* the start of our sample period to rule out that results are affected by the endogenous decisions of firms to switch banks. We restrict the sample to non-financial Eurozone firms with an active bank lending relationship in the pre-CSPP period, i.e., all firms are active borrowers in the syndicated loan market.

Next, we determine the extent to which banks are affected by the CSPP. We construct a proxy, *Bank IG Share*, as the share of (non-financial) investment grade borrowers in bank b 's term loan portfolio before the introduction of the CSPP. In particular, the proxy is defined as

$$\text{Bank IG Share}_i = \frac{\sum \text{Term Loan Amt. to EZ Inv. Grade Borrowers over 2010 – 2014 Period}}{\sum \text{Term Loan Amt. to all EZ Borrowers over 2010 – 2014 Period}}$$

which we calculate over the 2010 – 2014 period, i.e., we measure bank exposure to investment grade firms *before* CSPP introduction. We focus on term loans, i.e., exclude credit lines when estimating bank exposure to investment grade firms, as credit lines and bonds are not close substitutes (Berg et al., 2017). Credit lines provide liquidity insurance for firms; hence, we would not expect – and do not find – that CSPP eligible firms would substitute credit lines by bonds. Term loans and bonds, in contrast, are reasonably close substitutes. We only consider term loans in which a bank is lead arranger. We identify lead arrangers following, e.g., Ivashina

²⁸ We aggregate bank subsidiaries under the ultimate parent.

(2009) and Sufi (2007). We equally split the loan amount in case of multiple lead arrangers in a loan facility.²⁹ We match this information with our firm level data to determine the extent to which the relationship bank(s) of a firm i is (are) affected by the CSPP. In case a firm has an active lending relationship with more than one bank, we use the average *Bank IG Share* across all lenders. In our analysis we use a variable, *High Bank IG Share (0/1)*, which equals one for firms whose relationship lenders have an above median share of investment grade borrowers in their term loan portfolio prior to the CSPP introduction, and zero otherwise, to facilitate the interpretation of our results.

Finally, we use Dealscan to obtain information on the loans that the sample firms have obtained over the sample period from Q1 2015 to Q4 2016. That is, we define an indicator variable, *Loan Issue (0/1)*, that equals one if a firm obtains a bank loan in quarter t , and zero otherwise.³⁰ We use this information to analyze if a firm is more likely to obtain a loan post-CSPP introduction if it borrows from banks that have a higher fraction of investment grade firms in their loan portfolio pre-CSPP.³¹ In particular, we estimate the following regression model

$$\text{Loan Issue}_{i,t} = a_i + a_{kt} + a_{ct} + \beta_1 \text{Post}_t * \text{High Bank IG Share}_i + \beta_2 \text{High Bank IG Share}_i + \beta_3 \text{Post}_t + \theta' X_{t-4} + \varepsilon_{i,t} \quad (5)$$

Post equals one after Q1 2016, and zero otherwise. The regressions include firm-level controls, X , to control for the heterogeneity in firm characteristics ($\ln(\text{Total Assets})$, Profitability,

²⁹ We use a simple 1/N split, as the coverage on the exact lender shares in the Dealscan database is limited.

³⁰ Note that firm level information from Bureau van Dijk's Amadeus is only available on an annual level. We nonetheless create a panel on the quarterly level as our main dependent variable of interest, *Loan Issue (0/1)*, can be constructed on the quarterly level using Dealscan and because CSPP was announced and implemented in mid 2016. That is, the quarterly frequency allows for a clearer distinction between the pre and post CSPP period. For the firm-level control variables, obtained from Bureau van Dijk's Amadeus, we use information lagged by one year (i.e., t-4 quarters).

³¹ We focus on the probability that a loan is originated instead of loan volume to avoid confounding effects. However, our results are similar when we use $\ln(1 + \text{loan volume})$ as dependent variable.

Tangibility), We further include firm fixed effects (a_i), industry x quarter fixed effects ($a_{k,t}$), and country x quarter fixed effects ($a_{c,t}$) to control for demand effects at the industry of country level.³² As discussed above, we separately estimate equation (5) for public and private firms. We cluster standard errors on the firm level in all specifications.

5.2. Bank lending to non-eligible firms after CSPP

We report the results in Table 8. Panel A of Table 8 reports the results for the sample of private firms. We start with a model that only includes control variables and saturate it with firm fixed effects (column (2)) and industry x quarter and country x quarter fixed effects (column (3)). We find that the likelihood that a private firm issues a loan in any quarter after the announcement of the CSPP is about 3 pp higher if the firm is borrowing from a bank that has an above median share of investment grade borrowers in their term loan portfolio. Given that the unconditional likelihood of issuing a loan in our panel is about 6.3%, this corresponds to an almost 50% increase in the probability of obtaining a loan. This result is economically and statistically highly significant

[Table 8 here]

We perform the same tests using the sample of public firms and report the results in Panel B of Table 8. As discussed above, we expect spillovers of the CSPP to matter less for public firms as these firms are more likely to be directly affected by the CSPP. These firms have access to other financing sources and are generally less relying on bank debt. Consistent with this hypothesis, we do not find any significant effect in the sub-sample of public firms. Overall, our results are consistent with spillovers of monetary policy to non-eligible firms. Banks with a high percentage of eligible, i.e., investment-grade, borrowers in their portfolio increase lending to private firms after the announcement of the CSPP.

5.3. Investment decisions of non-eligible firms

³² Note that *High Bank IG Share_i* and *Post_t* will be absorbed by the fixed effects if firm fixed effects and county x quarter fixed effects are included in the estimation.

If non-eligible firms also indirectly benefit from CSPP, does this affect their investment decisions? Previous research highlights the negative consequences with a reduction in loan supply. An expansive monetary policy such as the CSPP might thus positively spill-over into the real sector.

Unfortunately, end-of-year financial statement data for 2016 are at this point hardly available for private firms. A thorough empirical analysis, as we report in Tables 5 and 6, is thus not feasible at this point. However, using the data that is available, we graphically explore potential effects on the investments of private firms for which information for 2016 is already available, and plot firm CAPEX-to-asset ratios over the 2014 to 2016 period. We distinguish between firms borrowing from banks with a high (low) share of eligible term-loan borrowers (see Figure 5).

[Figure 5]

While the graphs shows a parallel decline in capital expenditures in 2014-2015 for both groups of firms, this trend is attenuated for firms borrowing from banks with a high share of eligible term-loan borrowers. This is consistent with the interpretation that these firms use the increase in supply of loans to increase capital expenditures. This, of course, relies on a rather small number of observations and more research is needed once new data becomes available.

6. Conclusion

In this paper, we show that the announcement of the Corporate Sector Purchase Programme (CSPP) by the European Central Bank (ECB) led to a change in the composition of credit of firms, whose bonds are eligible for purchases by the central bank. In particular firms at the investment grade rating boundary with a BBB rating substitute bank debt with bond debt taking advantage of a low corporate bond yield environment. We show that the shift to bond debt has only limited effects on investment decisions of eligible firms. If anything, high credit quality firms increase payouts to shareholders and acquisition activity. We find no evidence that the

acquisition activity that is fueled by the ECB's bond buying program is value improving for the acquiring firms' shareholders. In particular, mergers announced by eligible firms after CSPP introduction have lower announcement returns.

Importantly, we document that the CSPP has significant spillover effects on the financing conditions of non-eligible firms without access to the public debt market. Banks redirect lending to these firms when eligible firms shift to bond financing. Finally, we find some evidence that relaxing financial constraints attenuates the decline in capital expenditures of these firms.

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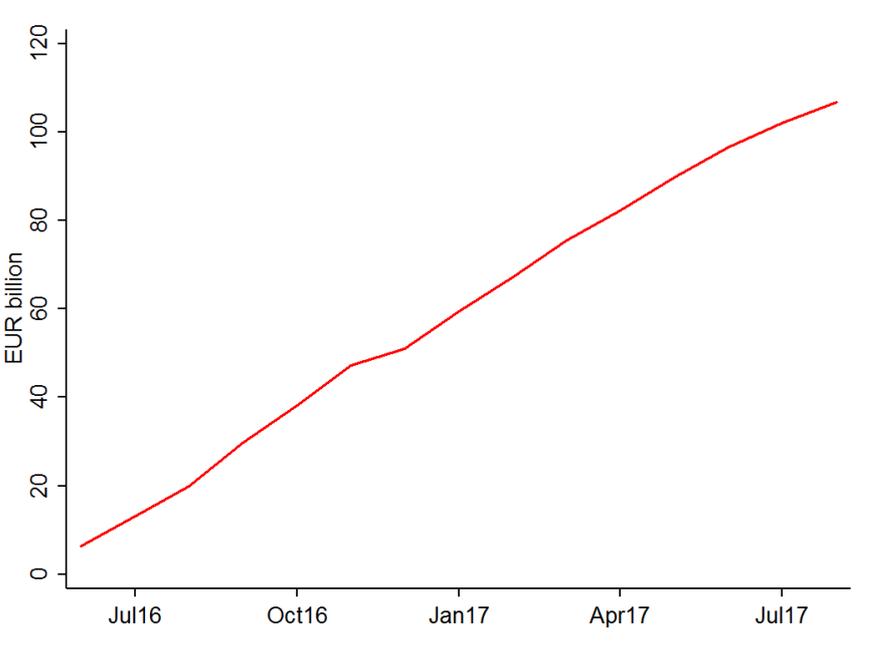
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Figure 1
Cumulative holdings of securities purchased under the CSPP

This figure shows the cumulative end-of-month holdings in EUR billion of securities purchased by the European Central Bank under its Corporate Securities Purchase Programme.

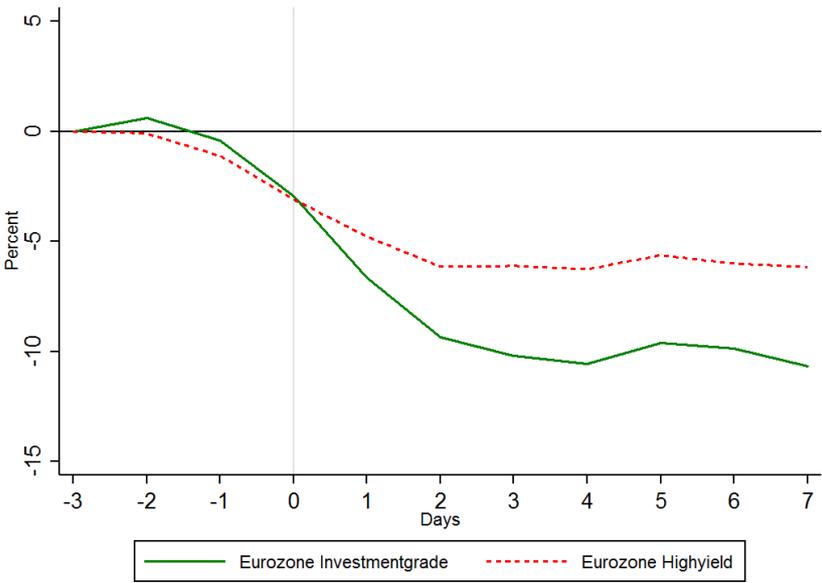


Source: ECB (2017) <https://www.ecb.europa.eu/mopo/implement/omt/html/index.en.html>

Figure 2. Corporate bond spreads around the CSPP announcement

This figure shows the cumulative percentage change in bond yield spreads, i.e. the spreads of corporate bond yields over the yields of government bonds of the same maturity around the CSPP announcement on March 10th 2016 for Eurozone non-financial firms of different rating categories.

Panel A. Eligible (Eurozone I-Grade) vs. non-eligible firms (Eurozone High-yield)



Panel B. Eligible (Eurozone I-Grade) at the I-Grade boundary vs. non-eligible firms (Eurozone High-yield)

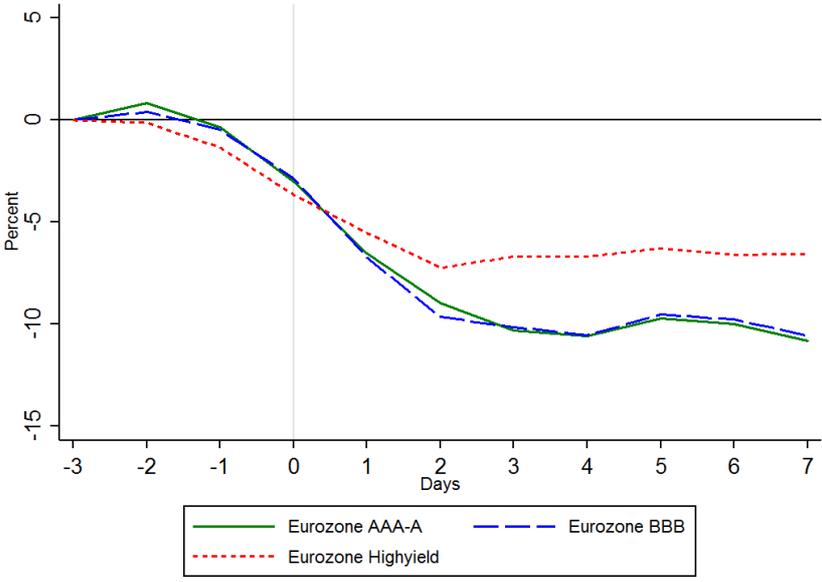


Figure 3
Identification: Parallel trend assumption

This figure plots the impact of CSPP on bond financing of Eurozone firms. We consider an 9-quarter window, spanning from 5 quarters before the CSPP announcement until 4 quarters thereafter. The dashed lines represent 90% confidence intervals, adjusted for firm-level clustering. Specifically, we report estimated coefficients from the following regression:

$$\text{Bond Debt/Assets}_{i,t} = a_i + a_{kt} + a_{ct} + \beta_1 \text{Treated}_i * \text{Q1 2015} + \beta_2 \text{Treated}_i * \text{Q2 2015} + \dots + \beta_8 \text{Treated}_i * \text{Q1 2017} + \gamma' X_{i,t-1} + \varepsilon_{i,t}$$

$\text{Treated}_i * \text{Quarter}$ equals one for treated firms, i.e., Eurozone investment grade firms, in the respective quarter, and zero otherwise. We exclude Q1 2016, thus estimating the dynamic effect of CSPP on bond financing relative to the CSPP announcement quarter. We control for firm fixed effects, industry x quarter fixed effects, and country x quarter fixed effects. Further included are firm-level controls, X , to control for the heterogeneity in firm characteristics ($\ln(\text{total assets})_{i,t-1}$, $\text{Profitability}_{i,t-1}$, $\text{Tangibility}_{i,t-1}$). The control group comprises non-investment grade rated Eurozone firms that have public debt outstanding in the four quarters prior to the CSPP announcement.

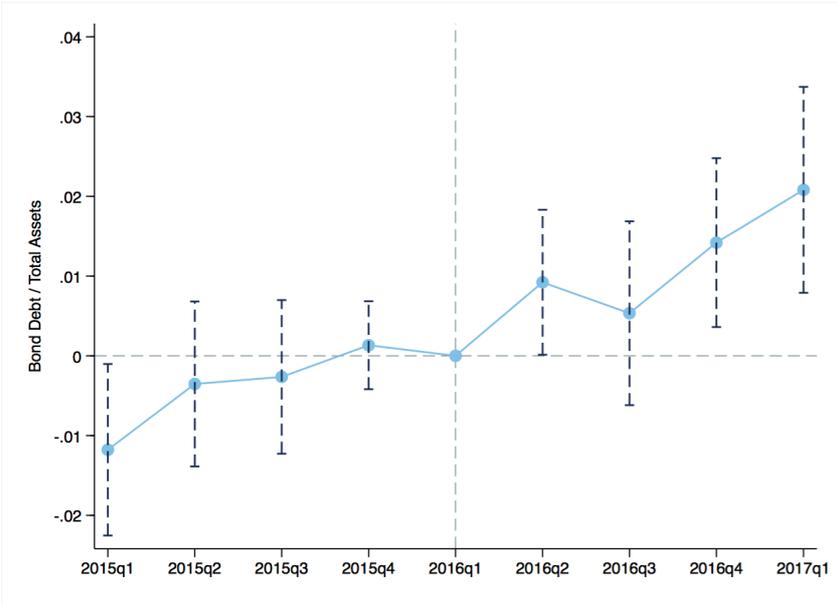


Figure 4
CARs around M&A announcements

This figure plots cumulative abnormal acquiring firm returns from (trading) day -5 before to (trading) day +3 after an M&A announcement. The daily abnormal returns are market model adjusted for each firm, averaged across firms, and then cumulated. Treated firms are Eurozone investment grade firms. The control group comprises non-investment grade rated Eurozone firms with public debt. PRE-CSPP comprises M&As announced between Q1 2015 and Q1 2016. POST-CSPP comprises M&As announced between Q2 2016 and Q1 2017.

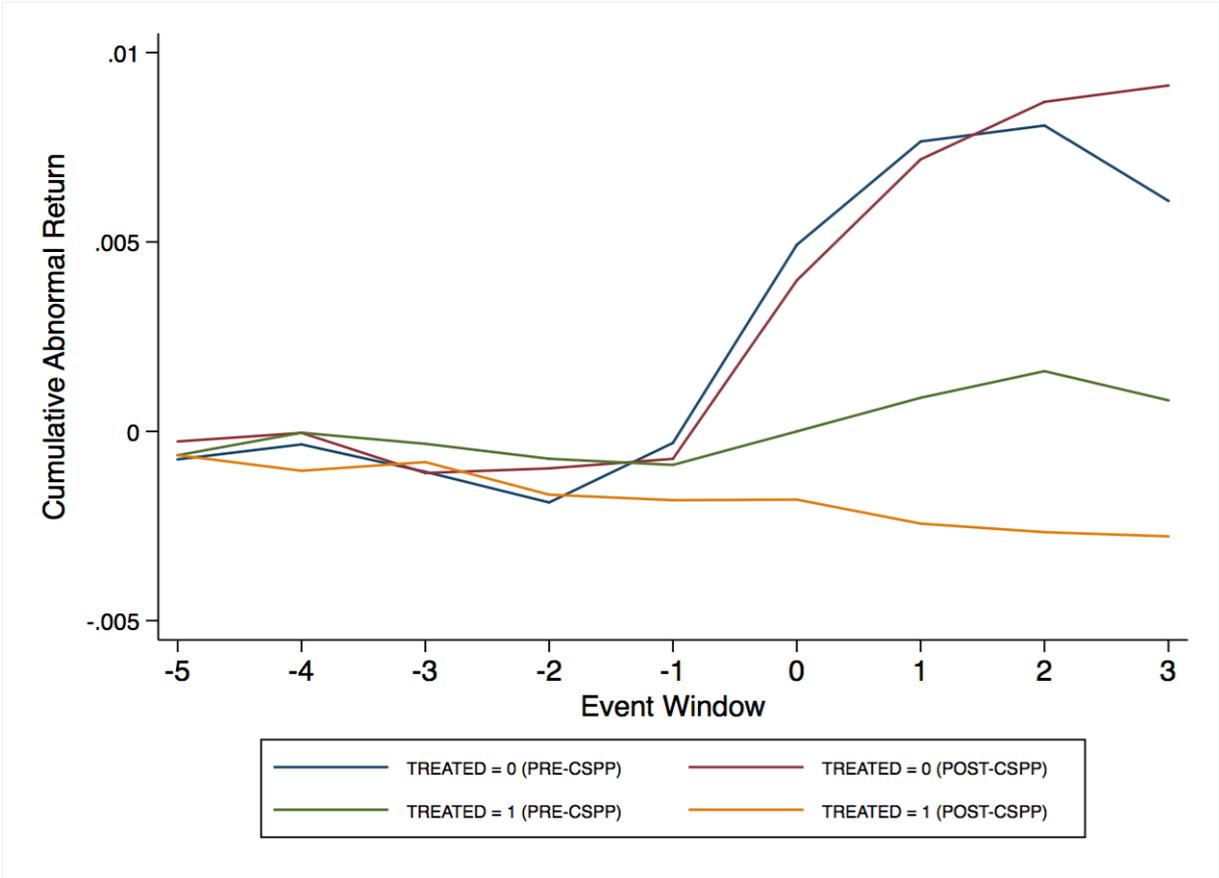


Figure 5
Capital expenditure changes for non-eligible firms

This figure plots the average CAPEX / Assets ratios for private firms contained in the Bureau van Dijk’s Amadeus database. We distinguish between firms whose relationship lenders have a high (above median) share of investment grade borrowers in their term loan portfolio prior to the CSPP introduction (estimated over the 2010 to 2014 period), and firms whose relationship lenders have a low (below median) share of investment grade borrowers in their term loan portfolio. Note, that the values are dated end-of-year.

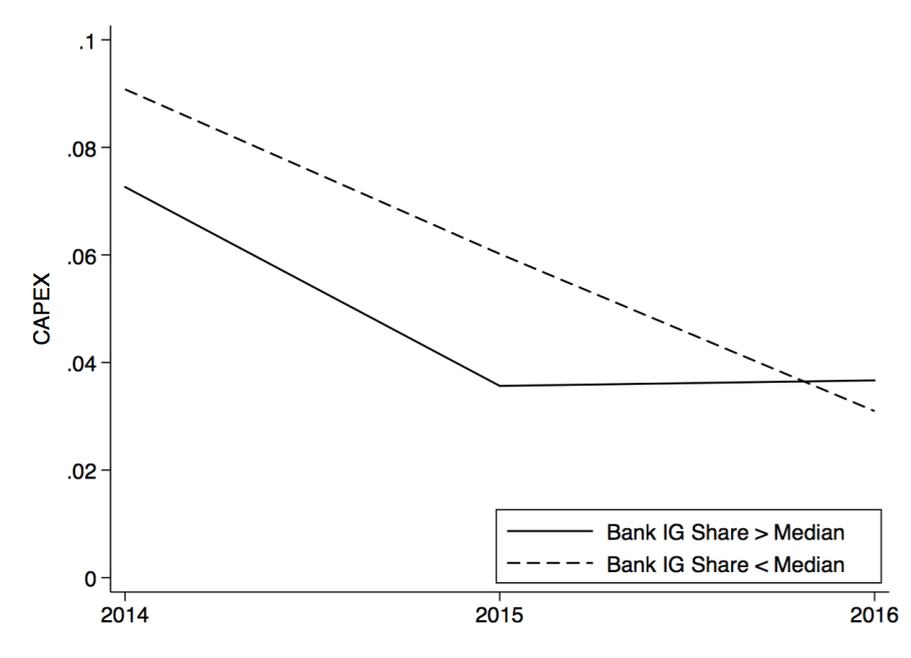


Table 1
Descriptive Statistics

This table reports summary statistics for the key variables in our sample over the period before CSPP implementation, i.e., Q1 2015 to Q1 2016. Treated firms are Eurozone investment grade firms. The control group comprises non-investment grade rated Eurozone firms with public debt. All variables are defined in Appendix A.

	TREATED				CONTROL			
	Mean	Median	Std. D.	N	Mean	Median	Std. D.	N
Leverage	0.303	0.287	0.138	558	0.360	0.313	0.238	3,596
Bond Debt / Assets	0.203	0.204	0.106	558	0.151	0.116	0.145	3,600
Term Loans / Assets	0.058	0.039	0.069	558	0.143	0.088	0.168	3,599
Revol. Credit / Assets	0.009	0.000	0.018	558	0.030	0.000	0.068	3,600
ln(Assets)	9.941	10.017	1.167	558	6.243	6.369	2.254	3,600
Profitability	0.027	0.026	0.014	550	0.014	0.019	0.038	3,534
Tangibility	0.290	0.268	0.200	555	0.262	0.218	0.221	3,570
MtB	1.437	1.325	0.498	529	1.573	1.181	1.831	3,456
Cash / Assets	0.099	0.079	0.080	558	0.113	0.076	0.123	3,594
CAPEX / Assets	0.011	0.008	0.009	515	0.010	0.007	0.012	3,231
Acq. / Assets	0.004	0.000	0.015	557	0.003	0.000	0.010	3,599
Share Rep. (0/1)	0.038	0.000	0.190	558	0.008	0.000	0.089	3,600

Table 2
Effect of CSPP on debt financing of eligible firms

This table reports results from the estimation of a pooled panel regression analyzing the effect of CSPP on bond financing, bank financing, and total leverage. The dependent variable in columns 1-2 is *Bond debt / Assets*, i.e., the sum of senior bonds, subordinated bonds and commercial paper scaled by total assets. The dependent variable in columns 3-4 is *Term Loans / Assets*, i.e., term loans scaled by total assets. The dependent variable in columns 5-6 is *Revolving Credit / Assets*, i.e., revolving credit scaled by total assets. The dependent variable in columns 7-8 is *Leverage*, i.e., total debt scaled by total assets. *Treated* equals one for Eurozone investment grade firms, and zero for the control group (non-investment grade rated Eurozone firms with public debt). *Post* equals one after Q1 2016, and zero otherwise. The sample period is Q1 2015 to Q1 2017. The regressions include firm-level controls to control for the heterogeneity in firm characteristics ($\ln(\text{total assets})_{i,t-1}$, $\text{Profitability}_{i,t-1}$, $\text{Tangibility}_{i,t-1}$), when indicated. All variables are defined in Appendix A. The regressions further include firm fixed effects, industry x quarter fixed effects, and country x quarter fixed effects, when indicated. We report t-values based on standard errors clustered at the firm-level in parentheses. ***, **, * denote significance at the 1, 5 and 10 % level, respectively.

	(1) Bond Debt / Assets	(2) Bond Debt / Assets	(3) Term Loans / Assets	(4) Term Loans / Assets
Treated (0/1) x Post (0/1)	0.0086* (1.78)	0.0147** (2.57)	-0.0060 (-1.53)	-0.0053 (-0.94)
Treated (0/1)	(omitted)	(omitted)	(omitted)	(omitted)
Post (0/1)	-0.0011 (-0.39)	(omitted)	0.0021 (0.77)	(omitted)
2-digit SIC x Quarter FE	No	Yes	No	Yes
Country x Quarter FE	No	Yes	No	Yes
Firm FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Observations	6,628	6,569	6,626	6,567
Adj. R ²	0.849	0.847	0.863	0.861
	(5) Revolving Credit / Assets	(6) Revolving Credit / Assets	(7) Total Debt / Assets	(8) Total Debt / Assets
Treated (0/1) x Post (0/1)	0.0012 (0.74)	0.0029 (1.09)	0.0026 (0.58)	0.0118* (1.76)
Treated (0/1)	(omitted)	(omitted)	(omitted)	(omitted)
Post (0/1)	-0.0004 (-0.28)	(omitted)	-0.0045 (-1.38)	(omitted)
2-digit SIC x Quarter FE	No	Yes	No	Yes
Country x Quarter FE	No	Yes	No	Yes
Firm FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Observations	6,628	6,569	6,618	6,559
Adj. R ²	0.807	0.808	0.923	0.922

Table 3
Effect of CSPP on debt financing of eligible firms – AAA-A vs. BBB rated firms

This table reports results from the estimation of a pooled panel regression analyzing the effect of CSPP on bond financing, bank financing, and total leverage. The dependent variable in columns 1-2 is *Bond debt / Assets*, i.e., the sum of senior bonds, subordinated bonds and commercial paper scaled by total assets. The dependent variable in columns 3-4 is *Term Loans / Assets*, i.e., term loans scaled by total assets. The dependent variable in columns 5-6 is *Revolving Credit / Assets*, i.e., revolving credit scaled by total assets. The dependent variable in columns 7-8 is *Leverage*, i.e., total debt scaled by total assets. *AAA-A Rating* equals one for Eurozone firms rated AAA – A, and zero otherwise. *BBB Rating* equals one for Eurozone firms rated BBB, and zero otherwise. *Post* equals one after Q1 2016, and zero otherwise. The sample period is Q1 2015 to Q1 2017. The regressions include firm-level controls to control for the heterogeneity in firm characteristics ($\ln(\text{total assets})_{i,t-1}$, $\text{Profitability}_{i,t-1}$, $\text{Tangibility}_{i,t-1}$) when indicated. All variables are defined in Appendix A. The regressions further include firm fixed effects, quarter fixed effects, industry x quarter fixed effects, and country x quarter fixed effects, when indicated. We report t-values based on standard errors clustered at the firm-level in parentheses. ***, **, * denote significance at the 1, 5 and 10 % level, respectively.

	(1) Bond Debt / Assets	(2) Bond Debt / Assets	(3) Term Loans / Assets	(4) Term Loans / Assets
AAA-A Rating (0/1) x Post (0/1)	0.0066 (0.93)	0.0120 (1.46)	0.0049 (0.74)	0.0076 (0.90)
BBB Rating (0/1) x Post (0/1)	0.0102* (1.80)	0.0159** (2.44)	-0.0101** (-2.45)	-0.0109* (-1.86)
2-digit SIC x Quarter FE	No	Yes	No	Yes
Country x Quarter FE	No	Yes	No	Yes
Quarter FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
<i>AAA-A = BBB Rating? (p-value)</i>	0.653	0.666	0.028**	0.021**
Observations	6,628	6,569	6,626	6,567
Adj. R ²	0.849	0.847	0.863	0.861
	(5) Revol. Credit / Assets	(6) Revol. Credit / Assets	(7) Total Debt / Assets	(8) Total Debt / Assets
AAA-A Rating (0/1) x Post (0/1)	0.0006 (0.34)	0.0039 (1.04)	0.0096 (1.44)	0.0211** (2.00)
BBB Rating (0/1) x Post (0/1)	0.0016 (0.80)	0.0025 (0.92)	0.0002 (0.04)	0.0078 (1.13)
2-digit SIC x Quarter FE	No	Yes	No	Yes
Country x Quarter FE	No	Yes	No	Yes
Quarter FE	Yes	No	Yes	No
Firm FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
<i>AAA-A = BBB Rating? (p-value)</i>	0.589	0.650	0.170	0.184
Observations	6,628	6,569	6,618	6,559
Adj. R ²	0.807	0.808	0.923	0.922

Table 4
Effect of CSPP on bond financing of eligible firms - Robustness

This table reports results from the estimation of a pooled panel regression analyzing the effect of CSPP on bond financing. The dependent variable is *Bond debt*, i.e., the sum of senior bonds, subordinated bonds and commercial paper scaled by total assets. Panel A analyzes the effect of CSPP on bond debt by rating letter. *AAA-A Rating* equals one for firms with a credit rating between AAA and A, and zero otherwise. *BBB / BB / B Rating* equals one firm firms with a credit rating of BBB / BB / B, and zero otherwise. “*Non-rated*” is the omitted category. Panel B presents results using a matched control group. In particular, a nearest neighbor matching is used to choose for each treated firm the control firm that is closest in terms of size, profitability, bond debt, and bank debt, in the pre-treatment period. The maximum permitted difference in the probability of receiving treatment (being eligible under CSPP) between matched subjects is 1%. *Post* equals one after Q1 2016, and zero otherwise. The sample period is Q1 2015 to Q1 2017. Panel C uses the announcement of the PSPP (Public Sector Purchase Program) in January 2015 as placebo event. That is, in Panel C, *Post* equals one after Q1 2015, and zero otherwise, and the sample period is Q1 2014 to Q4 2015. The regressions include firm-level controls to control for the heterogeneity in firm characteristics (cf. Table 2) when indicated. All variables are defined in Appendix A. The regressions further include firm fixed effects, quarter fixed effects, industry x quarter fixed effects, and country x quarter fixed effects, when indicated. We report t-values based on standard errors clustered at the firm-level in parentheses. ***, **, * denote significance at the 1, 5 and 10 % level, respectively.

Panel A. Discontinuity at the eligibility threshold

	(1) Bond Debt / Assets	(2) Bond Debt / Assets
AAA-A Rating (0/1) x Post (0/1)	0.0059 (0.83)	0.0118 (1.43)
BBB Rating (0/1) x Post (0/1)	0.0096* (1.65)	0.0156** (2.38)
BB Rating (0/1) x Post (0/1)	-0.0061 (-0.95)	-0.0013 (-0.17)
B Rating (0/1) x Post (0/1)	-0.0052 (-0.29)	-0.0038 (-0.22)
Not Rated (0/1) x Post (0/1)	(omitted)	(omitted)
2-digit SIC x Quarter FE	No	Yes
Country x Quarter FE	No	Yes
Quarter FE	Yes	No
Firm FE	Yes	Yes
Controls	Yes	Yes
<i>BBB = BB Rating? (p-value)</i>	0.038**	0.057*
Observations	6,628	6,569
Adj. R ²	0.849	0.847

Panel B. Matched control group

	(3) Bond Debt / Assets	(4) Bond Debt / Assets
Treated (0/1) x Post (0/1)	0.0218** (2.33)	0.0201 (1.44)
2-digit SIC x Quarter FE	No	Yes
Country x Quarter FE	No	Yes
Quarter FE	Yes	No
Firm FE	Yes	Yes
Controls	Yes	Yes
Observations	1,045	951
Adj. R ²	0.879	0.867

Panel C. Placebo test (PSPP announcement in January 2015)

	(5)	(6)
	Bond Debt / Assets	Bond Debt / Assets
Treated (0/1) x Post (0/1)	0.0036 (0.85)	0.0049 (0.87)
2-digit SIC x Quarter FE	No	Yes
Country x Quarter FE	No	Yes
Quarter FE	Yes	No
Firm FE	Yes	Yes
Controls	Yes	Yes
Observations	6,312	6,266
Adj. R ²	0.840	0.836

Table 5
Effect of CSPP on cash holdings, investments, and payouts of eligible firms

This table reports results from the estimation of a pooled panel regression analyzing the effect of CSPP on cash holdings, investments, and payouts. Cash is defined as change in cash and short-term investments scaled by lagged total assets. Investment is proxied by (i) capital expenditures scaled by lagged total assets and by (ii) investment in cash acquisitions scaled by lagged total assets. Share Rep. is a dummy variable that equals one if a firm announces a share repurchase program in quarter t and zero otherwise. *Treated* equals one for Eurozone investment grade firms, and zero for the control group (non-investment grade rated Eurozone firms with public debt). *Post* equals one after Q1 2016, and zero otherwise. The sample period is Q1 2015 to Q1 2017. The regressions include firm-level controls to control for the heterogeneity in firm characteristics ($\ln(\text{total assets})_{i,t-1}$, $\text{Leverage}_{i,t-1}$, $\text{Profitability}_{i,t-1}$, $\text{Tangibility}_{i,t-1}$), when indicated. All variables are defined in Appendix A. The regressions further include firm fixed effects, time fixed effects, industry \times quarter fixed effects, and country \times quarter fixed effects, when indicated. We report t -values based on standard errors clustered at the firm-level in parentheses. ***, **, * denote significance at the 1, 5 and 10 % level, respectively.

	(1) ΔCash_t / Assets_{t-1}	(2) ΔCash_t / Assets_{t-1}	(3) CAPEX_t / Assets_{t-1}	(4) CAPEX_t / Assets_{t-1}
Treated (0/1) x Post (0/1)	0.0015 (0.59)	0.0011 (0.35)	0.0008 (1.50)	0.0006 (1.03)
2-digit SIC x Quarter FE	No	Yes	No	Yes
Country x Quarter FE	No	Yes	No	Yes
Firm FE	Yes	Yes	Yes	Yes
Quarter FE	Yes	No	Yes	No
Controls	Yes	Yes	Yes	Yes
Observations	6,355	6,296	5,851	5,794
Adj. R ²	0.013	0.000	0.536	0.575
	(5) Acq._t / Assets_{t-1}	(6) Acq._t / Assets_{t-1}	(7) Share_t Rep. (0/1)_{t-1}	(8) Share_t Rep. (0/1)_{t-1}
Treated (0/1) x Post (0/1)	0.0001 (0.05)	-0.0004 (-0.30)	-0.0011 (-0.09)	0.0060 (0.51)
2-digit SIC x Quarter FE	No	Yes	No	Yes
Country x Quarter FE	No	Yes	No	Yes
Firm FE	Yes	Yes	Yes	Yes
Quarter FE	Yes	No	Yes	No
Controls	Yes	Yes	Yes	Yes
Observations	6,368	6,309	6,368	6,309
Adj. R ²	0.107	0.078	0.049	0.056

Table 6**Effect of CSPP on cash holdings, investments, and payouts of eligible firms – AAA-A vs. BBB rated firms**

This table reports results from the estimation of a pooled panel regression analyzing the effect of CSPP on cash holdings, investments, and payouts. Cash is defined as change in cash and short-term investments scaled by lagged total assets. Investment is proxied by (i) capital expenditures scaled by lagged total assets and by (ii) investment in cash acquisitions scaled by lagged total assets. Share Rep. is a dummy variable that equals one if a firm announces a share repurchase program in quarter t and, and zero otherwise. *AAA-A Rating* equals one for Eurozone firms rated AAA – A, and zero otherwise. *BBB Rating* equals one for Eurozone firms rated BBB, and zero otherwise. *Post* equals one after Q1 2016, and zero otherwise. The sample period is Q1 2015 to Q1 2017. The regressions include firm-level controls to control for the heterogeneity in firm characteristics ($\ln(\text{total assets})_{i,t-1}$, $\text{Leverage}_{i,t-1}$, $\text{Profitability}_{i,t-1}$, $\text{Tangibility}_{i,t-1}$), when indicated. All variables are defined in Appendix A. The regressions further include firm fixed effects, time fixed effects, industry x quarter fixed effects, and country x quarter fixed effects, when indicated. We report t-values based on standard errors clustered at the firm-level in parentheses. ***, **, * denote significance at the 1, 5 and 10 % level, respectively.

	(1) Cash _t / Assets _{t-1}	(2) Cash _t / Assets _{t-1}	(3) CAPEX _t / Assets _{t-1}	(4) CAPEX _t / Assets _{t-1}
AAA-A Rating (0/1) x Post (0/1)	0.0043 (1.47)	0.0040 (0.99)	0.0005 (0.80)	0.0008 (1.04)
BBB Rating (0/1) x Post (0/1)	0.0004 (0.11)	-0.0001 (-0.03)	0.0009 (1.48)	0.0005 (0.77)
2-digit SIC x Quarter FE	No	Yes	No	Yes
Country x Quarter FE	No	Yes	No	Yes
Firm FE	Yes	Yes	Yes	Yes
Quarter FE	Yes	No	Yes	No
Controls	Yes	Yes	Yes	Yes
<i>AAA-A = BBB Rating? (p-value)</i>	0.323	0.374	0.630	0.681
Observations	6,355	6,296	5,851	5,794
Adj. R ²	0.013	0.000	0.535	0.575
	(5) Acq. _t / Assets _{t-1}	(6) Acq. _t / Assets _{t-1}	(7) Share _t Rep. (0/1) _{t-1}	(8) Share _t Rep. (0/1) _{t-1}
AAA-A Rating (0/1) x Post (0/1)	0.0033** (2.12)	0.0034** (1.99)	0.0320* (1.66)	0.0366* (1.93)
BBB Rating (0/1) x Post (0/1)	-0.0013 (-0.86)	-0.0020 (-1.23)	-0.0145 (-0.99)	-0.0069 (-0.51)
2-digit SIC x Quarter FE	No	Yes	No	Yes
Country x Quarter FE	No	Yes	No	Yes
Firm FE	Yes	Yes	Yes	Yes
Quarter FE	Yes	No	Yes	No
Controls	Yes	Yes	Yes	Yes
<i>AAA-A = BBB Rating? (p-value)</i>	0.028**	0.011**	0.054*	0.049**
Observations	6,368	6,309	6,368	6,309
Adj. R ²	0.108	0.080	0.050	0.058

Table 7
CSPP and Acquirer Announcement Returns

This table studies the impact of the CSPP on acquiring firm stock returns around M&A announcements. The table reports regression results from an event study using daily stock returns. The dependent variable is the cumulative abnormal return over the [0,2] event window around the M&A announcement date. The regressions include a set of deal and acquirer characteristics when indicated (Controls). Deal characteristics comprise Public Target (0/1), Same 2-Digit SIC (0/1), Cross Border (0/1), Buyer Controls (0/1), Stock Payment (0/1), Cash Payment (0/1), Debt Payment (0/1), and Deal Value/Acq. Assets_{t-1} [column 4, only]. Acquirer characteristics comprise: Size_{i,t-1}, Leverage_{i,t-1}, Profitability_{i,t-1}, Tangibility_{i,t-1}, and MTB_{i,t-1}. All variables are defined in Appendix A. The regressions further include firm fixed effects, industry x quarter fixed effects, and country x quarter fixed effects, when indicated. We report t-values based on standard errors clustered at the firm-level in parentheses. ***, **, * denote significance at the 1, 5 and 10 % level, respectively.

	(1)	(2)	(3)	(4)
	CAR[0,2]	CAR[0,2]	CAR[0,2]	CAR[0,2]
Treated (0/1) x Post (0/1)	-0.0070*	-0.0096*	-0.0129	-0.0360**
	(-1.74)	(-1.65)	(-1.64)	(-2.37)
Treated (0/1)	0.0038	0.0091	0.0050	0.0315
	(1.28)	(0.52)	(0.31)	(1.16)
Post (0/1)	0.0049	0.0045	7.1346	-4.4808
	(1.31)	(0.92)	(0.00)	(-0.00)
Deal Value / Assets				-0.0215
				(-0.91)
2-digit NACE x Quarter FE	No	Yes	Yes	Yes
Country x Quarter FE	No	Yes	Yes	Yes
Firm FE	No	No	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Observations	1,205	1,077	915	242
Adj. R ²	0.022	0.142	0.192	0.000

Table 8**Indirect effects of CSPP: bank lending to non-eligible firms**

This table reports results from the estimation of a pooled panel regression analyzing the effect of CSPP on bank lending to private (Panel A) and public firms (Panel B). The dependent variable is *Loan Issue*, i.e., a dummy variable that equals one if the firm obtains a bank loan in the respective quarter, and zero otherwise. *High Bank IG Share* equals one for firms whose relationship lenders have a high (above median) share of investment grade borrowers in their term loan portfolio prior to the CSPP introduction (estimated over the 2010 to 2014 period), and zero otherwise. *Post* equals one after Q1 2016, and zero otherwise. The sample period is Q1 2015 to Q4 2016. The regressions include firm-level controls to control for the heterogeneity in firm characteristics (*ln(Total Assets)*, *Profitability*, *Tangibility*), when indicated. Firm level controls are lagged by one period. As the control variables are only available on an *annual* basis from Bureau van Dijk's Amadeus, we use information from the previous year. All variables are defined in Appendix A. The regressions further include firm fixed effects, industry x quarter fixed effects, and country x quarter fixed effects, when indicated. We report t-values based on standard errors clustered at the firm-level in parentheses. ***, **, * denote significance at the 1, 5 and 10 % level, respectively.

Panel A: Private firms

	(1) Loan Issue (0/1) _t	(2) Loan Issue (0/1) _t	(3) Loan Issue (0/1) _t
High Bank IG Share (0/1) x Post (0/1)	0.0190* (1.87)	0.0236** (2.26)	0.0299*** (2.68)
High Bank IG Share (0/1)	-0.0159** (-2.47)	-0.0193*** (-2.95)	(omitted)
Post (0/1)	-0.0073 (-1.10)	(omitted)	(omitted)
2-digit NACE x Quarter FE	No	No	Yes
Country x Quarter FE	No	No	Yes
Firm FE	No	Yes	Yes
Controls	Yes	Yes	Yes
Observations	7,464	7,464	7,400
Adj. R ²	0.009	0.022	0.008

Panel B: Public firms

	(4) Loan Issue (0/1) _t	(5) Loan Issue (0/1) _t	(6) Loan Issue (0/1) _t
High Bank IG Share (0/1) x Post (0/1)	-0.0003 (-0.01)	0.0080 (0.41)	-0.0220 (-0.78)
High Bank IG Share (0/1)	-0.0166 (-1.17)	-0.0223 (-1.54)	(omitted)
Post (0/1)	-0.0001 (-0.01)	(omitted)	(omitted)
2-digit NACE x Quarter FE	No	No	Yes
Country x Quarter FE	No	No	Yes
Firm FE	No	Yes	Yes
Controls	Yes	Yes	Yes
Observations	3,616	3,616	3,492
Adj. R ²	0.007	0.028	0.025

Appendix A Variable Definitions

Variable	Source	Description
Leverage	Capital IQ, Compustat Global	Ratio of book value of total debt to the book value of assets.
Bond Debt / Assets	Capital IQ, Compustat Global	Ratio of bond debt (senior bonds, subordinated bonds, and commercial paper) to total assets
Term Loans / Assets	Capital IQ	Ratio of term loans to total assets
Revolving Credit / Assets	Capital IQ	Ratio of (drawn) revolving credit to total assets
ln(Assets)	Compustat Global / Bureau van Dijk's Amadeus	ln(Total Assets in USD mio).
MtB	Compustat Global	Ratio of market value of equity to book value of equity (total assets minus total debt).
Profitability	Compustat Global	Ratio of EBITDA to total assets.
Tangibility	Compustat Global	Ratio of property, plant, and equipment to total assets.
CAPEX / Assets	Compustat Global	Ratio of capital expenditures to total assets.
Share Rep. (0/1)	Bureau van Dijk's Zephyr	A dummy variable that equals one if a firm announces a share repurchase program in quarter t and, and zero otherwise.
Acq. / Assets	Compustat Global	Ratio of investment in cash acquisitions to total assets.
Cash / Assets	Compustat Global	Ratio of cash and short-term investments to total assets
Treated (0/1)	Capital IQ	A dummy variable that equals one for Eurozone investment grade rated firms, and zero otherwise.
Treated AAA-A (0/1)	Capital IQ	A dummy variable that equals one for Eurozone firms rated A- or better, and zero otherwise.
Treated BBB (0/1)	Capital IQ	A dummy variable that equals one for Eurozone firms rated BBB-, BBB, or BBB+, and zero otherwise.
Post (0/1)		A dummy variable that equals one for quarters post Q1 2016, and zero otherwise
Loan Issue (0/1)	Dealscan	A dummy variable that equals one if a firm obtains a bank loan in quarter t, and zero otherwise.
Bank IG Share	Dealscan	Share of (non-financial) investment grade borrowers of a bank in its total term loan portfolio, measured of the 2010 – 2014 period.
High Bank IG Share (0/1)	Dealscan	A dummy variable, which is equal to one for firms whose relationship lenders have an above median share of investment grade borrowers in their term loan portfolio, and zero otherwise.
Public Target (0/1)	Bureau van Dijk's Zephyr	A dummy variable that equals one if the target is publicly listed, and zero otherwise.
Same 2-Digit SIC (0/1)	Bureau van Dijk's Zephyr	A dummy variable that equals one if the target and the acquirer share the same 2-digit SIC code, and zero otherwise.
Cross Border (0/1)	Bureau van Dijk's Zephyr	A dummy variable that equals one if the target and the acquirer are not incorporated in the same country, and zero otherwise.
Buyer Controls (0/1)	Bureau van Dijk's Zephyr	A dummy variable that equals one if majority control was acquired, and zero otherwise.
Stock Payment (0/1)	Bureau van Dijk's Zephyr	A dummy variable that equals one if at least part of the deal was paid for in stock, and zero otherwise.

Cash Payment (0/1)	Bureau van Dijk's Zephyr	A dummy variable that equals one if at least part of the deal was paid for in cash, and zero otherwise.
Debt Payment (0/1)	Bureau van Dijk's Zephyr	A dummy variable that equals one if at least part of the deal was paid for in debt, and zero otherwise.
Deal Value/Acq. Assets	Bureau van Dijk's Zephyr / Compustat Global	Deal value over lagged total assets of the acquirer.

APPENDIX B – Additional Figures and Tables

B.1 Descriptive Statistics for Overall Sample

This table reports summary statistics for the key variables in our sample over the period before CSPP implementation, i.e., Q1 2015 to Q1 2016. All variables are defined in Appendix A.

	OVERALL SAMPLE			
	Mean	Median	Std. D.	N
Leverage	0.352	0.308	0.228	4,154
Bond Debt / Assets	0.158	0.128	0.141	4,158
Term Loans / Assets	0.132	0.078	0.161	4,157
Revol. Credit / Assets	0.027	0.000	0.064	4,158
ln(Assets)	6.740	6.871	2.484	4,158
Profitability	0.016	0.020	0.036	4,084
Tangibility	0.266	0.225	0.218	4,125
MtB	1.555	1.200	1.716	3,985
Cash / Assets	0.111	0.077	0.118	4,152
CAPEX / Assets	0.010	0.007	0.011	3,746
Acq. / Assets	0.003	0.000	0.011	4,156
Share Rep. (0/1)	0.012	0.000	0.109	4,158.

B.2 Descriptive Statistics – Amadeus Sample

This table reports summary statistics for the key variables in our spillover analysis (Amadeus – Dealscan) sample over the period before CSPP implementation, i.e., Q1 2015 to Q1 2016. We distinguish between public and private firms. All variables are defined in Appendix A.

	PRIVATE FIRMS				PUBLIC FIRMS			
	Mean	Median	Std. D.	N	Mean	Median	Std. D.	N
Loan Issue (0/1)	0.055	0.000	0.228	7,185	0.096	0.000	0.295	3,055
Bank IG Share	0.210	0.205	0.090	7,185	0.232	0.227	0.071	3,055
High Bank IG Share (0/1)	0.463	0.000	0.499	7,185	0.597	1.000	0.491	3,055
Total Assets (mio. €)	1,403	254	7,919	4,334	11,158	2,121	31,300	2,437
Tangibility	0.300	0.202	0.302	4,278	0.232	0.193	0.198	2,429
Profitability	0.090	0.086	0.084	3,613	0.094	0.096	0.067	2,015

B.3 Matched Sample – Matching Quality

This table reports descriptive statistics for the matched sample used in Table 4, Panel B. A nearest neighbor (propensity score) matching is used to choose for each treated firm the control firm that is closest in terms of Size ($\ln(\text{Assets})$), Profitability, Bond Debt / Assets, and Bank Debt / Assets (bank debt comprises term loans and revolving credit), over the pre-treatment period. The maximum permitted difference in the probability of receiving treatment (being eligible under CSPP) between matched subjects is 1%. This table tests for potential remaining differences in the matching variables between the treated and control group over the pre-CSPP period (Q1 2015 to Q1 2016).

	TREATED = 1	TREATED = 0	
	Mean	Mean	Difference (t-value)
Ln(Assets)	9.54	9.56	0.02 (0.20)
Bond Debt / Assets	0.192	0.187	-0.005 (0.59)
Bank Debt / Assets	0.082	0.078	-0.004 (0.58)
Profitability	0.028	0.027	0.001 (0.54)

+B.4 Alternative Control Group: European Firms Outside of the Eurozone

Table B.4.1

This table reports results from the estimation of a pooled panel regression analyzing the effect of CSPP on bond financing. The dependent variable is *Bond debt*, i.e., the sum of senior bonds, subordinated bonds and commercial paper scaled by total assets. The control group in column 1 comprises European investment grade rated firms incorporated in non-Eurozone countries. The control group in column 2 comprises European non-rated firms incorporated in non-Eurozone countries. For both control groups, a nearest neighbor matching is used to choose for each treated firm the control firm that is closest in terms of size, profitability, bond debt, and bank debt, in the pre-treatment period. The maximum permitted difference in the probability of receiving treatment (being eligible under CSPP) between matched subjects is 1%. *Post* equals one after Q1 2016, and zero otherwise. The sample period is Q1 2015 to Q1 2017. The regressions include firm-level controls to control for the heterogeneity in firm characteristics (cf. Table 2) when indicated. All variables are defined in Appendix A. The regressions further include firm fixed effects and industry x quarter fixed effects when indicated. We report t-values based on standard errors clustered at the firm-level in parentheses. ***, **, * denote significance at the 1, 5 and 10 % level, respectively.

Control Group:	Non-Eurozone investment-grade	Non-Eurozone non-rated
	(1) Bond Debt / Assets	(2) Bond Debt / Assets
Treated (0/1) x Post (0/1)	0.0151* (1.86)	0.0353** (2.26)
2-digit SIC x Quarter FE	Yes	Yes
Firm FE	Yes	Yes
Controls	Yes	Yes
Observations	1,032	892
Adj. R ²	0.876	0.852

Matching quality

This table reports descriptive statistics for the matched sample used in Table B.4.1. A nearest neighbor (propensity score) matching is used to choose for each treated firm the control firm that is closest in terms of *Size* ($\ln(\text{Assets})$), *Profitability*, *Bond Debt / Assets*, and *Bank Debt / Assets* (bank debt comprises term loans and revolving credit), over the pre-treatment period. The maximum permitted difference in the probability of receiving treatment (being eligible under CSPP) between matched subjects is 1%. This table tests for potential remaining differences in the matching variables between the treated and control group over the pre-CSPP period (Q1 2015 to Q1 2016).

	TREATED = 1 Mean	TREATED = 0 Mean	Difference (t-value)
Control Group A: Non-Eurozone investment-grade firms			
Ln(Assets)	10.073	10.098	0.025 (0.229)
Bond Debt / Assets	0.2098	0.2130	0.0032 (0.358)
Bank Debt / Assets	0.0585	0.0523	-0.0062 (-1.299)
Profitability	0.0303	0.0300	-0.0003 (-0.272)
Control Group B: Non-Eurozone non-rated firms			
Ln(Assets)	9.284	9.431	0.147 (1.674)
Bond Debt / Assets	0.1872	0.1697	-0.0175 (-1.673)
Bank Debt / Assets	0.0818	0.0854	0.0036 (0.507)
Profitability	0.0285	0.0300	0.0015 (1.107)

B.5 Treatment based on bond issue ratings

In the main part of the paper we use the S&P issuer long-term debt rating (pre-CSPP announcement) as a proxy for CSPP eligibility. The S&P rating is the most commonly used rating and this information is readily available for our S&P Capital IQ sample, i.e., using this information leaves us with the largest sample possible. However, as discussed in Section 1.1, in practice CSPP eligibility is defined at the *issue* level, i.e., using issue level ratings by S&P, Moody's, Fitch, and DBRS. An issue is CSPP eligible if it is rated investment grade by at least one of the four rating agencies. Hence, by using the S&P issuer rating to proxy for CSPP eligibility we assume that the issuer rating is highly correlated with issue ratings and that credit ratings are highly correlated across rating agencies (both assumptions generally seem reasonable).

For robustness, we check if our results hold if we use *issue* level rating information from the three main rating agencies (S&P, Moody's, and Fitch) instead of relying on the issuer rating by S&P. In particular, we obtain information on all bonds issued by European firms in the pre-CSSP period (Q1 2015 – 10 March 2016) from the Dealogic database.³³ For each firm, we retain the most recent bond issue in case a firm issued multiple bonds in this period. We assign the *best* issue rating to each issue in case a bond is rated by more than one rating agency (applying the S&P rating scale for all agencies).³⁴ Next, we match the bond level information from Dealogic to our main firm level sample and assign the issue rating (instead of the issuer rating) to each firm. We only retain firms for which an issue rating can be obtained from Dealogic, i.e., this procedure leaves us with a significantly reduced dataset. The table below documents that our results are robust to using issue level rating information despite the restrictive sample selection procedure and reduced power of the test.

³³ We do not use bonds originated before 2015 as Dealogic only reports rating information at the time of the loan origination. Hence, ratings of bonds originated before 2015 may not be a good proxy for the credit quality at the time of the CSPP announcement.

³⁴ Bonds that are not rated by any of the three agencies are classified as “not rated”.

Table B.5

This table reports results from the estimation of a pooled panel regression analyzing the effect of CSPP on bond financing. The dependent variable is *Bond debt*, i.e., the sum of senior bonds, subordinated bonds and commercial paper scaled by total assets. *Post* equals one after Q1 2016, and zero otherwise. Credit ratings are defined based on issue level information, as discussed in detail above. The sample period is Q1 2015 to Q1 2017. The regressions include firm-level controls to control for the heterogeneity in firm characteristics (cf. Table 2 in the main body of the paper) when indicated. The regressions further include firm fixed effects, quarter fixed effects, industry x quarter fixed effects, and country x quarter fixed effects, when indicated. We report t-values based on standard errors clustered at the firm-level in parentheses. ***, **, * denote significance at the 1, 5 and 10 % level, respectively.

	(1) Bond Debt / Assets	(2) Bond Debt / Assets
AAA-A Rating (0/1) x Post (0/1)	0.0107 (1.28)	0.0035 (0.25)
BBB Rating (0/1) x Post (0/1)	0.0183* (1.86)	0.0266* (1.67)
BB Rating (0/1) x Post (0/1)	-0.0071 (-0.55)	-0.0207 (-0.76)
B Rating (0/1) x Post (0/1)	-0.0370 (-0.83)	-0.0730 (-1.09)
Not Rated (0/1) x Post (0/1)	(omitted)	(omitted)
2-digit SIC x Quarter FE	No	Yes
Country x Quarter FE	No	Yes
Quarter FE	Yes	No
Firm FE	Yes	Yes
Controls	Yes	Yes
<i>BBB = BB Rating? (p-value)</i>	0.058*	0.088*
<i>AAA-A = BBB Rating? (p-value)</i>	0.403	0.108
Observations	974	814
Adj. R ²	0.861	0.830
Number of Firms	117	99

Cutting Out the Middleman – The ECB as Corporate Bond Investor

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Online Appendix

- NOT FOR PUBLICATION -

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Bond Purchases under the ECB's CSPP between June 2016 and May 2017

In this Appendix we provide descriptive statistics on all bonds that have been purchased under the CSPP since June 2016. The six national central banks that conduct the purchases under the supervision of the ECB provide a list of all bond tranches³⁵ that have been purchased, as these securities are made available for securities lending. However, the exact timing of the purchase as well as the amount / fraction of the bond that has been purchased is not made public.

We obtain a list comprising all securities that have been purchased under the CSPP as of 12th May 2017 from the websites of the Banco de Espana, Bank of Italy, Banque de France, Banque Nationale de Belgique, Bundesbank, and Suomen Pankki.³⁶ In total, 913 distinct issues have been (partially) purchased under the CSPP.³⁷ We match this list to the Dealogic database as the national central banks only provide ISIN lists that do not contain further information on the bonds. Of the 913 issues we are able to match 833 (91%) to Dealogic. In the following we present basic descriptive statistics on this set of issues on which detailed information are available.

General information on bond size and coupon

The average (median) issue size is 713 (625) million. The cumulative face value of all 833 issues in our dataset is about 594 billion EUR. Given that our dataset represents about 91% of all issues purchased under the CSPP as of 12th May 2017 and given that the total amount purchased under the CSPP as of end of April 2017 is about 82 billion EUR according to the

³⁵ All descriptive statistics in this Appendix are on the tranche-level if not said otherwise.

³⁶ Note that this list comprises only securities that are still on the balance sheet of the national central banks as of May 2017. Securities that were purchased under the CSPP but matured before May 2017 are not included. However, given that all assets purchased under the CSPP are held until maturity and given that the minimum remaining maturity at the time of the purchase is 6 months, this should be a negligible fraction.

³⁷ The raw list comprises 915 ISINs. 2 duplicates are removed. These are issues that were purchased by two different national central banks.

ECB, a rough back of the envelope calculation implies that the CSPP holdings represent about 12% of the total face value of the purchased bonds.

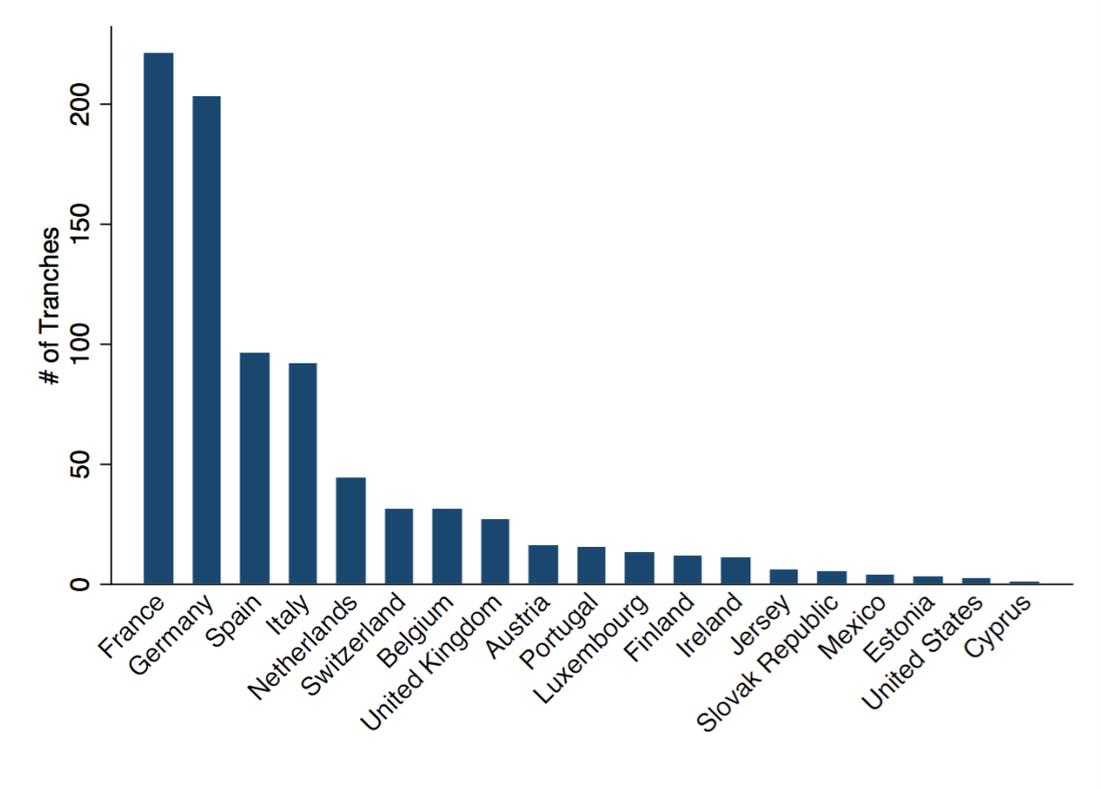
The average (median) coupon of the bonds in our sample is 2.4% (2%) with a range of 0.125% – 8.5%.

Issuer nationality

Figure B1 shows the number of bonds that have been (partially) purchased under the CSPP by issuer nationality (county of incorporation of the ultimate parent). The majority of issuers are from the large Eurozone countries. French and German firms alone account for about 50% of all bonds (about 25% each). Issuers from France, Germany, Italy, Spain, and the Netherlands account for about 79% of all bonds. Figure B1 also indicates that only a small fraction of bonds from non-Eurozone countries have been purchased under the CSPP (cf. Section 1.1 of the main body of the paper on general eligibility requirements). Again note that the actual amount that is purchased from each issue under the CSPP is not disclosed. That is, the actual portfolio shares by issuer nationality may differ from the regional split as shown in Figure C1.

Figure C1.
Number of bonds purchased under the CSPP by issuer nationality

This figure shows the number of bonds that have been (partially) purchased under the CSPP as of 12th May 2017 split by issuer nationality (country of incorporation of the ultimate parent). The sample comprises 833 issues (out of the total 913 issues) on which detailed issue level information can be obtained from Dealogic.



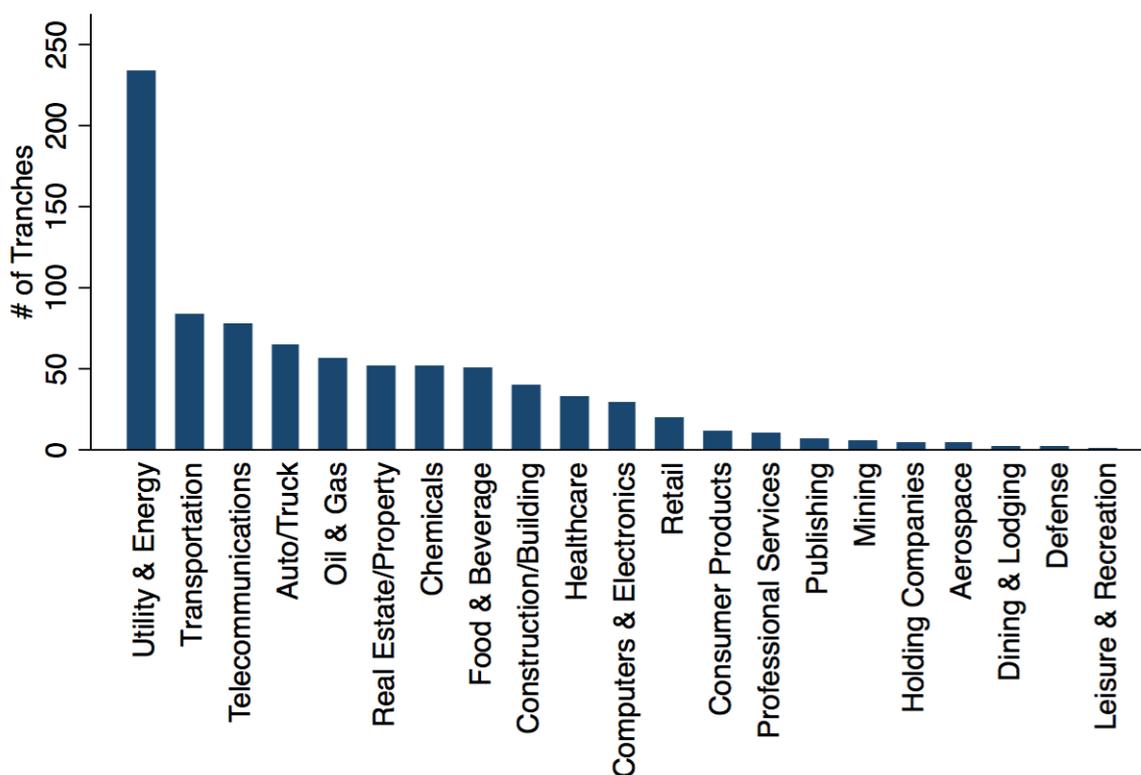
Industry

Figure C2 shows the number of bonds that have been (partially) purchased under the CSPP by industry. 28% of all bonds that have been purchased under the CSPP were issued by utilities. The industry distribution is otherwise relatively dispersed and covers a broad range of sectors.

Figure C2

Number of bonds purchased under the CSPP by industry

This figure shows the number of bonds that have been (partially) purchased under the CSPP as of 12th May 2017 split by industry. The sample comprises 833 issues (out of the total 913 issues) on which detailed issue level information can be obtained from Dealogic.



Credit risk

Figure C3, Panel A, shows the number of bonds that have been (partially) purchased under the CSPP by S&P issue credit rating at bond origination.³⁸ The majority of bonds (47%) is rated A- or better at offering date. However, also a large fraction of bonds (40%) is at the investment

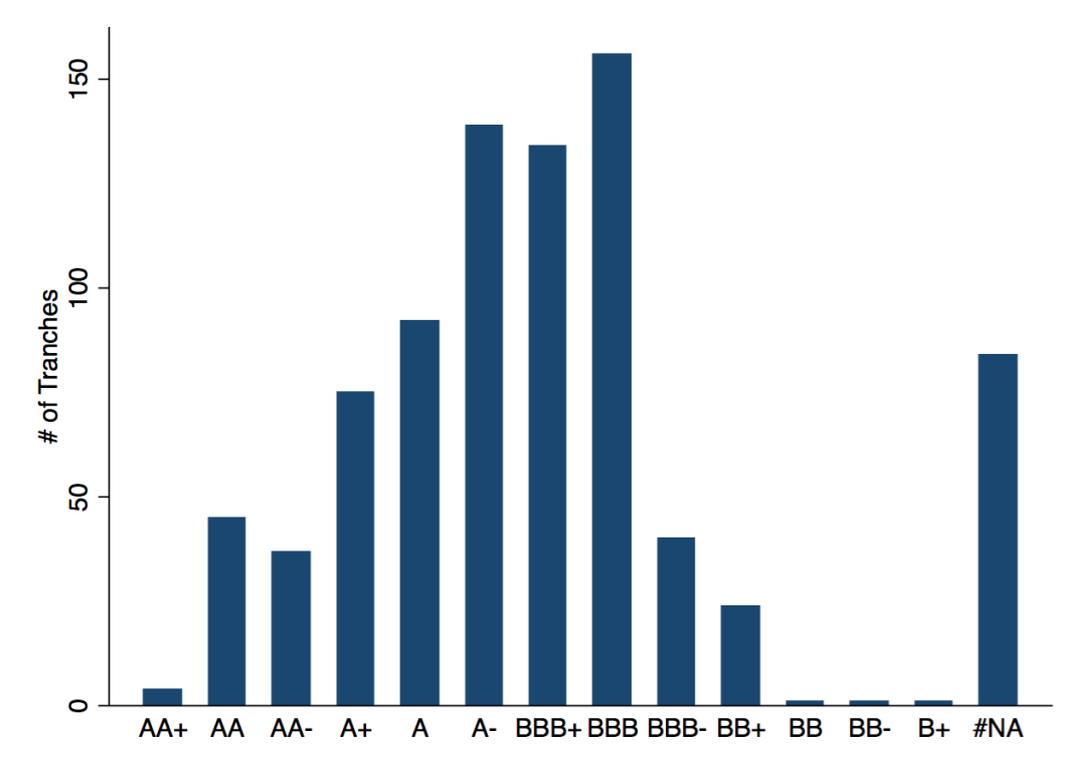
³⁸ Results are similar if the issuer credit rating is used instead of the issue credit rating. We present information on the issue credit rating as the issuer credit rating is only used to determine the CSPP eligibility in case an issue rating is not available.

grade border, i.e., is rated BBB. Only a small fraction of bonds (3%) has a non-investment grade rating by S&P.³⁹ About 10% of bonds do not have an S&P rating (these issues are eligible if they have an investment grade rating by one of the other rating agencies or if the issuer itself has an investment grade rating). Figure B3, Panel B and Panel C show the number of bonds by Fitch and Moody’s issue credit rating, respectively. Moody’s and in particular Fitch ratings are less commonly available compared to S&P ratings, however, the overall credit risk distributions are similar.

Figure C3
Number of bonds purchased under the CSPP by issue credit rating

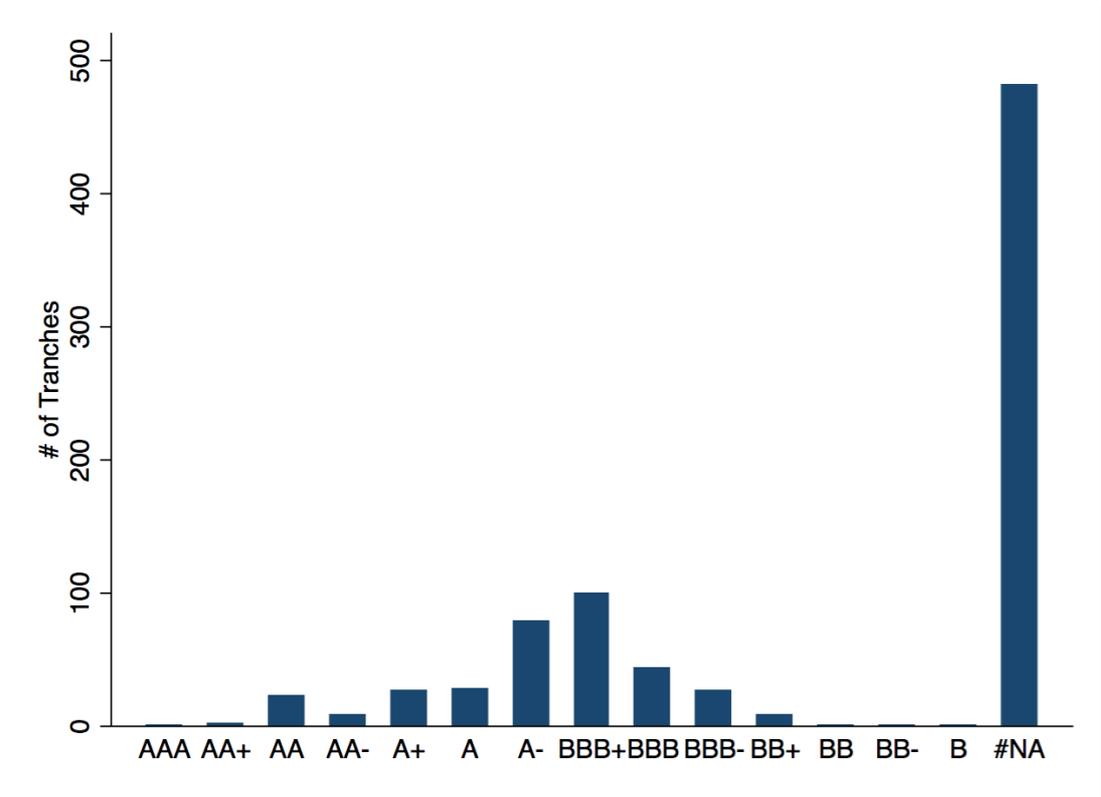
This figure shows the number of bonds that have been (partially) purchased under the CSPP as of 12th May 2017 split by issue credit rating. The sample comprises 833 issues (out of the total 913 issues) on which detailed issue level information can be obtained from Dealogic. Panel A shows the Standard and Poor’s issue credit rating as of issue date. Panel B and Panel C show information on the Fitch and the Moody’s issue credit rating, respectively.

Panel A: S&P Rating

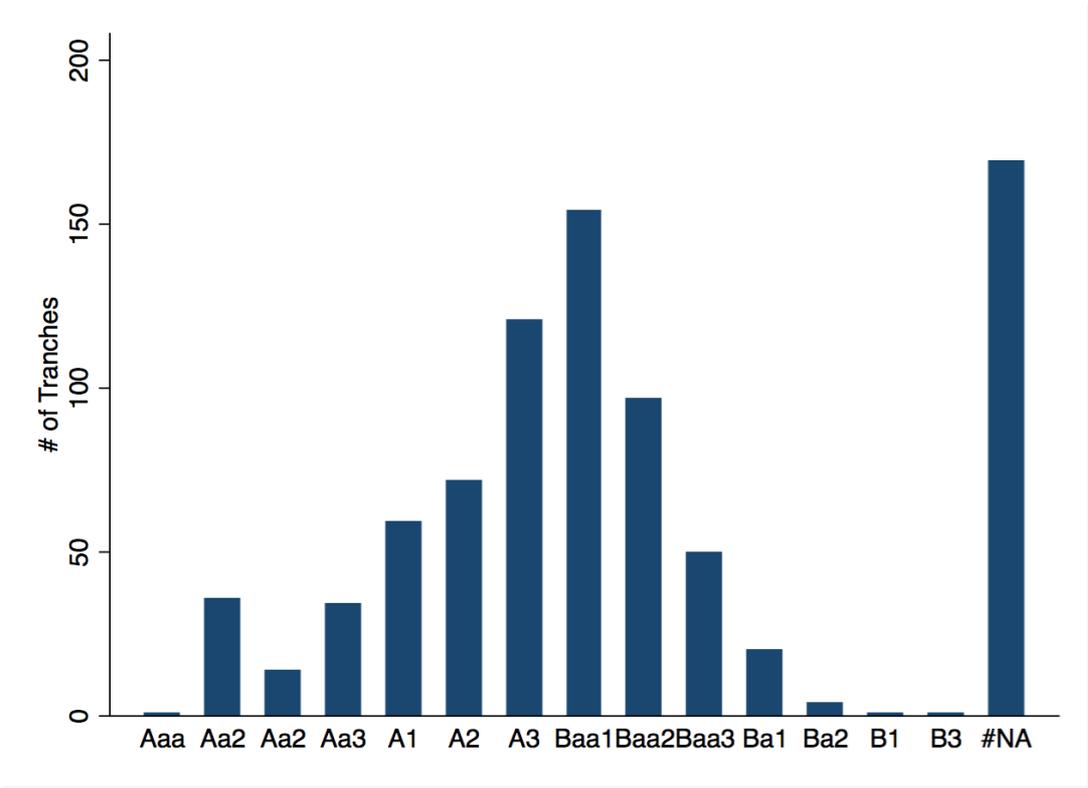


³⁹ These bond (issuers) were upgraded to investment grade rating after issuance and before the start of the CSPP and thus have been eligible under the eligibility criteria.

Panel B: Fitch Rating



Panel C: Moody's Rating



Offering dates and maturity

Figure C4 shows the number of bonds that have been (partially) purchased under the CSPP by initial offering date. The majority of bonds that were purchased were issued before the start of the program in June 2016. This implies that the majority of bonds were purchased in the secondary market. However, a significant increase in the number of bonds can be seen in Q2 2016, i.e., around the time of the start of the program. This indicates either an increased issuance activity of eligible bonds as result of the CSPP announcement and/or reflects the primary market activity by the ECB that is only feasible since implementation of the program in June 2016.

Figure C4

Number of bonds purchased under the CSPP by offering date

This figure shows the number of bonds that have been (partially) purchased under the CSPP as of 12th May 2017 by offering quarter. The sample comprises 833 issues (out of the total 913 issues) on which detailed issue level information can be obtained from Dealogic.

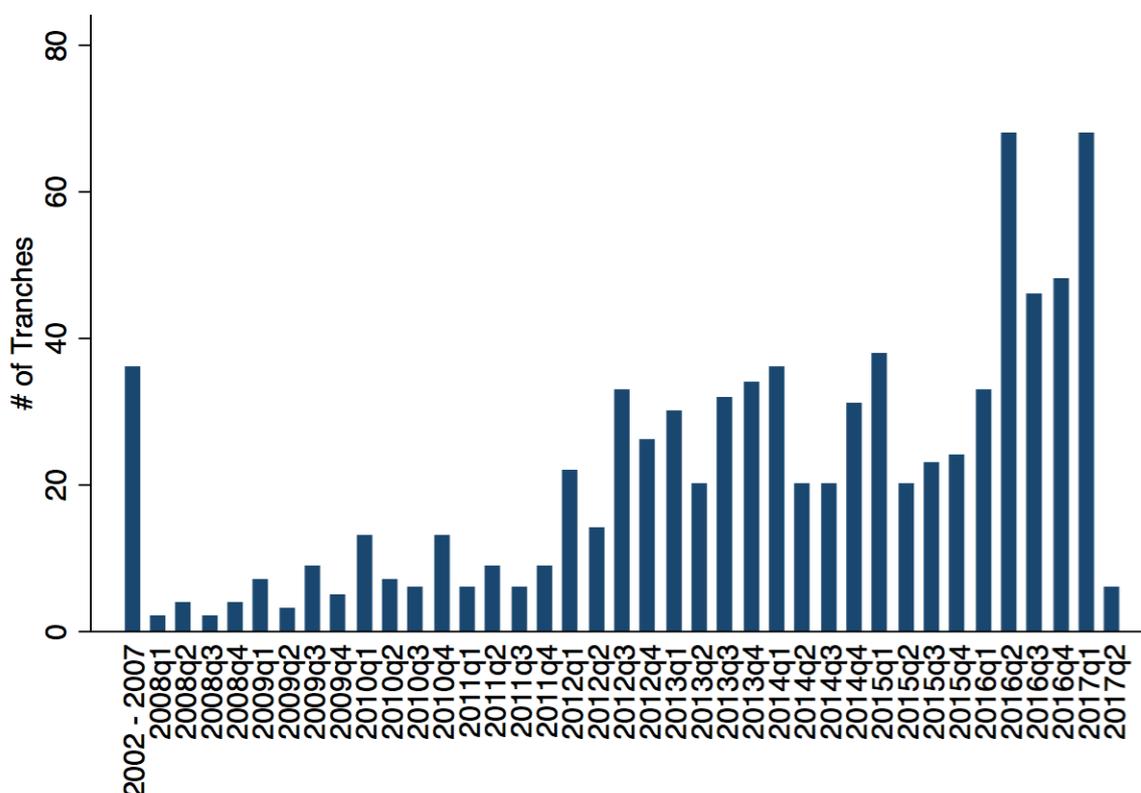


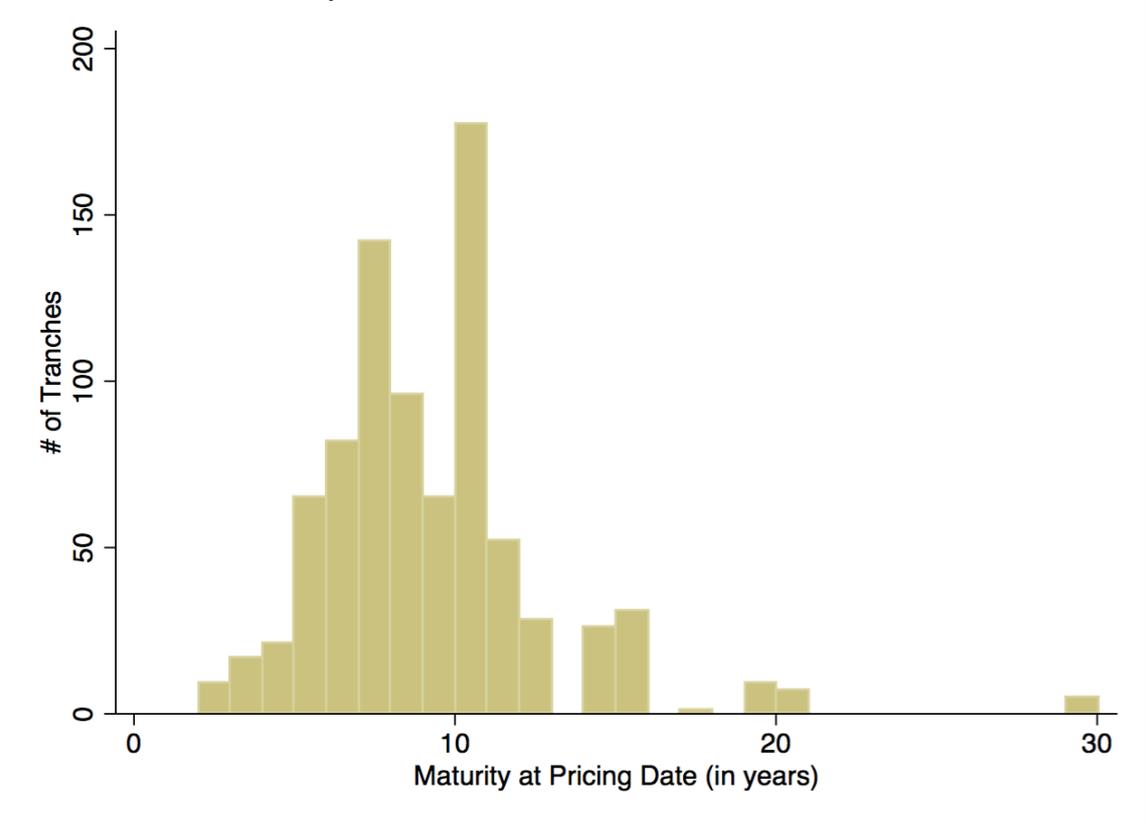
Figure C5, Panel A, shows the number of bonds that have been (partially) purchased under the CSPP by maturity (in years as of offering date). The average (median) bond has a maturity of 9 (8.5) years with a range of 2 – 30 years.

As the exact date at which a bond is purchased under the CSPP is not disclosed, it is not possible to precisely report the remaining maturity at purchase date. As a proxy for the maturity at the time of the purchase under the CSPP we report the remaining maturities of the bonds as of 12th May 2017 (as our sample reflects the CSPP portfolio as of 12th May 2017). The results are shown in Figure C5, Panel B. The average (median) remaining bond maturity as of 12th May 2017 is 5.8 (5.4) years with a range of 0.01 – 23.5 years.

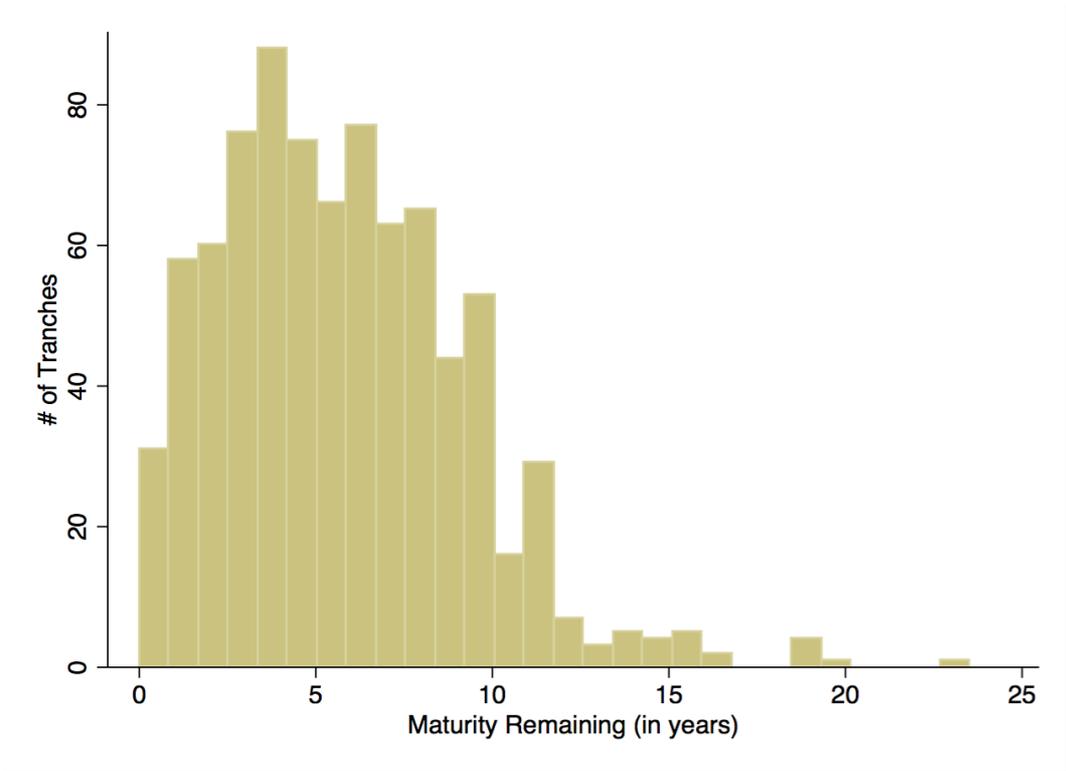
Figure C5
Number of bonds purchased under the CSPP by maturity

This figure shows the maturity distribution of the bonds that have been (partially) purchased under the CSPP as of 12th May 2017. The sample comprises 833 issues (out of the total 913 issues) on which detailed issue level information can be obtained from Dealogic. Panel A shows the initial maturity as offering date. Panel B shows the remaining maturity as of 12th May 2017.

Panel A: Initial maturity



Panel B: Maturity as of 12th May 2017



Most frequently purchased firms

Table C1 presents information on the firms that occur most frequently in the CSPP dataset, i.e., the firms whose bonds are purchased most frequently. In particular, the table presents the identity of the issuers from which more that 10 distinct bond tranches have been (partially) purchased under the CSPP. Again note that this does not necessarily imply that these firms are the largest beneficiaries of the program as information on the purchased volumes are not available.

Table C1**Most frequently purchased firms**

This table presents information on the identity of the firms from which more than 10 bond tranches have been (partially) purchased under the CSPP as of 12th May 2017.

Company	Country	Industry	# of Tranches
BMW AG	Germany	Auto/Truck	20
Daimler AG	Germany	Auto/Truck	20
Deutsche Bahn AG	Germany	Transportation	18
Anheuser-Busch InBev SA/NV	Belgium	Food & Beverage	17
ENI SpA	Italy	Oil & Gas	17
Telefonica SA	Spain	Telecommunications	17
Electricite de France SA	France	Utility & Energy	14
Danone SA	France	Food & Beverage	13
Deutsche Telekom AG	Germany	Telecommunications	13
Iberdrola SA	Spain	Utility & Energy	13
Sanofi SA	France	Healthcare	13
Royal Dutch Shell PLC	Netherlands	Oil & Gas	13
Air Liquide SA	France	Chemicals	12
Snam SpA	Italy	Utility & Energy	12
Unibail-Rodamco SE	France	Real Estate/Property	12
Energias de Portugal SA	Portugal	Utility & Energy	11
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