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Unconventional monetary policy and corporate bond issuance

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Abstract

We assess the effect and the timing of the corporate arm of the ECB quantitative easing (CSPP) on corporate bond issuance. Because of several contemporaneous measures, to isolate the programme effects we rely on one key eligibility feature: the euro denomination of newly issued bonds. We find that the significant increase in bonds issuance by eligible firms is due to the CSPP and that this effect took at least six months to unfold. This result holds even when comparing firms with similar ratings, thus providing evidence that unconventional monetary policy can foster a financing diversification regardless of firms' risk profile.

*JEL classification:*E52, G15,G32.
Keywords: Quantitative easing, CSPP, corporate bond market.

Non-Technical Summary

One important lesson stemming from the global financial crisis in 2008 and 2009 is that firms' ability to switch across alternative instruments of debt finance is a key element of resilience, since diversified sources of external financing can help absorb the negative implications of adverse financial and real economic shocks. We explore the effect of the ECB's quantitative easing on the bond issuance of euro-area corporations and address the following research questions: (i) Can monetary policy stimulate the supply of corporate bonds? (ii) How long does it take for such a monetary policy shock to produce its desired effects? The euro area is a good case study to empirically address these questions because the financing of the economic activity is primarily bank-based and the ECB engaged in a relatively unusual measure of monetary policy, the outright purchases of corporate bonds, not only in the secondary market but also in the primary market through an ad hoc programme: the Corporate Sector Purchase Programme (CSPP). In a nutshell, the CSPP entails the purchase of investment-grade euro-denominated bonds issued by non-bank corporations that are established in the euro area.

On 10 March, 2016 the ECB announced a set of measures in pursuit of its price stability objective. Three measures concerned the official policy rates and three were of a more unconventional nature. In particular, the three unconventional measures were aimed at strengthening the pass through of the accommodative monetary policy stance to the real sector of the economy. Among them, the introduction of the CSPP within the broader asset purchasing programme directly targeted the bond issuance of corporations, which in the euro area is historically a largely less used source of financing than bank loans.

Given the existence of several contemporaneous policy measures, to isolate the programme effect on bond placements we rely on one key eligibility feature characterising the CSPP, which uniquely distinguishes the programme from the other measures announced on the same day: the euro

denomination of newly issued bonds.

By employing data on more than 12,000 bonds placed over the period 2013Q3-2018Q2, we find that the CSPP significantly contributed to the increase in the size of the corporate bond market over the two years which followed the introduction of the 10 March, 2016 policy package. The probability of issuing bonds in euro vis-à-vis other currencies significantly increased for eligible corporations with respect to non-eligible ones by an estimated 14%. It is this change in the currency composition of the placements that suggests that the increased bond issuance is due to the CSPP and not to other monetary policy measures.

In addition, we find that the switch towards euro-denominated bonds by eligible corporations took time to unfold. Our estimates suggest that the CSPP started to have a statistically significant effect from the beginning of 2017 (i.e. at least six months after the start of the purchases). Only corporations already financing on the bond market in multiple currencies could rapidly adjust to the CSPP framework. This evidence squares well with the fact that it takes time to issue a new bond on the primary market, especially by firms which do not often resort to the direct bond-market financing or even first timers. Several parties such as investment bankers, institutional investors and ratings agencies are involved in the placement process that starts after the management decision and the approval by the corporate board, which protect shareholder interests.

Our results hold also when restricting the control sample to non-banks only and to investment grade corporations only. The former analysis guarantees that the result is not driven by the funding decisions of banks, which had also access to other policy measures, as the second wave of TLTROs. The latter exercise provides instead a policy-relevant result; by comparing the issuance activity of corporations with a similar creditworthiness, we can claim that the ECB unconventional monetary policy fostered a financing diversification regardless of firms' risk profile.

1 Introduction

One important lesson coming from the global financial crisis in 2008 and 2009 is that firms' ability to switch across alternative instruments of debt finance is a key element of resilience, since diversified sources of external finance can help absorb the negative implications of adverse financial and real economic shocks (De Fiore and Uhlig, 2015). However, many countries are still almost entirely relying on the banking system as the source of the economic activity funding. Can central banks foster a diversification process?

Central banks around the world have implemented a broad set of conventional and unconventional monetary policy measures (in particular, large-scale asset purchase programs or LSAPs for short) to drag the economies out of the global financial crisis and the great recession and a lively literature has suggested several channels of how LSAPs transmit to the real economy (Vayanos and Vila, 2009; Krishnamurthy and Vissing-Jorgensen, 2011; Rodnyansky and Darmouni, 2017; Koijen et al., 2017; Hachula et al., 2019). However, the link between LSAPs and the financing decisions of firms is by far less investigated (Acharya et al., 2019; Ferrando et al., 2019; Grosse-Rueschkamp et al., 2019).

In this paper, we explore the effect of the ECB's LSAP on the bond issuance of euro-area corporations and address the following research questions: (i) Can monetary policy stimulate the supply of corporate bonds? (ii) How long does it take for such a monetary policy shock to produce its desired effects? The euro area is a good case study to empirically address these questions because the financing of the economic activity is primarily bank-based and the ECB engaged in a relatively unusual measure of monetary policy, the outright purchases of corporate bonds, not only in the secondary market but also in the primary markets through an ad hoc programme: the Corporate Sector Purchase Programme (CSPP).

In a nutshell, the CSPP entails the purchase of investment-grade euro-denominated bonds issued by non-bank corporations that are established in

the euro area. It was announced on 10 March, 2016 together with other important policy measures, among which: the lowering of the rate on the main refinancing operations (the reference policy rate) to zero for the first time ever, the recalibration of the Public Sector Purchase Programme (PSPP) and the introduction of a new series of four targeted longer-term refinancing operations (TLTRO-II), which provided liquidity at favorable rates to banks expanding their credit to non-financial corporations (NFCs).

All policy measures launched contemporaneously in March 2016 aimed at easing the monetary policy stance and, in particular, improving firms' financing conditions, hence with potentially similar implications for corporate bond yields and issuance. Disentangling the specific effects of CSPP over time is of outmost importance from at least two points of view. On the one hand, it is relevant to check whether this new instrument was indeed successful in stimulating the corporate bond issuance; on the other hand, understanding its timing and effect could help to calibrate the monetary stimulus originating from LSAPs and plan the withdrawal of that stimulus in a following phase.

In order to isolate the CSPP-induced shift in the corporate bond issuance, we focus on the primary bond market and carry out an identification strategy along two dimensions. First we allocate the euro-area corporate bond issuers in the two segments of eligible and non-eligible corporations taking into account all the CSPP eligibility criteria (at the bond and issuer level). Secondly, we distinguish the issuance at the ISIN level (International Securities Identification Number) according to the bond currency of denomination, thus making use of one key CSPP eligibility feature (the euro-denomination of newly issued bonds), which uniquely distinguishes the programme from the other measures announced on the same day. We then employ a probit difference-in-differences model to assess how the probability of issuing euro-denominated bonds changed, after the CSPP announcement, for the treated group (eligible corporations) with respect to the control group (non-eligible corporations).

We find that the CSPP strongly contributed to increase the size of the corporate bond market over the two years which followed the introduction of the 10 March, 2016 policy package. The probability of issuing bonds in euro significantly increased for eligible corporations with respect to non-eligible ones by an estimated 14%. It is this change in the currency composition of the placements that suggests that the increased bond issuance is due to the CSPP and not to other monetary policy measures. In addition, we find that the switch towards euro-denominated bonds by eligible corporations took time to unfold. Our estimates suggest that the CSPP started to have a statistically significant effect from the beginning of 2017 (i.e. at least six months after the start of the purchases). Only corporations already financing on the bond market in multiple currencies could rapidly adjust to the CSPP framework. This evidence squares well with the fact that it takes time to issue a new bond on the primary market, especially by firms which do not often resort to the direct bond-market financing or even first timers. Several parties such as investment bankers, institutional investors and ratings agencies are involved in the placement process that starts after the management decision and the approval by the corporate board, which protect shareholder interests (Bhojraj and Sengupta, 2003).

Our results hold also when restricting the control sample to non-banks only and to investment grade corporations only. The former analysis guarantees that the result is not driven by the funding decisions of banks, which had also access to other policy measures, as the TLTRO. The latter finding is instead particularly relevant from a policy perspective, since it avoids the possibly flawed, but not rare in the literature, comparison of decisions made by firms with different risk profiles (investment grade versus high yield).

The remaining of the paper is organized as follows: Section 2 places the paper in the current literature debate; Section 3 describes the CSPP features; Section 4 introduces the econometric approach; Section 5 discusses the empirical results; Section 6 tests the results relying on several robustness

checks; Section 7 draws the conclusions.

2 Literature review

The paper contributes to the current policy debate on the effects of the launch of the CSPP. A first group of studies documented a significant reduction in corporate bond spreads in several market segments (Rischen and Theissen 2018, De Santis et al. 2018, Abidi and Miquel-Flores 2018, Li et al. 2019) and analyzed the working of the portfolio rebalancing channel (Zaghini 2019). A second group of fewer papers looked at the effect of the CSPP on the financing decision of firms. While Arce et al. (2017) documented a surge in bond placements one-quarter after the CSPP announcement by Spanish eligible firms, Grosse-Rueschkamp et al. (2019) and Todorov (2019) enlarged the analysis to the whole euro area. In particular, Grosse-Rueschkamp et al. (2019) looked at the balance sheets of listed NFCs registered in the euro area over the one-year period after 10 March, 2016 and found a significant increase in a "bond debt" aggregate for investment grade (IG) firms relative to non-IG firms. However, the corporate bond debt they looked at, which is defined at firms' balance sheet level, is made of very different securities (commercial paper, senior bonds and notes, subordinated bonds and notes), regardless of the currency of issuance, the kind of placement (public or private) and the market of placement (local, euro-area or foreign), features which instead matter for the CSPP eligibility. Thus, it might not be ruled out that the reported increase in the corporate debt of the selected NFCs was due to kinds of issuance which were not suitable for CSPP purchases, such as subordinated bonds (that typically are of HY type), bonds in foreign currency, commercial paper (which has by definition very short maturities), or even bonds issued in markets other than the euro area.

Todorov (2019), instead, used an indirect approach to take into account newly issued bonds. He looked at individual bonds starting from the sec-

ondary market: filtering out bonds which were less than one week old, he obtained a restricted panel of bond-week observations, which was used as proxy of the true issuance in the primary bond market. He then reported an overall increase in the issuance volume by eligible corporations. In addition, an analysis based on a subsample of corporations issuing regularly in more than two currencies showed an increase in euro-denominated bonds. However, these results may well be driven by the combination of the incomplete sample of issuers and a very short time horizon (a total of 23 weeks around the announcement date of 10 March, 2016). In such short period of time, only corporations already relying on the bond market might have been able to increase the issuance volume through new placements or by tapping existing bonds. The latter decision is very different from the one concerning the issuance of a new bond (via a new ISIN) fulfilling the eligibility criteria, criteria which were disclosed more than a month after the CSPP announcement (21 April, 2016).[1] Indeed, firms' decision about a new bond issuance and the process associated to it require a longer time span (up to three months for newcomers).[2]

A related literature investigated a different spillover effect of the CSPP: NFCs eligible to the CSPP substituted bank loans with bond debt and relaxed banks' lending constraints, this in turn allowed banks to increase the lending to the NFCs which did not benefit from the CSPP. Grosse-Rueschkamp et al. (2019), which named this mechanism as the capital structure channel of monetary policy, addressed the issue by looking at loan syndication and large corporations, Ertan et al. (2018) and Betz and De Santis (2019) focussed on the credit supply of bank-dependent firms, particularly

[1] The same author acknowledge that the statistically significance of the results (often at the 10% level) was driven by the interim period between 10 March and 21 April, 2016, a period in which the CSPP eligibility criteria were still unknown by market participants.

[2] Typically, a detailed offering prospectus must be provided and a road-show involving potential investors organized in order to negotiate rates and ancillary conditions. If issuing corporations are not rated, the involvement of a rating agency must also be taken into account.

small and medium enterprises.

All in all, while the results of the literature are informative and go a long way in the right direction, the findings about the direct effect of the CSPP on the corporate bond issuance and its timing are still not conclusive.

In order to identify the CSPP effects, we propose a direct approach based on the currency of denomination of the newly issued bonds. By relying on the primary bond market and making use of the CSPP currency criterion, which states that all eligible bonds must be denominated in euro, our identification strategy allows ex-ante to disentangle the effect of the CSPP from the other confounding sources (i.e., the other monetary policy measures announced on the same day). In particular, differently from Grosse-Rueschkamp et al. (2019) and Todorov (2019), we look at the primary bond market placements at the daily frequency and we rely on a much longer horizon of 2 years after the CSPP announcement, which makes us confident about the unfolding of the CSPP effects.

We also differ from the existing literature as we cover all corporations that directly or indirectly were affected by the CSPP. Instead of looking at a predetermined group of firms (such as, for instance, the euro-area set of listed NFCs), we set up the sample in three steps. By employing ECB databases we started from taking all bond placements, ISIN by ISIN, on the market relevant to the CSPP, we then associated the ISINs of the placements to the issuing corporations and finally we selected the eligible corporations according to all the CSPP requirements, both at the firm and bond level.[3] The accurate sample construction and the strategy of relying on the euro-denomination criterion allow a neat identification of the effects of the CSPP on the corporate bond issuance.

A final feature of our paper is that we are interested in the timing of the programme. We show that the CSPP effects took time to unfold and

[3]The description and discussion on the eligibility criteria on both issuing corporations and bond placements is provided in Section 3.

to involve the whole corporate bond market, since in the very first months after the CSPP announcement only corporations already regularly financing on the bond market could benefit from the programme (around 10% of the total sample).

3 The CSPP at work

On 10 March, 2016 the ECB announced a set of measures in pursuit of its price stability objective. Three measures concerned the official policy rates and three were of a more unconventional nature:

1. The interest rate on the main refinancing operations (MRO) was decreased by 5 basis points to 0.00%.

2. The interest rate on the marginal lending facility was decreased by 5 basis points to 0.25%.

3. The interest rate on the deposit facility was decreased by 10 basis points to -0.40%.

4. The monthly purchases under the asset purchase programme was expanded to €80 from €60 billions starting in April 2016.

5. Investment grade euro-denominated bonds issued by non-bank corporations established in the euro area were included in the list of assets eligible for regular purchases under a new programme named "Corporate sector purchase programme" (CSPP).

6. A new series of four targeted longer-term refinancing operations (TLTRO II), at a rate that, for banks whose net lending exceeded a benchmark, could be as low as the interest rate on the deposit facility and with a maturity of four years, were scheduled starting from June 2016.

In particular, the three unconventional measures were aimed at strengthening the pass through of the accommodative monetary policy stance to the real sector of the economy. Among them, the introduction of the CSPP within the broader asset purchasing programme directly targeted the bond issuance of corporations, which in the euro area is historically a largely less used source of financing than bank loans.

The aim of the CSPP, in addition to a broad signalling effect, was to lower the yield on targeted bonds and, mainly through the work of the portfolio rebalancing channel, influence also other asset prices, in particular (corporate) non-eligible bonds. The idea behind rebalancing channel is that by generating scarcity in the eligible bond segment investors would be encouraged to shift holding into other (riskier) asset classes (Draghi 2015). In addition, the presence of a large player in the euro-area bond market would encourage the issuance activity on the primary market and guarantee an increased liquidity in secondary market trades (Steeley 2015, Boneva and Linton 2017). In turn, the improved funding conditions of corporations would stimulate their business and support euro-area economic growth.

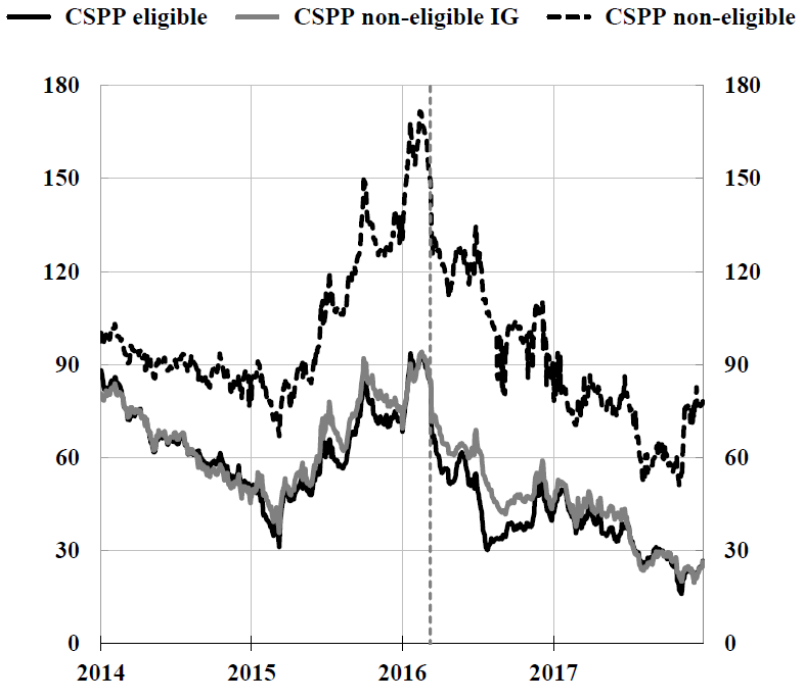
The bond and issuer eligibility conditions set forth by the ECB after the Governing Council meeting on 21 April, 2016 were as follows:

- the bond must be eligible as collateral for Eurosystem credit operations;
- the bond must be denominated in euro;
- the bond must have a minimum first-best credit assessment of at least BBB- or equivalent (obtained from an external credit assessment institution);
- the bond must have a minimum (remaining) maturity of six months and a maximum (remaining) maturity of less than 31 years;
- the issuer must be a corporation established in the euro area, defined as the location of incorporation of the issuer;

- the issuer must not be a credit institution nor have any parent undertaking which is a credit institution.

In addition, other conditions were introduced to ensure a diversified allocation of purchases across issuers, to sustain the market liquidity, and to guarantee the transparency of the programme.[4]

Figure 1 Corporate bond spreads by issuer

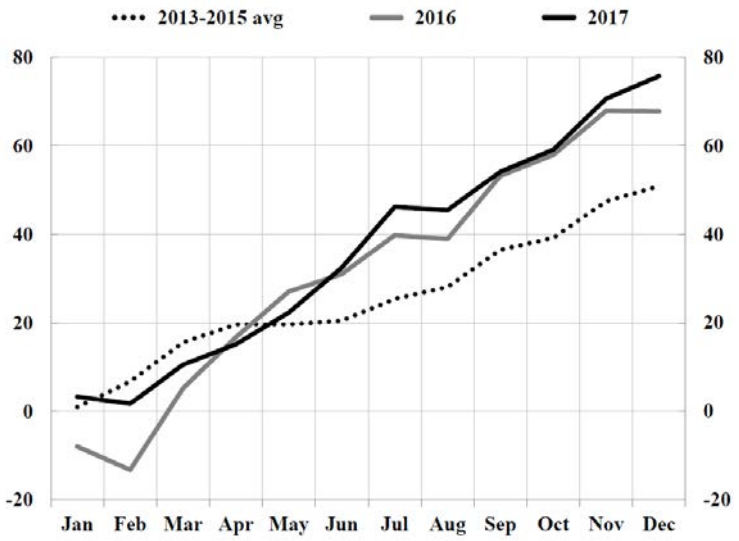


Note: Corporate bond spreads are measured by the Z-spread, which is the spread over the EURIBOR curve required to discount a pre-determined cash flow (basis points). The indices, which include only senior unsecured bonds, are constructed as a weighted average of the individual ISINs' corporate spreads with weights provided by the outstanding amount. The vertical line marks the announcement of the CSPP on 10 March, 2016. Sources: Bloomberg and authors' calculations.

[4]For further details see the ECB press releases:
https://www.ecb.europa.eu/press/pr/date/2016/html/pr160421_1.en.html,
https://www.ecb.europa.eu/mopo/implement/omt/html/cspp-qa.en.html.

By using individual corporate bond spreads at the ISIN level with daily frequency and focusing only on senior unsecured bonds, Figure 1 shows that, immediately after the announcement of the policy measures, corporate bond spreads declined on secondary market trades on both eligible and non-eligible segments. Also the net issuance by NFCs picked up in March 2016 from historically low levels and remained strong in both 2016 and 2017 (Figure 2).

Figure 2 Corporate bond issuance



Note: Cumulated net issuance of euro-denominated long-term debt securities by NFCs in the euro area, in billion euros. Monthly flows. Source: ECB.

As concerns the placement volume, in the whole euro-area primary market, the bond issuance increased from an average of 201 billion euro per quarter before the CSPP to 210 billion after the CSPP, with the share of euro denominated bond increasing from 68% to 72%.[5] However, this basic evidence about the corporate issuance is not sufficient to attribute to the

[5]Data collected over the period 2013Q3-2018Q2 from more than 12,000 bonds placed by issuers registered in the euro area.

CSPP the merit of the size increase of the bond market, since other expansionary monetary policy measures were implemented at the same time.

In order to disentangle the effect of the CSPP from the other sources at work, we propose in the next section an identification strategy based on the currency denomination of bonds. Indeed, the only difference concerning the impact on bond supply of the CSPP with respect to the other monetary policy measures announced on the same day is that, in order to be eligible to the programme, the new bonds must be issued in euro. A stimulus stemming from the other impulses would not impact the currency of denomination of the bond, which is a decision pertaining the characteristics of the firm, the market liquidity, and the macroeconomic and institutional environment (McBrady et al. 2010). Thus a significant change in the currency composition of newly issued bonds by CSPP eligible firms relative to non-eligible firms would suggest that the increase in the market size is due to the CSPP.

4 Data and the econometric approach

We study the CSPP impact on bond supply by looking at more than 12,000 placements in the primary bond market over the period from October 2013 to June 2018. Since the bond issuance is a phenomenon which is not continuous over time, we resort to a cross-section econometric approach, in which the time dimension is taken into account by a set of time dummies. Just focusing on the period after the CSPP announcement, we have that only 22 corporations out of the over 1,000 in the sample issued at least one bond in each quarter. In other words, just around 2% of the sample showed a time-continuos issuance at the quarterly frequency. Therefore, adopting a panel approach – as done for instance by Todorov (2019) – with our data sample would not be satisfactory.

Our econometric approach is based on a probit difference-in-differences (DID) framework employing two sources of identifying variation: the time

before and after the announcement of the CSPP, and the cross section of firms affected (treatment group) and not affected by CSPP (control group). The specification takes the following form:

$$P(Euro_{isct} = 1) = \varphi(\beta_1 Post \text{ x } Eligible_{isc} + \beta_2 Eligible_{isc} + \beta_3 X_{isct} + FE_{sct} + \varepsilon_{isct}) \quad (1)$$

where $Euro_i$ is a dummy variable equal to 1 if the currency of denomination of the bond i is the euro and 0 otherwise; $Post$ is a dummy equal to 1 from March 10, 2016 onwards and 0 before; $Eligible_i$ is a dummy equal to 1 if the firm issuing bond i is CSPP-eligible and 0 otherwise; X_{isct} is a vector of time-varying control variables (at firm-, bond- and market-level); FE_{sct} are the sector, country and time fixed effects.

The coefficient of interest is β_1 which assesses the differential effect of the CSPP on the probability of issuing bonds in euro by eligible issuers.[6] All exogenous variables are taken at the bond issuance date (time t) with the exception of balance sheet data which refer to year $t-1$. We cluster the standard errors at the level of the treatment, namely at the issuers' level.

We saturate the model using a broad set of control variables and fixed effects to take into account all possible sources of systematic difference between treated and non-treated corporations. As regards the bond features, the exogenous variables taken into account are: the time to maturity at origination, the amount issued (single tranche) and the coupon frequency. Concerning the firm-level controls, we use a measure of the creditworthiness of the corporation, an indicator of the size and the frequency of issuance. In addition, a set of dummy variables takes into account the industry sector of

[6] Note that an eligible firm may issue bonds denominated in euro which are not suitable for purchase under the CSPP if the maturity at issuance of the bond is over 31 years. Dropping the latter bonds from the sample or correcting the dependent variable for this circumstance does not change the results, since less than 1% of the bonds show a maturity longer than 31 years.

the issuer.[7] As for the creditworthiness, we rely on the rating provided by the three most important rating agencies: Moody's, Fitch and S&P. Given the likely non-linear relation between the probability of default and the rating, we use a set of dummy variables, one for each rating grade.[8] The variable size is the log of the total assets. To take into account whether the corporations does not often tap the bond market we use a 1-timer dummy, which takes 1 if the corporation has issued only one bond in the period under consideration and 0 otherwise.

Finally, to take into account the possibly changing euro-area market conditions, we rely on time fixed effects and several indices at different frequencies.[9] With a high frequency we have the daily VSTOXX index, which is a measure of the equity market volatility in the euro area (computed relying on both call- and put-implied volatilities from the DJ Euro STOXX 50 index) and the weekly CISS bond index (Composite Indicator of Systemic Stress), which is the systemic stress indicator for the euro-area financial market proposed by Hollo et al. (2012) and regularly updated by the ECB statistical data warehouse (SDW). With a lower frequency we have two monthly indices: the €-coin index by Altissimo et al. (2010) and the economic policy uncertainty (EPU) index by Baker et al. (2016). The €-coin is an index of macroeconomic conditions summarizing in real time the "current" eco-

[7] We have 19 sectors: 9 for financial corporations (Banks, Investment management, Leasing companies, Special purpose vehicles, Finance-automobile, Finance-miscellaneous, Insurance, Holding companies and Real estate); and 10 for non-financial corporations (Auto and track, Basic materials, Consumer goods, Consumer services, Healthcare, Industrials, Oil and gas, Technology, Telecommunications and Utilities).

[8] The rating of the issuer is first linearized between 1 (CC/Ca) and 20 (AAA/Aaa), so that when the same bond receives more than one assessment from Moody's, Fitch and Standard&Poors they can be averaged. Then the average is transformed into a set of dummy variables. We rely on the rating of the parent company when the issuer's rating is not available but the parent's is. We also add a dummy tracking the corporations whose rating is not available at all.

[9] In the baseline regressions the time fixed effects have a quarterly frequency, but the results remain qualitatively invariant if the frequency is increased to monthly or even weekly.

nomic picture of the euro area; the EPU index summarizes the geopolitical uncertainty possibly affecting the financial markets' decision making process.

As for the data sources, we merged information from several providers in order to have the final sample of 12,113 bonds for which all variables' values are available. In particular, balance sheet variables are sourced from Capital IQ, financial indices from Bloomberg, issuance features from DCM Analytics by Dealogic, the CISS index and the euro exchange rates from ECB SDW.

Starting from the list of bonds in the sample, the set of treated corporations is determined according to the following procedure. We first selected the *de facto* eligible corporations: namely those from which a bond has been purchased by the ECB on either the primary or secondary market (295 corporations). Then we added all those corporations fulfilling the CSPP eligibility criteria published by the ECB according to Dealogic data (131 corporations). Finally, the control sample is simply made of all issuers not already in the treated sample. All in all, our sample contains 1,084 corporations, 39% of which are eligible issuers.

Table 1 Bond issuance by period and sector

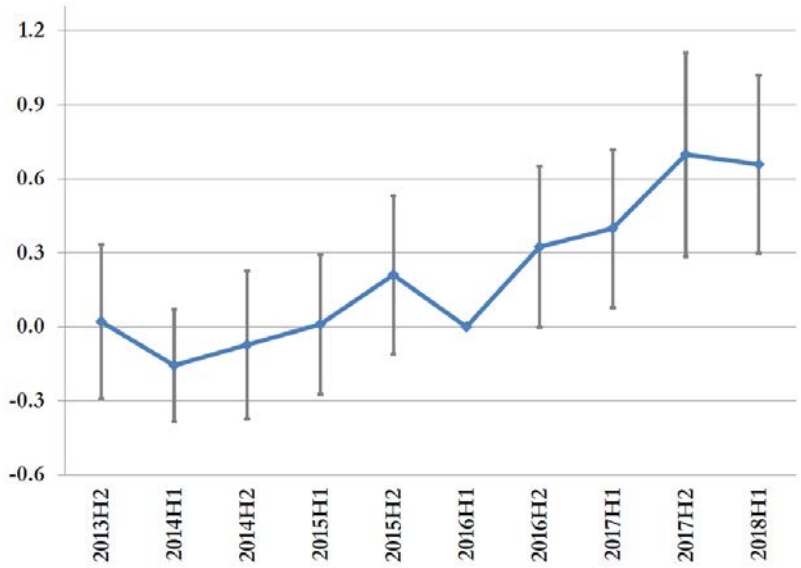
	Eligible		Banks		Other non-eligible		TOTAL	
	Total	**Euro**	**Total**	**Euro**	**Total**	**Euro**	**Total**	**Euro**
2013Q3-2018Q2	87,221	63,584	83,734	59,629	33,692	19,460	204,646	142,673
Pre-CSPP	80,855	56,981	89,309	62,259	30,994	18,172	201,158	137,413
CSPP	96,416	73,122	75,681	55,829	37,589	21,320	209,685	150,272
CSPP - (Pre-CSPP)	15,561	16,141	-13,629	-6,429	6,595	3,148	8,526	12,859
	[0.053]	[0.011]	[0.761]	[0.802]	[0.074]	[0.143]	[0.098]	[0.081]

Note: this table shows the quartely average bond issuance in million euros by euro-area corporations. Pre-CSPP is the period 2013Q3-2016Q1; CSPP is the period 2016Q2-2018Q2; CSPP - (Pre-CSPP) is the difference between values in CSPP and Pre-CSPP; the p-value associated to the t-test with H_1: CSPP - (Pre-CSPP) > 0 is reported in brackets. Source: Dealogic Analytics.

An advantage of our database is that we can assess the change in the

bond issuance by eligible and non-eligible corporations, split by currency of denomination, over a relatively long time-span before and after the announcement of the CSPP. Table 1 provides a snapshot of the issuance over time of different market segments. The issuance by eligible issuers significantly increased and was entirely driven by the euro-denominated bonds. Banks instead reduced their placement volume (almost equally divided between bonds in euro and in other currencies), most likely because of the cheaper funding source provided by the TLTROs. Over the same horizon, non-bank non-eligible issuers increased their issuance (again almost equally shared between euro-denominated and non euro-denominated bonds). All in all, in the euro area the average quarterly issuance increased after the CSPP and the positive involvement of the non-bank non-eligible issuers is in line with the unfolding of the portfolio rebalancing channel (Zaghini, 2019).

Figure 3 Relative bond issuance in euro: Parallel trend shift



This figure plots a test for the parallel trend assumption for eligible and non-eligible corporations issuance before the announcement of the CSPP with respect to the currency denomination of bonds. It reports the estimated coefficients (and 90% confidence intervals) of the interaction of the semi-annual time dummy with the CSPP-eligible dummy in a probit regression in which the dependent variable is a dummy which takes 1 when the bond is denominated in euro as described in Equation (1).

Before exploiting the DID framework, we must note that a causal interpretation of Equation (1) relies on the assumption of a parallel trend in euro-denominated bond issuance between eligible and non-eligible issuers before the CSPP announcement. It requires that in the absence of treatment, the difference between the 'treatment' and 'control' group is constant over time. We thus perform a test of the assumption by running a probit regression as in Equation (1) adding the interaction of the semiannual and the CSPP-eligible dummies over the whole time span. We exclude the dummy variable associated to the first half of 2016 to center the estimated dynamics on the semester in which the CSPP was announced. Figure 3 shows the estimated interaction coefficients and the 90% confidence intervals. There is not a different trend in euro-denominated bond issuance between the treated and non-treated group of issuers before the first half of 2016: all the coefficients are not statistically significant. Instead, in the period of CSPP purchases, eligible corporations significantly increased the issuance of bonds in euro relative to non-eligible issuers. All in all, even if there was an increase in the issuance of bonds in euro before the announcement of the CSPP, this trend was not significantly different across the two segments under analysis.

5 The empirical evidence

In the previous sections we made clear that the issuance activity is not a time-continuous phenomenon and that the time needed to place a new bond may be long and depends on several factors, in particular whether the corporation is an established issuer or it is new to the investors (an irregular issuer of even a new issuer). In addition, the details about the CSPP features offering the eligibility criteria were released on 21 April, 2016, more than one month after the initial announcement of the programme. Thus, we may expect that, also in the case of the increased demand due to the CSPP, the market needed a sufficiently long time span to adjust the volumes to the programme.

Table 2 reports the coefficients of OLS and probit DID regressions of the euro dummy over three different horizons in columns (1)-(3) and (4)-(6), respectively.[10] In columns (1) and (4) we rely on the 23 weeks from January 2016 to June 2016 as in Todorov (2019); in columns (2) and (5) we extend the horizon backward as far as our dataset allows (October 2013 to June 2016); in columns (3) and (6) we rely on the maximum time-span available (October 2013 to June 2018).

Table 2 OLS and Probit estimations

	OLS			PROBIT		
	Jan16-Jun16	Oct13-Jun16	Oct13-Jun18	Jan16-Jun16	Oct13-Jun16	Oct13-Jun18
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Post x Eligible	0.0486	0.0404	0.1057 ***	0.0619	0.0763	0.1241 ***
	0.0945	0.0575	0.0315	0.0848	0.0533	0.0297
Eligible	0.1435	0.1590 ***	0.1267 ***	0.1540	0.1480 ***	0.1271 ***
	0.1182	0.0386	0.0410	0.1130	0.0427	0.0422
Post	-0.0911	-0.1412	-0.1717	-0.0759	-0.1348	-0.1506
	0.1196	0.1257	0.1353	0.0980	0.1109	0.1145
Market and Macro controls	NO	NO	NO	NO	NO	NO
Weekly FEs	YES	YES	YES	YES	YES	YES
Sector FEs	YES	YES	YES	YES	YES	YES
Country FEs	YES	YES	YES	YES	YES	YES
No. observations	1,632	7,925	12,113	1,622	7,894	12,075
R2	0.223	0.162	0.174	0.192	0.133	0.150

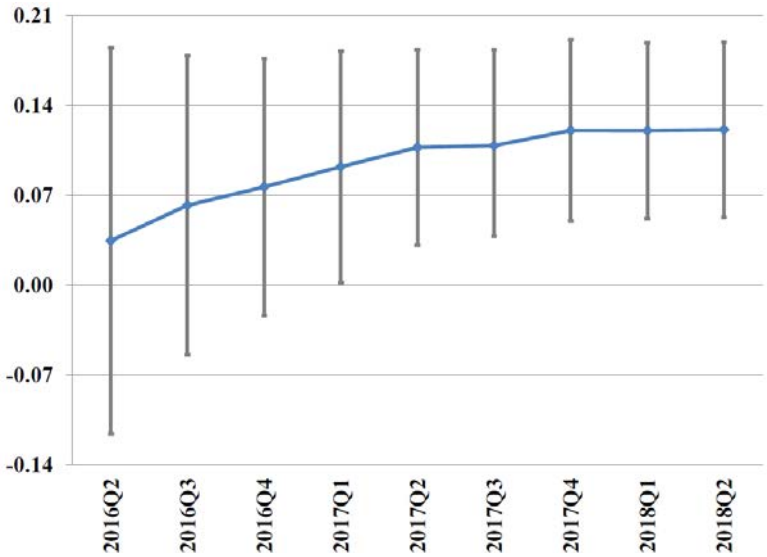
Note: This table presents difference-in-differences estimates where the dependent variable is a dummy which takes 1 when the bond is denominated in euro. Eligible is a dummy which takes 1 when the corporation issuing the bond is CSPP-eligible, Post is a dummy which take 1 after 10 March, 2016. All regressions include fixed effects as specified. Robust standard errors are clustered at the issuer level. For the probit regression (columns 4 to 6) the coefficient in the table is the average marginal effect and the stadard error is compute according to the Delta method. Symbols ***, **, * indicate significance at the 1%, 5% and 10% level, respectively. Sources: Dealogic Analytics, Thomson Reuters, Capital IQ, ECB.

As expected, relying on the bonds placed on the primary market, by the end of June 2016 the changes in the euro denomination of bonds did not take place. The variable tracking the interaction of the time dummy over the treatment period and the treated group of eligible issuers ($Post \times Eligible$)

[10] All regressions are run with weekly, sector and country fixed effects. For the ease of comparison, the coefficients reported in Table 2 concerning the probit regressions are the average marginal effects, whereas the standard errors are computed according to the Delta method.

is not statistically significant, neither over the 23-week horizon (columns 1 and 4), nor over the backward-extended horizon (columns 2 and 5). Instead, the effect of the CSPP kicks in (and it is statistically significant under both estimation methodologies) over the relatively long horizon ending two years after the launch of the purchases, occurred on 8 June, 2016 (columns 3 and 6).

Figure 4 CSPP effect on issuance over time



This figure plots the values of the coefficient β_1 (and 90% confidence intervals) in Equation (1) from a set of expanding regressions in which the starting date is always October 2013.

Indeed, relying on expanding probit regressions from October 2013, Figure 4 shows that in order to achieve an effect which is statistically significant the horizon must be extended up to the first quarter of 2017, and it is after the fourth quarter of 2017 that the effect levels off. Thus, in order to take into account the latter circumstance and take advantage of the full sample, we henceforth focus the analysis on regressions over the period October 2013 - June 2018.[11]

[11] While in the following sections we propose the results stemming from probit regres-

Table 3 CSPP impact and additional probit estimations

	(1)	(2)	(3)	(4)	(5)
Post x Eligible	0.6671 ***	0.6503 ***	0.6662 ***	0.6229 **	0.6304 **
	0.2539	0.2505	0.2536	0.2708	0.2733
Eligible	0.5465 ***	0.5462 ***	0.5441 ***	0.5719 ***	0.5904 ***
	0.1935	0.1933	0.1948	0.2080	0.2242
Issuer size	-0.5348 ***	-0.5357 ***	-0.5338 ***	-0.5019 ***	-0.5009 ***
	0.1538	0.1536	0.1536	0.1754	0.1794
Value	0.6324 ***	0.6384 ***	0.6310 ***	0.5888 ***	0.5975 ***
	0.1210	0.1200	0.1214	0.1260	0.1230
Maturity	-0.1159 ***	-0.1157 ***	-0.1157 ***	-0.1143 ***	-0.1156 ***
	0.0087	0.0088	0.0088	0.0091	0.0090
One-timer	0.5294 ***	0.5278 ***	0.5288 ***	0.5484 ***	0.6353 ***
	0.1484	0.1482	0.1486	0.1651	0.1745
Exchange rate		0.0790 ***	-0.0026		
		0.0279	0.0025		
PF&IC holdings				1.3480 ***	0.3110
				0.4120	0.4780
Market and Macro controls	YES	YES	YES	YES	YES
Issuer rating FEs	YES	YES	YES	YES	YES
Coupon frequency FEs	YES	YES	YES	YES	YES
Sector*Country*Time FEs	YES	YES	YES	YES	YES
No. observations	12,075	12,075	12,075	12,075	12,075
Pseudo R2	0.436	0.437	0.436	0.437	0.436

Note: This table presents difference-in-differences estimates where the dependent variable is a dummy which takes 1 when the bond is denominated in euro. Eligible is a dummy which takes 1 when the corporation issuing the bond is CSPP-eligible, Post is a dummy which take 1 after 10 March, 2016; Issuer size is the log of the balance sheet value of all assets (in billion euros); Value is the tranche value of the bond (in million euros); Maturity is the maturity of the bond at issuance (in days); One-timer is a dummy which takes 1 for corporations which issued only one bond. Market and Macro controls include the CISS index by Hollo et al. (2012), the €coin index by Altissimo et al. (2010), the EPU index by Baker et al. (2016) and the VSTOXX index. Exchange rate is the nominal effective exchange rate index computed by the ECB with respect to the 38 major euro-area trading partners in column (2) and the currency basis (i.e. the difference between the 5-year currency swaps contracts in euro and dollar) in column (3); PF&IC holdings is the assests' holding of pension funds and insurance corporations in lagged quarterly stocks in column (4) and in quarterly flows in column (5). All regressions include fixed effects as specified. Robust standard errors are clustered at the issuer level. Symbols ***, **, * indicate significance at the 1%, 5% and 10% level, respectively. Sources: Dealogic Analytics, Thomson Reuters, Capital IQ, ECB.

Table 3 reports in column (1) the coefficients of a baseline regression which includes all macro and financial market controls, the variables tracking the bond features and the variables taking into account the characteristics of the issuing corporations as described in the previous section. In addition, in order to take into account the different sector specific shocks at the country level,

sions, the findings of the paper are confirmed when relying on OLS regressions as well (material available upon request).

we introduce the interaction of time, country and sector fixed effects. The coefficient on the ($Post \times Eligible$) variable is strongly significant and the estimated impact (the average marginal effect) can be calculated at 14.4%, which indicates that the CSPP effect on the treated group was also economically relevant.

In order to take into account other possible sources of influence at work with the CSPP on both the supply and demand side, we expand the baseline regression by introducing several new regressors in columns (2) to (5). In particular, we look at two possible sources of influence. On the one hand, the decision about issuing in a given currency might well be influenced by the competitiveness (actual and expected) of the euro. We thus introduce the real effective exchange rate of the euro (column 2) and the 5-year currency basis vis-à-vis the US dollar (column 3).[12] On the other hand, in the period under analysis, there have been several changes in regulation for institutional investors such as pension funds and insurance corporations (PF&IC). In particular, the requirements included in the new supervisory regime Solvency II for the insurance corporations started to be binding in 2016Q1. Since in the euro area a significant part of the demand for corporate bonds historically comes from PF&IC, we also introduce the assets' holding of these institutions both in lagged stocks (column 4) and as quarterly flows (column 5).

While the coefficients of the real effective exchange rate and the lagged stock of assets' holdings by PF&IC are significantly different from zero, thus providing evidence of an active role of both the exchange rate and the institutional investors PF&IC in influencing the decision about the currency of denomination of the bond placement, the CSPP effect on the treated group is confirmed in both sign and magnitude. This in turn suggests that the influence of the added controls is not different for the eligible firms and the control group and that the effect of the CSPP is economically relevant for

[12] The currency basis is a common measure of expected appreciation of the euro via-a-vis the dollar. It is constructed as the difference between the 5-year currency swap contract in euro and the 5-year currency swap contract in dollar.

the euro-area bond market.

6 Robustness

The robustness checks mainly concern three issues: the credit risk of the issuer, the ability of the issuer in placing bonds denominated in different currencies, and the role of banks in influencing the results of the analysis.

As for the first issue, our test consists in relying on corporations with an investment grade rating only. This exercise differs from the analyses proposed in the literature about the CSPP since we are comparing the issuance activity of corporations with a similar credit risk. For instance both Arce et al. (2017) for Spain and Grosse-Rueschkamp et al. (2019) for the euro area find that the CSPP triggered an increase in eligible firms' leverage (bond debt to asset ratio) with respect to non-eligible firms. However, it can be argued that the reported change in leverage might be driven by the improper comparison of decisions made by firms with different risk profiles (i.e. firms issuing investment grade versus non-investment grade bonds). The less risky firms need less monitoring and usually face less constraints, and, consequently, were better suited to benefit from several of the measures included in the 10 March, 2016 ECB policy package. Instead, by focusing on corporations with a similar credit risk we can better disentangle the CSPP effect. The number of corporations declines to 695, 479 of which issued more than one bond. We focus on the latter sample in order to control for unobserved heterogeneity among corporations through issuer fixed effects.

Table 4 (column IG) shows that β_1 (the effect on the eligible set of issuers) is statistically significant ($p < 0.05$) and larger than in the baseline regressions (the average marginal effect stands at 27% versus 14%). In addition, it emerges that the firms' characteristics of size and eligibility to the programme (essentially the business sector) are not significantly different from zero, which in turn suggests that a more homogeneous sample of corpora-

tions is used for the regression. Thus, by focusing on corporations with a similar credit rating, we have the policy-relevant result that monetary policy can affect the financing choice of corporations regardless of their risk profile. However, also for this restricted sample of corporations the effect of the CSPP started to be signicantly different from zero in the second half of 2017. Thus, it took more than one year after the starting of the purchases to fully adjust to the increased ECB demand.[13]

Table 4 Robustness checks

	Baseline	IG	Multi-currency	Non-banks
Post x Eligible	0.6671 ***	1.3917 **	1.2031 **	0.6467 ***
	0.2539	0.7146	0.5322	0.2290
Eligible	0.5465 ***	0.4270	-1.3313	0.6259 ***
	0.1935	1.0297	1.2807	0.1879
Issuer size	-0.5348 ***	-0.6381	-0.2723	-1.7936 ***
	0.1538	0.4359	0.3667	0.5964
Value	0.6324 ***	0.7914 ***	0.8222 ***	0.3615 ***
	0.1210	0.0799	0.0774	0.1284
Maturity	-0.1159 ***	-0.0734 ***	-0.0759 ***	-0.1836 ***
	0.0087	0.0063	0.0071	0.0152
Market and Macro controls	YES	YES	YES	YES
Issuer FEs	NO	YES	YES	NO
Coupon frequency FEs	YES	YES	YES	YES
Sector*Country*Time FEs	YES	YES	YES	YES
No. observation	12,075	7,355	7,033	4,744
Pseudo R2	0.4359	0.4936	0.4769	0.5387

Note: This table presents three robustness checks concerning the control sample of the baseline difference-in-differences estimates reported in the first column. In the second column the sample is made of corporations with an IG rating (namely a rating of at least BBB-); in the third column the sample is made of corporations wich issued bonds in euro and in other currency both before and after the annoucement of the CSPP; in the fourth column the sample is made on non-bank corporations. The dependent variable is a dummy which takes 1 when the bond is denominated in euro. For the definition of the other variables see Table 3. All regressions include fixed effects as specified. Robust standard errors are clustered at the issuer level. Symbols ***, **, * indicate significance at the 1%, 5% and 10% level, respectively. Sources: Dealogic DCM Analytics, Thomson Reuters, Capital IQ, ECB.

In a further adjustment we restrict the sample to corporations financing

[13] All the sets of expanding regressions for the robustness checks discussed in this Section (not reported for the sake of brevity) are available upon request.

on the bond market in multiple currency before and after the CSPP announcement. There are only 108 corporations (out of the over 1,000 with at least one bond placed over the period under analysis) which issued bonds in euro and in other currencies both before and after the CSPP announcement. However, they account for more than half of the total value of the primary bond market.

Analyzing their behavior is relevant because we can check the effect of the CSPP on corporations which actively dealt with the decision about the currency of denominations of their debt when financing on the bond market and could swtich to euro-denominated placements faster than other corporations. Firm fixed effects control again for unobserved heterogeneity among firms. Regression estimations (column Multi-currency) confirm that (i) the increase in the probability of issuing in euro is significantly larger for eligible corporations, (ii) the effect is larger than in the baseline scenario (24% versus 14%) and (iii) size and the eligibility status are no longer statistically significant, suggesting that the sample is formed by more homogeneous corporations. In addition, expanding regressions for the set of multy-currency issuers show that the CSPP effect was statistically significant already in June 2016, thus even before the actual start of purchases by the ECB. This evidence support again the argument that only a very restricted group of corporations (i.e., large companies already financing on the bond market) could benefit from the programme in the very short period analysed by Todorov (2019).

A final check concerns the fact that banks, regardless of the credit risk, are non-eligible according to CSPP criteria. However they benefited from other ECB non-conventional monetary policy measure as, for instance, the two waves of TLTRO (the second announced on 10 March, 2016), which provided a cheaper funding to credit institutions willing to increase the credit to the private sector. Therefore, the last test is carried out relying on non-banks only (column Non-banks). In other words, we employ as control sample only corporations belonging to the non-financial sector and financial corporations

other than banks. Even though the number of observations shrinks to almost one third of the initial sample, the β_1 coefficient on the $(Post \times Eligible)$ variable is statistically significant ($p < 0.01$) and very similar to the baseline estimation, implying a 13% average marginal effect.

7 Conclusions

A diversified access to external finance is key for corporations to face the challenges caused by real economic and financial shocks. Often the fixed costs needed to shift from bank- to market-based financing are relatively large and, as a result, the *status quo* among firms' decisions prevails, despite the potential diversification benefits. In the paper, we assess whether monetary policy can help boosting a specific source of alternative funding: the issuance of corporate bonds.

In order to address this question, we focus on the effect of the CSPP, the corporate arm of the ECB's quantitative easing. We setup a detailed dataset, which considers the bonds issued during the sample period October 2013 - June 2018, and distinguishes the issuers between eligible and non-eligible corporations according to all the CSPP eligibility criteria. Thus, we differ from existing contributions about the CSPP, which usually start from a predetermined set of corporations (typically the listed euro-area non-financial corporations, which exclude, among others, all financial corporations other than banks, which instead are CSPP-eligible), and make the sample selection the first relevant step of our analysis.

Then, by relying on one key feature of the CSPP, the euro-denomination of the newly issued bonds, we isolate the CSPP-induced shift in the corporate bond issuance in the euro area. Indeed, in March 2016, together with the CSPP announcement, the ECB introduced several other conventional and unconventional policy measures, which may act as confounding sources for the identification of the effect of the CSPP on bond issuance. However, according

to the CSPP requirements, all purchasable bonds have to be denominated in euro. Thus, differently from the other measures, a stimulus stemming from the CSPP would also impact the bonds' denomination currency.

We take advantage of this feature by implementing a probit difference-in-differences analysis by which we study the differential effect on the currency of denomination of placements by eligible corporations (the treatment group) with respect to non-eligible corporations (the control group). Over the period in which the CSPP is active, we find a significant increase in the issuance of euro denominated bonds of around 14% for the treated corporations with respect to the control group. The change in the currency composition of the newly issued bonds thus suggests that the increased bond issuance is due to the CSPP and not to the other monetary policy measures announced on the same day.

In addition, we find that the switch towards euro-denominated bonds by eligible corporations took time to unfold. Our estimates suggest that the CSPP started to have a statistically significant effect from the beginning of 2017 (i.e. at least six months after the start of the purchases). This finding is backed by the fact that it takes time for new bond placements to reach the primary market, especially when the issuing corporation does not often resort to the direct bond-market financing, because several parties are involved in the process and a number of actions must be taken (management decisions, discussions with investment bankers and institutional investors, engagements with ratings agencies...). Our evidence suggest that in the few months between the announcement of the programme (March 2016) and the actual starting of purchases (June 2016), only companies already financing on the bond market in multiple currencies adjusted to the CSPP features by significantly increasing the issuance of euro-denominated bonds.

The findings of the paper are robust to several checks, but in particular they still holds (and are even reinforced) when restricting the analysis to the sample of investment grade corporations only. The latter exercise provides a

policy-relevant result, which eluded, at least partially, the literature on the effects of the CSPP. Indeed, previous works, to assess the effect of the CSPP, compared the decisions made by firms with different risk profiles. Instead, by comparing the issuance activity of corporations with a similar creditworthiness, we can claim that the ECB unconventional monetary policy affected the propensity of corporations to take advantage of the bond financing regardless of their risk profile.

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