INTERNET APPENDIX FOR

DEMAND-DRIVEN BOND FINANCING IN THE EURO AREA*

Stefano Pegoraro† Mattia Montagna‡

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A.1 CHANGES IN RISK PREMIA ACROSS ASSET CLASSES

In this Appendix, we study the effect of the CSPP announcement on spreads and returns in a variety of asset classes. In the paper, we focused on outstanding bonds. Here, we consider CDS spreads, default probabilities, spreads at issuance, and equity returns. We show that, across a variety of asset classes, the CSPP improved the valuation of those assets that were most exposed to non-diversifiable risk, thus providing additional evidence the CSPP lowered risk premia.

A.1.1 CDS SPREADS AND DEFAULT RISK PREMIA

We extend our analysis on valuation of credit risk by looking at CDS spreads and expected default frequencies (EDFs) around the announcement of the CSPP. We use CDS data from IHS Markit and EDF data from Moody's KMV. For CDS spreads, we find information on 133 of the issuers in our sample. We then match Markit's data with KMV's, resulting in a sample of 80 issuers for which we observe both CDS spreads and EDFs.

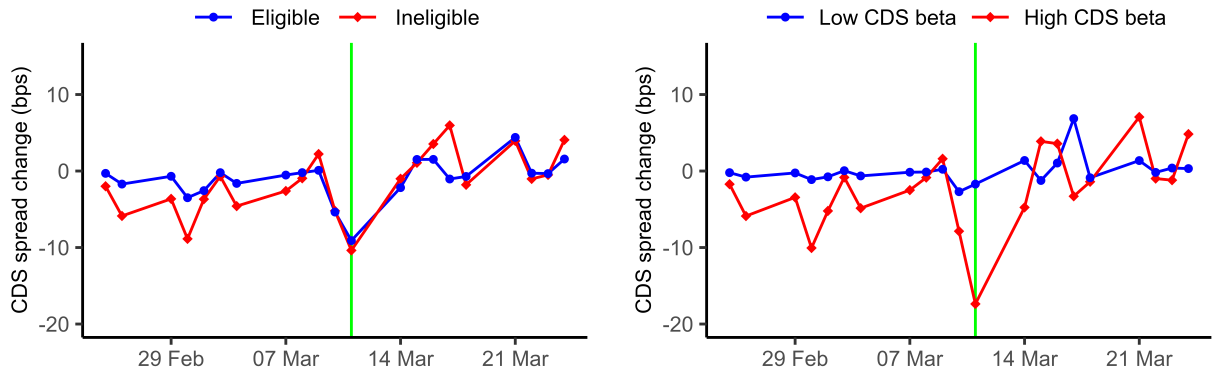
A.1.1.1 CDS SPREADS

Figure A.1(a) plots the average five-year CDS spread of eligible and ineligible issuers, where an issuer is defined as eligible if it had eligible bonds outstanding in 2015. Consistent with our arguments so far, the spreads of eligible and ineligible issuers declined by a comparable amount when the CSPP was announced.

*This paper should not be reported as representing the views of the European Central Bank (ECB). The views expressed are those of the authors and do not necessarily reflect those of the ECB.

†University of Notre Dame, Mendoza College of Business, Notre Dame IN, USA – s.pegoraro@nd.edu.

‡Quantum Bridge Technologies Inc., Toronto, Canada. – mattia.montagna@qubridge.io.



(a) Entities by issuer eligibility

(b) Entities by beta

Figure A.1: Daily change in five-year CDS spreads of euro-area non-financial issuers around the announcement of the CSPP. Issuers are sorted according to eligibility and exposure to non-diversifiable risk. An issuer is classified as eligible if it had eligible bonds outstanding at some time during the calendar year before the announcement. We measure an issuer's exposure to non-diversifiable risk in terms of its CDS beta before the announcement. The CDS beta is the slope coefficient in a regression of the change in the issuer's five-year spread on the change in the average five-year spread of the market. Issuers are classified as high CDS beta if their CDS beta is above the median. The vertical line marks the first trading day after the announcement of the CSPP.

In Figure A.1(b), we sort reference entities on the basis of the beta of their CDS spread. Again, entities with the highest beta experienced the greatest improvement in the valuation of their credit risk. To compute the CDS beta, first we construct a CDS index as the cross-sectional average of the five-year spreads of non-financial issuers domiciled in the euro area. Then, we compute an entity's CDS beta as the slope coefficient in a regression of the daily change in the entity's five-year spread on the daily change in the index's five-year spread.

As a first approximation, we can interpret the level of a CDS spread as a function of the entity's probability of default and of the correlation of the entity's default with the aggregate market. Entities whose default is more likely to happen during economic downturns will have a higher spread for a given (unconditional) probability of default. The CDS beta measures the co-movement of a change in CDS spreads with a change in the aggregate market's spread, regardless of the level of the spread. The CDS beta, therefore, captures the entity's exposure to non-diversifiable credit risk only, and not the entity's idiosyncratic risk.

Table A.1 shows summary statistics for CDS spreads before and after the announcement for all entities, for eligible entities, and for ineligible entities. We consider daily data for the five-year CDS contract, which is the most actively traded, and the 30-year CDS contract, which is the longest maturity in our data. Later, in Table A.3, we show summary statistics for the one-year contract for the subsample of entities for which we

Table A.1: Summary statistics for CDS spreads. The table reports the number of entities and summary statistics for the five-year and 30-year CDS spreads. Summary statistics are separately computed for the three months before and after the announcement of the CSPP using daily data.

	5yr spread (%)			30yr spread (%)		
Issuers:	All	Eligible	Ineligible	All	Eligible	Ineligible
N entities	133	80	53	121	73	48
Pre-CSPP: Mean (%)	1.531	0.942	2.415	1.950	1.377	2.863
Pre-CSPP: Median (%)	0.902	0.789	1.501	1.384	1.203	2.029
Pre-CSPP: St.Dev. (%)	1.894	0.612	2.667	1.780	0.718	2.458
Post-CSPP: Mean (%)	1.406	0.821	2.292	1.804	1.230	2.707
Post-CSPP: Median (%)	0.824	0.718	1.520	1.242	1.092	1.959
Post-CSPP: St.Dev (%)	1.815	0.455	2.582	1.707	0.560	2.383

also have data on their probability of default. In general, we notice the same patterns we observed in Figure A.1: higher-beta entities experience a greater decline in CDS spreads after the announcement.

In Table A.2 we run regressions of changes in CDS spreads after the announcement on an indicator for whether the firm is eligible and the beta of the firm CDS. We also study abnormal CDS spread changes, defined as the change in CDS spreads in excess to the change predicted by the firm's beta. Betas are computed for each maturity of the two maturities. Consistent with theories predicting a decline in risk premia, we observe a larger decline in CDS spreads for entities exposed to more non-diversifiable risk. Whereas the CSPP may have generated scarcity of eligible bonds, it did not generate a scarcity of CDSs. Therefore, we observe no statistically significant changes in CDS spreads for eligible entities, even when considering abnormal changes.

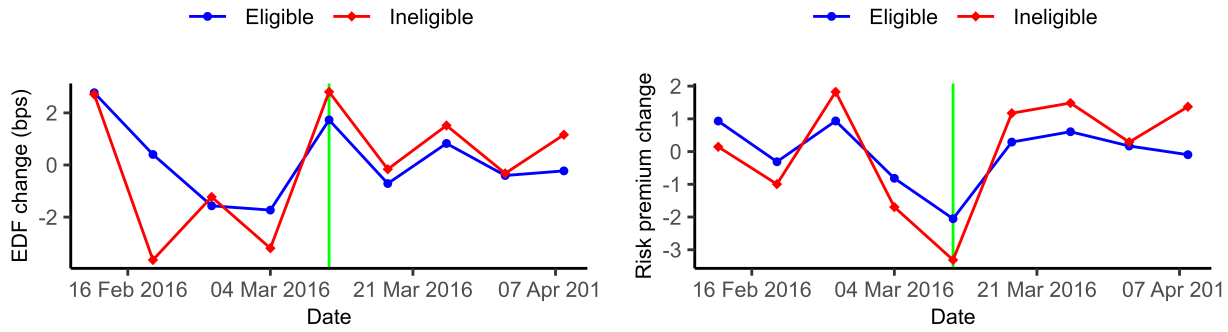
A.1.1.2 CSD Risk Premia

To obtain a measure of risk premia, we consider the ratio between the CDS spread and the expected default frequency (EDF) of bond issuers. We find EDF data for 80 of the 133 issuers in the CDS sample. The ratio between the CDS spread and the entity's EDF represents, approximately, the ratio between the risk-neutral expected default frequency and the default frequency under the physical probability measure. The ratio, therefore, captures a default risk premium. We focus on one-year EDFs and CDS spreads because we can directly interpret these quantities as annualized arrival rates of defaults under the physical and risk-neutral measure, respectively. We use weekly data to reduce mi-

Table A.2: Changes in five-year and thirty-year CDS spreads after the CSPP announcement. The dependent variable is the daily change in CDS spreads (columns 1-4) and the abnormal change in CDS spread (columns 5 and 6). EligibleFirm = 1 if the reference entity had eligible bonds outstanding at some time during the calendar year before the announcement. CDSBeta is the entity's CDS beta. Standard errors are in parentheses and are clustered at the country-industry level.

	Δ CDS spread (bps)				Abn. Δ CDS spread (bps)	
	5yr		30yr		5yr	30yr
	(1)	(2)	(3)	(4)	(5)	(6)
EligibleFirm	−2.191	−0.886	−0.306	0.743	−1.205	2.759
	(3.932)	(2.230)	(4.028)	(3.546)	(4.365)	(3.095)
CDSBeta		−6.390***		−3.379***		
		(0.955)		(0.979)		
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Rating FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	131	131	114	113	111	113
R^2	0.328	0.694	0.412	0.546	0.357	0.493
Notes:	$^{*}p \leq .10$; $^{**}p \leq .05$; $^{***}p \leq .01$					

crostructure noise in the daily estimates of the EDFs (Berndt et al., 2005).



(a) Expected default frequency

(b) Risk premium

Figure A.2: Weekly changes in average one-year EDF and risk premium of euro-area non-financial issuers in the three months before and after the announcement of the CSPP. The vertical line marks the first trading day after the announcement of the CSPP.

Figure A.2 shows the announcement brought about a decline in risk premia. Table A.3 shows summary statistics for EDFs, one-year spreads, and risk premia before and after the announcement. Table A.4 shows regressions of the weekly change in 1-year spreads, 1-year EDFs, and 1-year risk premia. Consistent with the risk channel of monetary pol-

Table A.3: Summary statistics for EDFs, one-year spreads, and risk premia. The table reports the number of entities and summary statistics for entities with EDF and CDS data available. Summary statistics are separately computed for the three months before and after the announcement of the CSPP using daily data.

	1yr EDF (%)			1yr spread (%)			Risk premium		
Issuers:	All	Eligible	Ineligible	All	Eligible	Ineligible	All	Eligible	Ineligible
N entities	80	50	30	80	50	30	80	50	30
Pre-CSPP: Mean	0.184	0.185	0.182	0.599	0.372	0.996	8.669	8.404	9.134
Pre-CSPP: Median	0.050	0.040	0.060	0.280	0.244	0.357	5.652	5.143	6.941
Pre-CSPP: St.Dev.	0.421	0.456	0.352	1.346	0.457	2.090	15.178	15.627	14.351
Post-CSPP: Mean	0.192	0.183	0.207	0.481	0.268	0.854	7.863	6.850	9.631
Post-CSPP: Median	0.050	0.040	0.050	0.210	0.183	0.331	4.680	4.103	5.343
Post-CSPP: St.Dev	0.484	0.481	0.490	1.126	0.356	1.744	17.453	15.412	20.417

icy, risk premia declined the week of the CSPP announcement. No statistically different change in risk premia was observed based on firms' eligibility or based on their CDS beta, consistent with a generalized decline in the premium investors required for risk.

A.1.2 Spreads at Issuance

Next, we consider spreads of new bond issues. Grosse-Rueschkamp et al. (2019) observe that the spreads of new issues declined for bonds rated between BBB+ and BBB- in the second quarter after the announcement of the CSPP. They do not observe any significant decline in spreads in the quarter immediately after the announcement. In the same spirit of Grosse-Rueschkamp et al. (2019), we consider the spreads of new issues. Unlike them, we focus on the change in spreads in the days immediately following the announcement.

Although spreads at issuance provide additional information about changes in valuation around the CSPP announcement, we avoid a causal interpretation of the following results. Unlike outstanding bonds, changes in the yields of new bond issues are affected by firms' market-timing activity, because firms choose which type of bonds to issue and when to issue them. In fact, in section B, we show firms shifted toward riskier issuance after the CSPP announcement, favoring unsecured and non-guaranteed bonds. Because firms shifted toward riskier bonds, changes in spreads at issue underestimate the effect of the CSPP on bond spreads.

We consider zero-coupon and fixed-coupon bonds issued in the six months before and after the CSPP announcement. For these bonds, we can compute yields at issue given information on their issue price, redemption price, maturity, and coupon payments. We then compute each bond's spread at issue as the difference between the yield at issue and the maturity-matched risk-free rate.

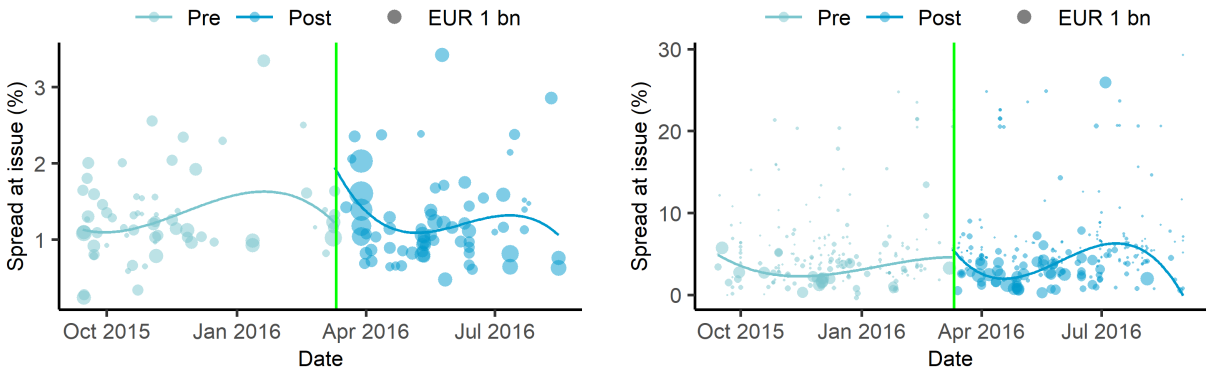
Figure A.3 plots yield spreads at issue around the CSPP announcement, together

Table A.4: Change in one-year CDS spreads, EDF, and risk premium in the week of the CSPP announcement. EligibleFirm = 1 if the reference entity had eligible bonds outstanding at some time during the calendar year before the announcement. CDSBeta is the entity's CDS beta. Standard errors are in parentheses and are clustered at the country-industry level.

	Δ 1yr spread (bps)		Δ 1yr EDF (bps)		Δ Risk premium	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	-9.623^{***}		0.021^{**}		-2.387^{***}	
	(3.297)		(0.009)		(0.532)	
EligibleFirm		-0.579		0.039		0.322
		(5.281)		(0.070)		(0.942)
CDS β		-6.322^{**}		0.012		-0.225
		(2.430)		(0.010)		(0.351)
Country FE	No	Yes	No	Yes	No	Yes
Industry FE	No	Yes	No	Yes	No	Yes
Rating FE	No	Yes	No	Yes	No	Yes
Observations	74	62	83	66	74	62
R^2	-0.000	0.974	0.000	0.577	0.000	0.119
Notes:	$^{*}p \leq .10$; $^{**}p \leq .05$; $^{***}p \leq .01$					

with the predicted values using third-degree polynomials for the pre-announcement and the post-announcement period. Polynomial regressions are weighted by bonds' issued amounts. One can immediately observe two patterns around the CSPP announcement. First, firms increased their issuance activity rapidly after the announcement. Second, the predicted spreads do not appear to immediately decline for either group of bonds.

Next, we adopt a regression discontinuity design using new bond issues in the six months before and after the announcement of the CSPP. Controlling for high-order polynomials, we estimate the discontinuity in spreads around the CSPP announcement. We view our discontinuity estimates as illustrations of a pattern, rather than as measures of a causal effect of the CSPP on coupon rates. In fact, Gelman and Imbens (2019) encourage the use of local linear or quadratic regressions instead of higher-order polynomials. Unfortunately, our data are not dense enough near the discontinuity for us to implement their suggested approach. Moreover, firms changed the characteristics of their bond issues after the announcement, as we show in section B, with firms shifting toward riskier bond issues.



(a) Eligible bonds **(b)** Ineligible bonds

Figure A.3: Spreads at issue of newly issued zero-coupon and fixed-coupon bonds around the CSPP announcement. The dots represent the spreads of newly issued bonds, and their area is proportional to the amount issued. The lines represent the predicted value from a third-degree polynomial regression of spreads on issue date. Regressions are separately estimated for the six months before and after the announcement, and they are weighted by the bonds' issued amounts.

Table A.5: Estimates of the discontinuity in a regression of spreads at issue on issue date. In the first row, we control for a third-degree polynomial; in the second row, we control for a fourth-degree polynomial. We also control for rating, maturity, country, and sector fixed effects. Odd columns show the results from unweighted regressions, whereas even columns show the results for regressions weighted by the amount issued. Standard errors are clustered at the firm level.

	Discontinuity in coupon spread (%)											
	Eligible bonds		Ineligible bonds		Invest. grade bonds		Non-invest. grade bonds		Eligible firms		Ineligible firms	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
3rd degree poly.	0.627**	0.490	−3.914*	2.203	0.523**	0.558*	−3.952*	0.761	0.490	0.345	−1.605	2.317
	(0.286)	(0.302)	(2.044)	(2.718)	(0.247)	(0.330)	(2.033)	(2.645)	(0.525)	(0.303)	(2.063)	(2.468)
4th degree poly.	0.750*	0.425	−5.705**	−2.656	0.433	0.142	−5.580**	−3.807	0.551	0.352	−2.425	−0.921
	(0.441)	(0.446)	(2.532)	(2.147)	(0.366)	(0.455)	(2.558)	(2.678)	(0.740)	(0.501)	(2.627)	(2.626)
Weighted	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Rating FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Maturity FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	134	134	396	396	155	155	375	375	163	163	367	367

Notes: $^{*}p \leq 0.10$; $^{**}p \leq 0.05$; $^{***}p \leq 0.01$

We consider a regression in the following form:

$$s_{it} = a_0^0 + a_0^1 x^1 + \cdots + a_0^p x^p + \text{Post}_t \times (a_1^0 + a_1^1 x^1 + \cdots + a_1^p x^p) + \iota_{r(i)} + \iota_{m(i)} + \iota_{c(i)} + \iota_{s(i)} + u_{it}, \quad \text{(A.1)}$$

where s_{it} is the spread of issue i at date t, x_{it} is the time difference in days between t and the first trading day after the announcement of the CSPP, $\iota_{r(i)}$ is a rating fixed effect, $\iota_{m(i)}$ is a maturity-bin fixed effect like the one used in (1), $\iota_{c(i)}$ is a country fixed effect, and $\iota_{s(i)}$ is a sector fixed effect.

The coefficient a_1^0 provides an estimate of the change in spreads immediately after

the announcement. We report estimates in Table A.5. Here, we consider polynomials of the third and fourth degree. We include estimates obtained with and without weighting observations by the issued amount.

The CSPP announcement was followed by a decline in the spreads of smaller issues of ineligible and non-investment-grade bonds, as a comparison between unweighted and weighted regressions reveal. However, it was not followed by a drop in the spreads of eligible bonds.

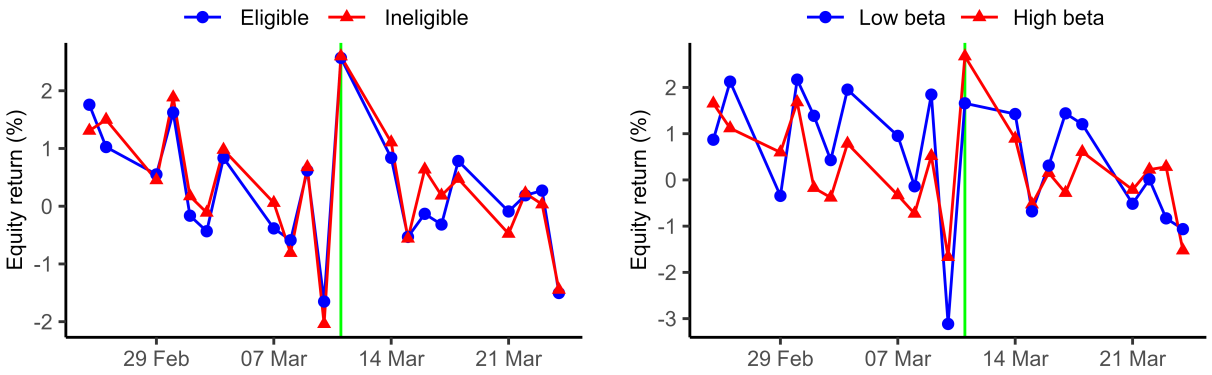
A.1.3 Equity Returns

Finally, we consider equity returns after the CSPP announcement. Whereas a risk channel predicts positive stocks returns for stocks exposed to non-diversifiable risk, the scarcity channel should not affect returns of eligible firms because the CSPP did not create scarcity of corporate stocks. We show stocks of bond issuers experienced positive returns and abnormal returns at the announcement. We find changes in valuation reflect changes in risk premia, consistent with the risk channel of QE and previous findings in bond and CDS markets. We also find no higher abnormal returns for the stocks of eligible and ineligible issuers, consistent with the CSPP not exerting price pressure on stocks through a scarcity channel.

We consider issuers' stock performance. Using Orbis and Compustat data, we match issuers to their stocks. We obtain a sample of 105 publicly traded eligible firms and 534 publicly traded ineligible firms.

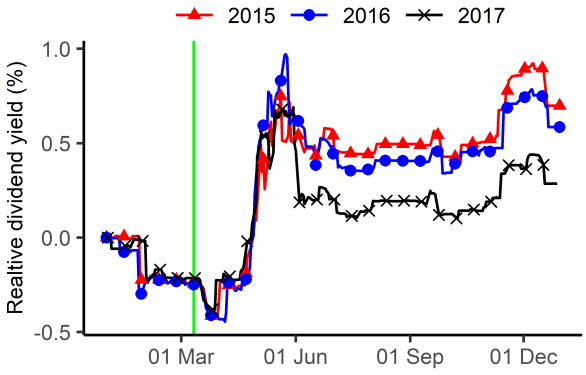
We sort firms based on their eligibility and their beta. We form value-weighted portfolios of eligible and ineligible firms and study their performance and cumulative dividend yield. Figure A.4(a) shows the portfolios of eligible and ineligible firms performed equally well after the CSPP announcement. We then form portfolios based on the betas of stocks with the aggregate portfolio of bond issuers in the euro area. As for bonds, a stock's beta measures the stock's exposure to non-diversifiable risk. Figure A.4(b) illustrates that, at the time of the announcement, the portfolio of high-beta firms experienced higher abnormal returns than the portfolio of low-beta firms.

To formally investigate cross-sectional differences in stock returns after the announcement, we run regressions where the dependent variables are stock returns and abnormal stock returns on the announcement day. Results are in the first four columns in Table A.6. In columns 1 and 3, we show stocks experienced positive and statistically significant returns after the announcement. In columns 2 and 4 we control for country-sector and rating fixed effects and add indicators for firm eligibility and, in case of returns, the beta of the stock. In column 2, we find eligible issuers experienced no better stock returns as in-



(a) Stock returns by issuer eligibility

(b) Stock returns by stock beta



(c) Relative dividend yields

Figure A.4: Stock returns and relative dividend yield of eligible and ineligible issuers. In Figure (a), we plot the daily equity returns of portfolios of eligible and ineligible issuers. In Figure (b), we plot the daily equity returns of portfolios of firms with equity beta above or below median. The vertical line marks the first trading day after the announcement of the 2016 CSPP. In Figure (c), we plot the difference between the cumulative dividend yield of the portfolio of eligible firms and the portfolios of ineligible firms as a function of the day of the year for three different years. The vertical line marks the day of the year corresponding, in 2016, to the first trading day after the announcement of the CSPP.

eligible issuers after the CSPP announcement. However, returns increased with the stock beta, consistent with the risk channel. Finally, in column 4, we observe no relation between abnormal stock returns and the eligibility of the issuers, consistent with the CSPP not exerting price pressure on the stocks of eligible firms other than through a decline in risk premia.

DIVIDEND YIELDS. Finally, we investigate whether eligible firms delivered higher returns to shareholders in the form of dividend payments after the CSPP announcement. Figure A.4(c) plots the difference between the cumulative dividend yield of the portfolio of eligible firms and the portfolio of ineligible firms in years 2015, 2016, and 2017. In Figure A.4(c), a positive (negative) value at a given date indicates that, up to that day of the year, the dividend yield of eligible firms was higher (lower) than ineligible firms.

Table A.6: Stock performance and change in dividend yield. In columns 1 and 2, the dependent variable is the issuer's stock return after the CSPP announcement. In columns 3 and 4, the dependent variable is the abnormal stock return after the CSPP announcement. In columns 5 and 6, the dependent variable is the dividend yield paid within the first ninety days after the CSPP announcement minus the divided yield paid over the same calendar period the previous year. EligibleFirm = 1 if the firm had eligible bonds outstanding at some point during 2015. EquityBeta is the beta of the firm's stock. Standard errors are in parentheses and are clustered at the country-sector level.

	Stock return (%)		Abn. stock return (%)		Δ div. yield (%)	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	1.455^{***}		0.595^{***}		-0.031	
	(0.135)		(0.130)		(0.055)	
EligibleFirm		0.149		0.054		0.115
		(0.361)		(0.349)		(0.274)
Equity β		1.993^{***}				-0.213
		(0.584)				(0.186)
Country FE	No	Yes	No	Yes	No	Yes
Industry FE	No	Yes	No	Yes	No	Yes
Rating FE	No	Yes	No	Yes	No	Yes
Observations	621	612	618	612	600	593
R^2	0.000	0.148	0.000	0.108	0.000	0.081
Notes:	$^{*}p \leq .10$; $^{**}p \leq .05$; $^{***}p \leq .01$					

Figure A.4(c) shows eligible firms increased their dividend yields relative to ineligible firms in the months after the announcement, as Todorov (2020) also observed. However, the pattern is typical for the time of the year. In fact, even in 2015 and 2017, eligible firms sharply increased their dividend yield relative to ineligible firms starting in May.

In columns 5 and 6 of Table A.6, we study the change in divided yield after the announcement, while controlling for seasonality in dividend payments in eligible and ineligible firms. The left-hand side variable is the dividend yield paid within the first ninety days after the CSPP announcement, minus the divided yield paid over the same calendar period the previous year. By comparing dividend yields over the same period of the year, we assess whether eligible firms increased dividend payments as a result of the CSPP. After controlling for seasonality, no significant increase in dividend yields can be observed around the CSPP announcement.

A.2 Additional Results on Bond Issuance

In this Appendix, we provide details on lag between bond-issuance announcements and bond issuance for eligible firms. We also conduct an additional analysis on the relation between the total issuance and the market-timing activity of eligible firms.

A.2.1 The Timeline of Corporate Bond Issuance

Table A.7: Summary statistics of issue amounts and the announcement-to-issuance lag of bonds available on Bloomberg. The sample includes all euro-denominated bonds issued between January 1, 2014 and December 31, 2017 by non-financial corporations domiciled in the euro area.

	All bonds	Eligible bonds	Ineligible bonds
Number of issues	1350	374	976
Avg. issued amount (€mln)	228.74	387.67	167.47
Median issued amount (€mln)	100.00	500.00	54.97
Std. of issued amount (€mln)	258.84	287.43	218.05
Mean announcement-to-issuance lag (days)	8.64	7.97	8.89
Median announcement-to-issuance lag (days)	7.00	7.00	7.00
Std. of announcement-to-issuance lag (days)	9.38	2.82	10.89

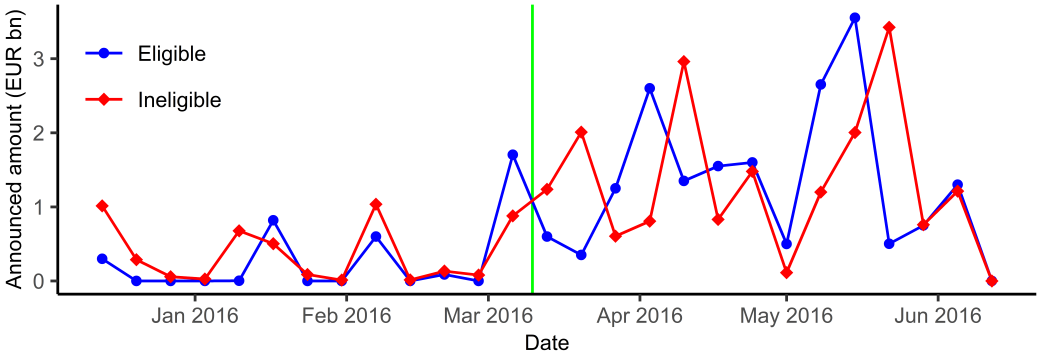


Figure A.5: Weekly announced bond issuance for the three months before and after the CSPP. All bonds are euro-denominated and issued by non-financial corporations domiciled in the euro area. The vertical line marks the announcement of the CSPP.

To shed some light on the typical timeline of a bond issue for eligible firms, we collect some anecdotal evidence by manually searching for information about eligible issuers issuing bonds in the second half of March 2016. Most of the issuers had long-term issuance agreements already in place with major banks. These agreements allow firms to issue bonds of a predetermined type "from time to time," thus giving firms substantial flexibility to issue when they deem it appropriate.

To conduct a more systematic analysis, we use data from Bloomberg, which provides both bonds' issue dates and the dates of the issues' public announcements. Table A.7 provides summary statistics of the time lag between issuance announcements and bond-issue dates. In particular, the median time lag is only seven days. We also plot the weekly time series of bond-issuance announcements in Figure A.5. Here, we observe an increase in bond issuance announcements after the CSPP announcement, thus suggesting the bond issues that took place in the Spring of 2016 had not already been scheduled before the ECB intervention.

Issuance-announcement data provide information on the typical timeline for eligible firms to issue bonds. However, one should not interpret these numbers as representative of the entire bond market. As Table 1 shows, bonds in Bloomberg are biased toward the largest issuers, and eligible firms tend to be large and established issuers themselves. However, new and smaller issuers will face longer delays if they have to present themselves to investors by roadshow or establish relations with rating agencies.

A.2.2 Total Issuance and Market-Timing Activity Among Eligible Firms

To further investigate the effects of scarcity on bond issuance, we study whether firms that timed the market also increased total issuance compared to other firms. As discussed in section A, the relation between market timing and total issuance depends on the elasticity of firms' bond supply. If firms supply bonds very elastically, we might observe no relation between market timing and total issuance.

In section IV, we showed firms elastically supplied bonds in response to the ECB's demand and the decline in risk prima. In particular, in section B, we showed firms increase total issuace in the short term primarily in response to a decline in risk premia. Here, we focus on eligible firms and show that, consistent with these other findings, firms which timed the market more aggressively did not increase total issuance relative to other firms.

We calculate a firm's change in total net issuance by considering the change in net issuance after the CSPP announcement. We calculate the firm's eligible shift by running the same regressions as (2) while omitting the Post×Eligible independent variable. We obtain residuals for eligible and ineligible issuance before and after the announcement and compute the eligible shift as the difference between the change in eligible-issuance residuals and the change in ineligible-issuance residuals around the announcement. We calculate the *requirement shift* in a similar way for the issuance meeting the three eligibility requirements, as discussed in Section A.

A potential concerns is that an eligible shift could mechanically correlate with total issuance. For example, one would observe perfect correlation if all eligible firms had a

net issuance of ineligible bonds always equal to zero.[1] Therefore, to clearly interpret our results, we conduct the tests in this section using an alternative measure of market timing.

As an additional measure of market timing, we define a firm's *eligible share* as the period's fraction of gross issuance that is eligible. We construct this measure for the three- and 10-month periods before and after the announcement. Because gross issuance includes only increases in a bond's outstanding amount, eligible share measures a firm's propensity to use eligible bonds when borrowing funds from the market. If a firm's eligible share increased after the announcement, the firm's propensity to use eligible bonds increased as well. Thus, the change in eligible share offers a measure of market timing that does not mechanically correlate on the amount of bonds issued.

Using the sample of eligible firms, we study whether the change in eligible share around the announcement of the CSPP is correlated with the eligible shift and with the change in total net issuance, by running a regression in the form

$$\mathrm{y}_i = \Delta\text{EligibleShare}_i + \iota_{c(i)} + \iota_{s(i)} + u_i,$$

where y_i is either firm i's eligible shift or its change in total net issuance. The variables $\iota_{c(i)}$ and $\iota_{s(i)}$ are, respectively, country and industry fixed effects. Note that because of the definition of eligible share, the sample for this regression is reduced relative to Table 5. In fact, here we may include only firms with positive gross issuance both before and after the announcement, whereas in Table 5, we could include any firm with a positive outstanding amount of bonds at the beginning of the sample period.

Because eligible bonds may have characteristics that investors find attractive besides their eligibility, in some regressions, we control also for the change in the share of bonds having those characteristics. We then calculate the *meet-the-requirement share* as the fraction of gross issuance that meets the three eligibility requirements; namely, being listed, senior, and investment-grade rates. We thus include the change in the meet-the-requirement share in some of the regressions as a control.

In the first six columns of Table A.8, we verify the change in eligible share is a valid measure of market timing. In particular, we show the change in eligible share is positively correlated with eligible shift. Firms that increased their eligible share the most are also those that increased eligible issuance over ineligible issuance the most, even after controlling for the change in the share of gross issuance meeting requirements.

In the remaining columns of Table A.8, we show firms that timed the market more ag-

[1] The in-sample correlation between total issuance and eligible shift is 18.4% for the three-month horizon and 33.2% for the 10-month horizon.

Table A.8: Issuance and market-timing activity in eligible firms. In the first six columns, the dependent variable is firms' eligible shift in the three months (columns 1-3) and 10 months (columns 4-6) around the CSPP announcement. In the last six columns, the dependent variable is the change in firms' total net issuance in the three months(columns 7-9) and 10 months (columns 10-12) around the CSPP announcement. ΔEligibleShare is the change in the share of eligible gross issuance in the three or 10 months around the CSPP announcement. ΔMeetReqShare is the change in the share of gross issuance meeting eligibility requirements in the three or 10 months around the CSPP announcement. The eligibility requirements are being listed, being senior, and being investment-grade rated. Regressions are weighted by the firms' initial outstanding amount of bonds. Standard errors are in parentheses and are clustered at the firm level.

	Eligible shift (%)						Total issuance (%)					
	3M			10M			3M			10M		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
ΔEligibleShare (%)	0.293*		0.400***	0.387**		0.494***	−0.116		−0.166	−0.079		−0.272
	(0.150)		(0.149)	(0.159)		(0.162)	(0.168)		(0.214)	(0.140)		(0.183)
ΔMeetReqShare (%)		−0.405*	−0.611***		−0.153	−0.505		−0.046	0.039		0.572	0.767*
		(0.204)	(0.224)		(0.258)	(0.341)		(0.211)	(0.267)		(0.391)	(0.400)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	78	78	78	101	101	101	78	78	78	101	105	105
R^2	0.544	0.529	0.599	0.265	0.218	0.287	0.338	0.346	0.360	0.172	0.207	0.225

Notes: $^{*}p \leq .10$; $^{**}p \leq .05$; $^{***}p \leq .01$

gressively by increasing their eligible share did not issue more than other firms. Hence, the change in total issuance among eligible firms is not related to the market-timing activity of firms in terms of changes in the share of eligible bonds issued. The share of gross issuance meeting eligibility requirements is only weakly related to total issuance in the 10-month horizon after controlling for the change in eligible share.

Therefore, the results are consistent with a high elasticity of bond supply and the result in section B whereby total issuance was driven by a change in risk premia.

A.3 The Bond Market before the CSPP Announcement

The corporate bond market in Europe was going through a period of price declines in the two months leading to the CSPP announcement. In January 2016, The Wall Street Journal wrote that "A wave of selling has taken Europe's corporate-bond market to levels typically seen during recessions, another indication that the turmoil in global markets could spread into the wider economy" (Whittall, 2016). Other newspaper articles can later be found discussing the low valuation of corporate bonds at the beginning of 2016 (Barley, 2016; Platt, 2016; Smith, 2016). Signs of distress in the corporate bond market are also discussed in the February and March 2016 Economic Bulletins of the ECB (ECB, 2016a,b).

Figure 2(a) in section A plots the average daily spreads of corporate bonds in the months leading up to the CSPP announcement. From these figures, it appears that European corporate bonds, and non-eligible bonds in particular, had been going through a period of particularly high spreads in the months before the CSPP announcement.

Because credit spreads widened in the first two months of 2016, conditions were particularly suitable for the CSPP announcement to produce the effects predicted by the risk channel of monetary policy. Consistent with the predictions of the risk channel, we find that spreads of bonds exposed to non-diversifiable risk fell the most after the CSPP announcement. These patterns cannot be observed around other QE announcements. Indeed, in Figure A.12 and A.13 of Internet Appendix A.7, we plot similar series for the PSPP and 2014 TLTRO announcements. In the month preceding these announcements, there was no significant decline in bond prices. In this case, bond spreads do not seem to display any heterogeneity in their response to these monetary policy announcements based on their exposure to undiversifiable risk.

No research article, to our knowledge, rigorously attempts to identify the causes of the corporate bond stress at the beginning of 2016 and investigating them is well beyond the scope of our paper. However, it suffices to highlight that the European corporate bond market was, at that time, going through a period of high pressure and increasing uncertainty. While the ECB policy decision may well have been an endogenous response to this situation, this does not detract from our analysis. On the contrary, we can exploit the fact that eligible bonds targeted for purchase tend to have lower levels of undiversifiable risk. We can, thus, disentangle the transmission of QE through the scarcity channel and the risk channel.

A.4 INTERMEDIARIES AND THE CSPP

According to our results, the CSPP generated substantial spillover effects on ineligible bonds which are consistent with a risk channel. In this Appendix, we document a series of facts about the reaction of major bond holders to the CSPP. According to the Securities Holding Statistics, as of December 2015, the largest holders of corporate bonds in the euro area were "Insurance corporations and pension funds" and "Financial corporations other than monetary financial institutions, insurance corporations and pension funds." The latter group is primarily made of investment funds.

Because a full investigation of the transmission of QE through intermediaries is well beyond the scope of this paper, we focus on evidence from flows to bond funds and changes in CDS spreads and stock prices of insurance companies. We also provide evidence from intermediaries' disclosures.

Overall, the evidence suggests major bond holders benefited from the CSPP announcement. Specifically, flows to corporate bond funds rapidly increased after the announcement. As long as bond funds did not invest their entire inflows in eligible bonds, these inflows likely generated demand pressure and spillover effects also on ineligible bonds. Insurance companies enjoyed a reduction in their credit spreads and an increase in their net equity value, suggesting their risk-bearing capacity increased. Moreover, in their disclosures, institutional bond holders made observations on the increased investors' demand for ineligible bonds.

A.4.1 EVIDENCE FROM FUND FLOWS AND STOCK RETURNS

We consider mutual fund flows and CDS spreads. We show that corporate bond funds experienced substantial inflows after the CSPP announcement. This finding suggests investors desired to increase their exposure to corporate credit risk through funds. We also show insurance companies benefited from a drop in their CDS spreads and from an increase in their equity valuation when the CSPP was announced. This finding suggests financial constraints were eased for insurance companies by the CSPP announcement.

FUND FLOWS. We obtain daily data on funds' total net assets (TNA) and returns from Morningstar. We select funds that specialize in European corporate bonds, are located in the European Economic Area, and whose shares are denominated in euro. In the three months before and after the announcement, we have a total of 519 mutual funds and 48 exchange-traded funds specializing in euro-area corporate bonds. For each fund f and

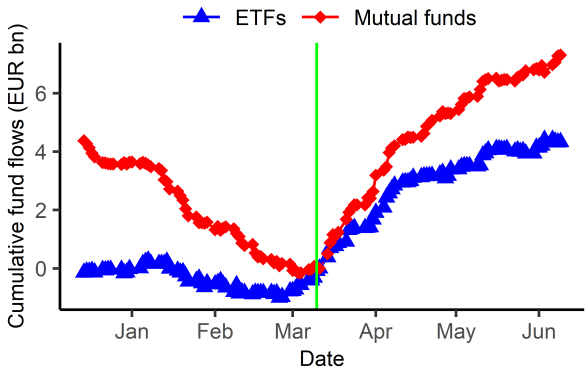


Figure A.6: Corporate bond ETFs and mutual funds

Figure A.7: Cumulative flows to euro-area corporate bond funds. The figure shows cumulative fund flows relative to the day of the CSPP announcement. We consider euro-denominated corporate bond funds domiciled in the European Economic Area in the 3 months before and after the CSPP announcement. The vertical line marks the first trading day after the announcement of the CSPP.

day t we compute daily fund flows as

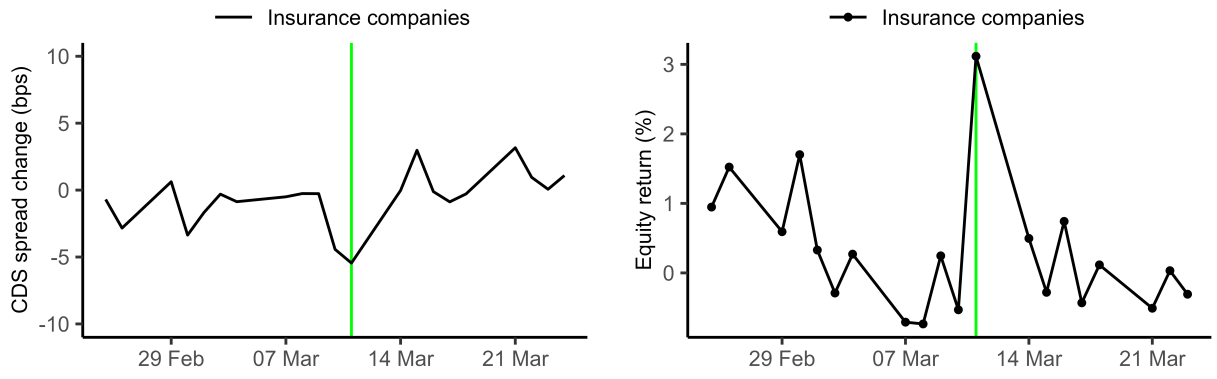
$$\text{Flow}_{ft} = \text{TNA}_{ft} - \text{TNA}_{ft-1}(1 + R_{ft})$$

where TNA_{ft} are fund f's TNA at the end of day t and R_{ft} is the fund's net return from day $t-1$ to day t. Hence, Flow_{ft} measures the net inflow of money into the fund.

Starting from 90 days before the CSPP announcement, we then compute cumulative fund flows relative to the day of the announcement. Figure 2(b) in the main text shows cumulative flows for the entire sample of funds. Figure A.7 shows results for mutual funds and ETFs separately. The figures show that, before the CSPP announcement, corporate bond funds were experiencing outflows. In the three months preceding the announcement, funds lost about €4 bn to outflows. However, after the announcement of the CSPP, flows rapidly reverted and corporate bond funds experience a period of robust inflows. By April, funds had already recovered the €4 bn lost in the three months before the CSPP. By June, funds had gained a total of about €12 bn from day day of the CSPP announcement.

These results from fund flows suggest that investor's appetite for credit risk increased. To the extent that bond funds did not tilt their portfolio entirely toward eligible bonds, fund flows likely created demand pressure across all bonds held by these funds, including ineligible bonds. As a matter of fact, at least some funds were positioned "long credit and duration risk versus the index throughout June",[2] indicating some asset managers

[2]See interview with the Co-Manager of the Henderson Horizon Euro Corporate Bond Fund: https://www.fundssociety.com/en/news/markets/



(a) Change in CDS spreads

(b) Equity returns

Figure A.8: Changes in CDS spreads and equity returns of insurance companies. Figure A.8(a) plots the average daily change in the five-year CDS spreads of euro-area insurance companies. Figure A.8(a) plots the daily return of value-weighted portfolio of stocks of euro-area insurance companies. The vertical line marks the first trading day after the announcement of the CSPP.

increased exposure to credit risk compared to their benchmarks in the short period after the CSPP announcement.

INSURANCE COMPANIES. Next, we investigate whether insurance companies benefited from the CSPP announcement. First, we consider five-year CDS spreads from Markit, for which we have data on 20 euro-area insurance companies in the days around the CSPP announcement. Figure A.8(a) shows CDS spreads dropped by about 5 bps after the CSPP announcement.

Second, we consider stock returns from Compustat, from which we obtain data on 43 euro-area insurers. Figure A.8(b) shows insurers experienced a substantially positive stock return on the day of the announcement. The average return for insurers was 3.12% with a heteroskedasticity-consistent standard error of 0.406% (p-val < 0.1%).

Hence, these findings from insurance companies suggest their perceived risk declined and their net worth increased, thus likely allowing insurers to increase exposure to credit risk.

A.4.2 EVIDENCE FROM INVESTORS' DISCLOSURES

We consider statements made by professional investors during dialogues with the ECB. We also provide quotes from the manager of the largest corporate bond fund at the time of the CSPP announcement. Overall, consistent with our findings, also institutional investors observed an increase in investors' demand for ineligible bonds and the spillover

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effects on ineligible credit spreads.

INSTITUTIONAL INVESTOR DIALOGUES. The ECB holds regular Institutional Investor Dialogues (IIDs) to discuss industry developments and structural trends in the financial sector.[3] On November 16, 2016, the ECB held an IID with representatives of major pension funds, asset managers, and insurance companies[4] to discuss, among other issues, the ongoing monetary policy measures of the ECB.[5] The summary of the meeting reports: "With regards to the Corporate Sector Purchase Programme (CSPP), the most widely acknowledged consequence was spread tightening in the corporate bond market and in other (non-eligible) credit markets while increased issuance activity was not mentioned as frequently as in June 2016. [...] Some investors also mentioned that the ECB's purchases affect private investors' allocation strategies."

In a subsequent IID, held on April 5, 2017, participants reiterated that "With regards to the Corporate Sector Purchase Programme (CSPP), the most widely acknowledged consequence of the programme was spread tightening, followed by reduced financial fragmentation. Increasing issuance, which was expected to be the main impact of the CSPP in the responses received last year, has become less important."

Therefore, based on investors' statements during the IIDs, one can infer that institutional investors noticed a decline in the spreads of non-eligible assets, consistent with our findings on the spillover effects on ineligible bonds.

DISCLOSURE TO FUNDS' CLIENTS. In a commentary to professional clients dated July 31, 2016, Morgan Stanley, which managed the largest euro corporate bond fund at the time of the CSPP announcement, notes that "We continue to expect higher-yielding markets to be supported by ongoing central bank action over the coming months. The ECB bought in excess of €13 billion of corporate bonds in the first seven weeks of the CSPP, and we anticipate continued ECB activity in the market. As a result of the conglomeration of easy central bank policy measures, we expect continued demand for credit. Specifically, we anticipate markets that benefit most from portfolio rebalancing efforts, such as higher-

[3] A list of IIDs and summaries is available at https://www.ecb.europa.eu/mopo/market-contact-groups/iid/html/index.en.html.

[4] Participants included representatives of Aegon Asset Management, Allianz SE, Amundi, Assicurazioni Generali, Aviva Investors, AXA, Nomura Asset Management UK, Norges Bank Investment Management, PGGM, Pioneer Investments, State Street Global Advisors, Swiss Re, Union Investment and Zurich Insurance Group

[5] On June 22, 2016, the ECB held the first IID after the CSPP, but, on that occasion, "Investors agreed that it was too early to draw consequences from the ECB's Corporate Sector Purchase Programme. Nevertheless, they expected increasing issuance and spread tightening going forward"

quality high yield and subordinated notes, to see ongoing demand."[6]

Interestingly, Morgan Stanley expected an increase in demand for high yield and subordinated notes. As discussed in section A, subordinated bonds were not eligible for the CSPP. Hence, the manager of the the largest euro corporate bond fund explicitly acknowledged how the CSPP boosted demand for ineligible bonds.

[6]Source: https://www.morganstanley.com/im/publication/msinvf/commentary/ic_en_msinvf_globalbond.pdf

A.5 CORPORATE INVESTMENTS

Our paper focuses on the effects of corporate QE on the quantity and composition of bond issuance, for which we possess an established theoretical framework. To date, no established theoretical framework exists to predict how corporate QE should affect corporate investments. We leave the study of how a change in the quantity and composition of bond issuance causally affects corporate investments for future research. As a first step in this research direction, in this Internet Appendix, we report the empirically observed correlations between changes in the quantity and composition of bond issuance after the CSPP announcement and changes in real investments for the subsample of firms for which we have financial-statement data.

To explore how firms changed their investments, we use end-of-the-year detailed financial statements from Orbis. We are able to match 569 issuers from the CSDB to Orbis. Out of these, 113 are eligible firms. We consider changes in growth rates for seven quantities: (i) total assets; (ii) fixed assets, (iii) property, plant and equipment (PPE); (iv) intangible assets excluding goodwill; (v) long term financial investments; (vi) employment; and (vii) cash and equivalent instruments. We also consider the change in the research and development (R&D) expenses-to-sales ratio to evaluate firm investments in long-term projects which may not be immediately reflected in firms' assets. To limit the influence of outliers, we winsorize the top and bottom 1% of the observations. Tables A.14 and A.15 in the Internet Appendix show results when we winsorize at the 0.5% and 2.5% level.

We measure each firm's change in total issuance and its shift to eligible bonds. We compute a firm's *change in total net issuance* (ΔNetIssuance) as its change in net issuance around the CSPP announcement. We use the 10-month period before and after the CSPP to evaluate the change to cover issuance over the entire 2016. We also compute a firm's *eligible shift* (EligibleShift) as a measure of a firm's market-timing activity in response to the scarcity channel. Specifically, we run the same regressions as (2) for the 10-month horizon, but we omit the Post$\times$Eligible independent variable. We obtain residuals for eligible and ineligible issuance before and after the announcement. For each firm, eligible shift is computed as the difference between the change in eligible-issuance residuals and the change in ineligible-issuance residuals around the announcement. A cross-sectional average of this firm-level measure of eligible shift provides the same point estimates on the Post$\times$Eligible coefficient in column 4 of Table 5. We use this measure of eligible shift when studying the market-timing activity of eligible firms in the cross section.

Let quantity q_{it} represent either a growth rate for firm i during year t or the R&D-to-sales ratio at the end of year t. Let $\Delta q_{it} \coloneqq q_{it} - q_{it-1}$ represent the change in this quantity

from year $t-1$ to year t. For the sample of eligible firms, we run the following regression:

$$\Delta q_{i2016} = \beta^{TI} \Delta \text{NetIssuance}_i + \beta^{TE} \text{EligibleShift}_i + \text{Controls}_i + \iota_{c(i)} + \iota_{s(i)} + u_i. \quad \text{(A.2)}$$

ΔNetIssuance$_i$ is the firm's change in total net issuance around the CSPP announcement, and EligibleShift$_i$ measures the firm's shift toward eligible issuance after the CSPP announcement. We control for the log of total assets as of 2015 and the log of liabilities as of 2015. By doing so, we control for size and leverage. The indicators $\iota_{c(i)}$ and $\iota_{s(i)}$ are, respectively, country and sector fixed effects. Although our focus is on the relation between market timing, measured by the eligible shift, and investments, we include the change in total net issuance because firms with better investment opportunities are, in general, more likely to increase total bond issuance.

Panel A of Table A.9 reports the results. Total net issuance is positively associated with asset growth and, in particular, growth of fixed assets. A one standard deviation increase in ΔNetIssuance is associated with a 0.5 standard deviation increase in the growth of fixed assets. Moreover, we find a statistically significant relation between changes in net issuance and the growth of real long-term investments, namely PPE and intangible assets. The relation between issuance and growth in long term financial assets is similar in terms of magnitude, but is not statistically significant.

Focusing on firms' eligible shift, we find no statistically significant relation between eligible shift and investments. According to the point estimates, firms that shifted the most toward eligible issuance increased growth in total assets, fixed assets, long-term financial investments, employment, and cash holdings. We find a negative relation with R&D expenses. However, none of these estimates are statistically significant.

Finally, we explore the relation between unsecured issuance and firm investments. In section B we showed eligible and ineligible firms shifted toward unsecured issuance after the CSPP announcement. For the sample of all firms, we run regressions similar to (A.2) where we replace the eligible shift with the unsecured shift, which is calculated in the same manner.[7] We also include an indicator for the firm's eligibility and interact it with the change in total net issuance and the unsecured shift. By doing so, we assess heterogeneity between eligible and ineligible firms.

Panel B of Table A.9 shows the results. We find eligible firms increased cash holdings compared to ineligible firms. However, consistent with De Santis and Zaghini (2021)

[7]Specifically, we run the same regressions as those in Panel A of Table 9, but we omit the Post×Unsecured independent variable, thus obtaining residuals for unsecured and secured issuance before and after the announcement. For each firm, unsecured shift is calculated as the difference between the change in unsecured-issuance residuals and the change in secured-issuance residuals around the announcement.

Table A.9: Changes in growth rates and R&D from 2015 to 2016. In columns 1-7, the dependent variables are changes in the growth rates of total assets (A), fixed assets (FA), property, plant, and equipment (PPE), intangibles excluding goodwill (IA), long-term financial investments (LTFI), employees (Empl), and cash (Cash). In column 8, the dependent variable is the change in the ratio of R&D expenses to sales. EligibleFirm = 1 if the firm had eligible bonds outstanding at some point during 2015. ΔNetIssuance is the change in total net issuance from the 10 months before to the 10 months after the announcement. EligShift measures the shift toward eligible issuance with the methodology described in section A.2.2. UnsecuredShift measures the shift toward unsecured issuance obtained with a similar methodology. We control for country and industry fixed effects and lagged values of log-assets and log-liabilities. Dependent variables and issuance measures are expressed in units of standard deviation. Regressions are weighted by firms' outstanding amount of bonds. Standard errors are in parentheses and are clustered at the country-sector level.

PANEL A: SCARCITY CHANNEL AND INVESTMENTS (ELIGIBLE ISSUERS)

	A	FA	PPE	IA	LTFI	Empl	Cash	R&D
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ΔNetIssuance	0.567**	0.509**	0.290**	0.242***	0.234	−0.167	0.165	−0.043
	(0.269)	(0.233)	(0.118)	(0.087)	(0.252)	(0.230)	(0.117)	(0.210)
EligibleShift	0.216	0.131	0.001	0.089	0.117	0.321	0.256	−0.338
	(0.192)	(0.151)	(0.076)	(0.073)	(0.124)	(0.239)	(0.174)	(0.249)
FEs and controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	108	108	106	106	107	100	107	107
R^2	0.596	0.585	0.319	0.647	0.671	0.633	0.266	0.371
Notes:	$^{*}p \leq .10$; $^{**}p \leq .05$; $^{***}p \leq .01$							

PANEL B: RISK CHANNEL AND INVESTMENTS (ALL ISSUERS)

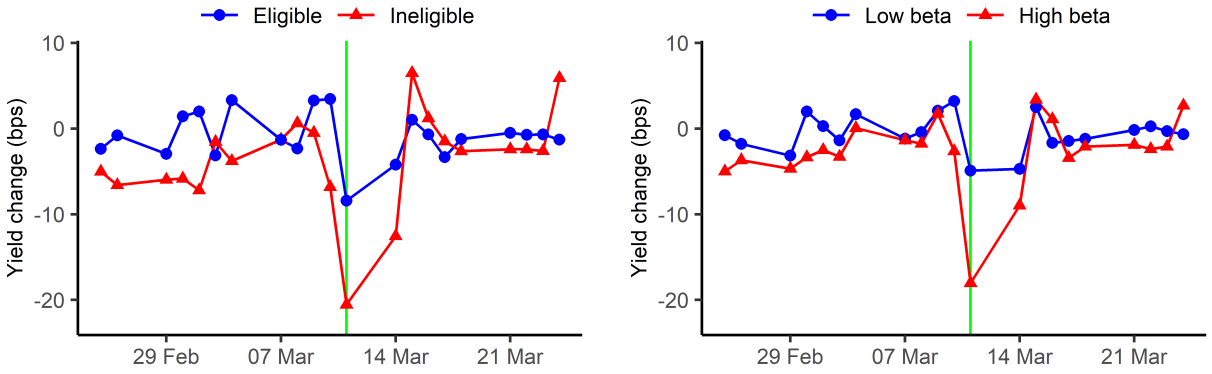
	A	FA	PPE	IA	LTFI	Empl	Cash	R&D
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
EligibleFirm	−0.049	0.017	−0.025	−0.149*	−0.090	−0.107	0.139***	0.192
	(0.086)	(0.128)	(0.055)	(0.084)	(0.125)	(0.274)	(0.053)	(0.146)
ΔNetIssuance	0.558***	1.002**	0.027	0.295***	0.588**	0.082	0.134*	0.243*
	(0.205)	(0.468)	(0.085)	(0.106)	(0.256)	(0.353)	(0.075)	(0.130)
UnsecuredShift	−0.405*	−0.903*	−0.144**	−0.244*	−0.589**	−0.252	0.109	−0.399***
	(0.220)	(0.478)	(0.071)	(0.127)	(0.241)	(0.340)	(0.075)	(0.137)
EligibleFirm×ΔNetIssuance	1.501*	0.530	0.374*	0.027	−0.242	0.911	0.615	0.407
	(0.881)	(0.821)	(0.226)	(0.538)	(0.659)	(0.775)	(0.740)	(0.614)
EligibleFirm×UnsecuredShift	−0.990	−0.115	−0.156	0.108	0.410	−0.688	−0.578	−0.362
	(0.720)	(0.706)	(0.204)	(0.518)	(0.498)	(0.698)	(0.651)	(0.506)
FEs and controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	455	451	447	433	446	402	451	459
R^2	0.389	0.344	0.126	0.377	0.385	0.512	0.189	0.234
Notes:	$^{*}p \leq .10$; $^{**}p \leq .05$; $^{***}p \leq .01$							

and Todorov (2020), eligible issuers did not increase investments compared to ineligible ones. Moreover, similar to the set of eligible firms in panel A, we find an increase in total issuance is associated with an increase in assets and fixed assets, with intangible and long-term financial investments increasing significantly among ineligible issuers.

A shift toward unsecured issuance is correlated with a decline in assets and fixed assets. The association is statistically significant for all components of fixed assets and strongest for PPE and long-term investments. Moreover, a shift toward unsecured issuance is also associated with a decline in R&D expenses. No stastistically significant difference exists between eligible and ineligible firms in their relation between unsecured shift and investments.

Overall, these results indicate that firm issuance choices were correlated with real investments. Firms that issued more also increased the growth in long-term assets. Moreover, for firms that shifted toward unsecured issuance, we observe a decline in investments in long-term assets and projects. However, further research is needed to establish a causal link between issuance choices and investments.

A.6 Additional Figures and Tables



(a) Yields by eligibility

(b) Yields by exposure to non-diversifiable risk

Figure A.9: Average change in yields of euro-denominated corporate bonds around the CSPP announcement. Bonds are sorted according to their eligibility and their exposure to non-diversifiable risk. We measure a bond's exposure to non-diversifiable risk in terms of its beta before the announcement. The beta is the slope coefficient in a regression of the daily change in bond yields on the change in the aggregate bond market's yield. Bonds are classified as high beta if their beta is above the median of the cross-sectional distribution of betas. The vertical line marks the first trading day after the announcement of the CSPP.

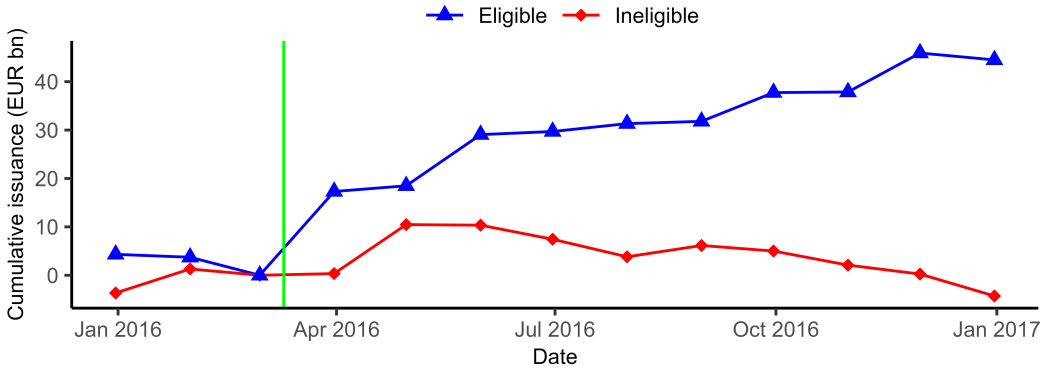
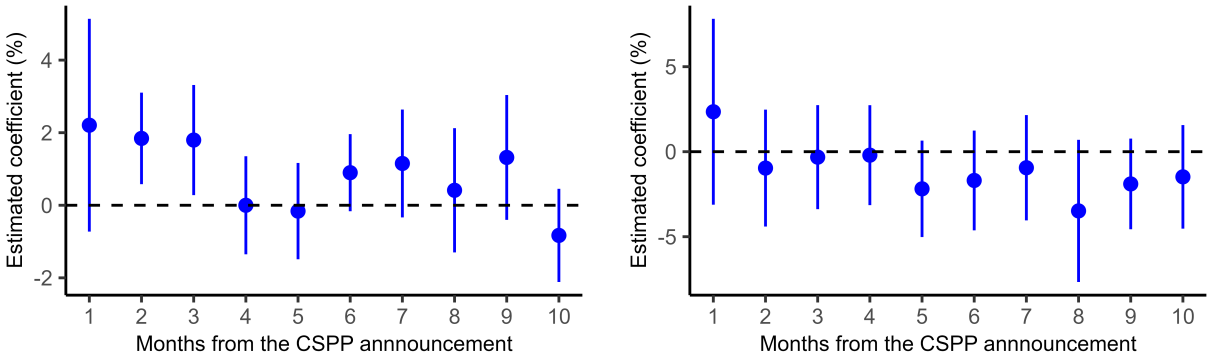


Figure A.10: Cumulative issuance of eligible firms. The figure shows the cumulative change in the outstanding amount of eligible and ineligible bonds for eligible firms. The plot shows the difference in outstanding amounts relative to the month before the announcement of the CSPP.



(a) Total issuance

(b) Relative total issuance

Figure A.11: Relative total issuance after the CSPP announcement. Figure A.11(a) plots the estimates and 95% confidence intervals for the coefficients γ_τ's in the following regression:

$$\frac{I_{it}}{B_i} = \sum_{\tau=1}^{10} \gamma_\tau \mathbb{I}[t = t_0 + \tau] + \iota_i + u_{it},$$

where I_{it} is the total net issuance of firm i in moth t, $\mathbb{I}[\cdot]$ is a indicator function, t_0 is the month before the CSPP announcement, and ι_i is a firm fixed effect. We consider the three months before the CSPP announcement for the pre-announcement period and B_i is firm i's outstanding amount of bonds at the beginning of the pre-announcement period. Standard errors are double clustered at the firm and country-industry-month level. Figure A.11(b) plots the estimates and 95% confidence intervals for the coefficients β_τ's in the following regression:

$$\frac{I_{it}}{B_i} = \sum_{\tau=1}^{10} \beta_\tau \text{EligibleFirm}_i \times \mathbb{I}[t = t_0 + \tau] + \iota_i + \iota_{c(i)s(i)t} + u_{it},$$

where I_{it} is the total net issuance of firm i in moth t, EligibleFirm_i is an indicator variable taking the value of one if firm i had eligible bonds outstanding in the year before the the announcement of the CSPP, $\mathbb{I}[\cdot]$ is a indicator function, t_0 is the month before the CSPP announcement, ι_i is a firm fixed effect, and $\iota_{c(i)s(i)t}$ is a country-industry-month fixed effect. We consider the three months before the CSPP announcement for the pre-announcement period and B_i is firm i's outstanding amount of bonds at the beginning of the pre-announcement period. Standard errors are double clustered at the firm and country-industry-month level.

Table A.10: Changes in bond yield spreads after the CSPP announcement for the sample of bonds with price changes in at least half of the trading days in the three months before and after the announcement. We use bonds outstanding in the three months before and after the announcement of the CSPP. The dependent variable is the change in spread (columns (1)-(4)) and the abnormal change in spread (columns (5)-(8)). EligibleBond = 1 if the bond is eligible to be used as collateral at the ECB as of three months before the CSPP announcement. BidAsk is the bond's average bid-ask spread relative to the midpoint during the period starting three months before the announcement and ending two weeks before it. A firm is classified as eligible if it had eligible bonds outstanding at some time during the calendar year before the announcement. Regressions are weighted by the bond's outstanding amount. Standard errors are in parentheses and are clustered at the country-industry level.

	Two-day spread change (bps)				Two-day abnormal spread change (bps)			
	All firms		Eligible firms		All firms		Eligible firms	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
EligibleBond	8.210***	7.015**	8.427***	7.072**	−9.532***	−8.867**	−8.152***	−9.506**
	(2.685)	(3.486)	(3.151)	(3.055)	(3.517)	(3.815)	(3.038)	(3.852)
BidAsk	−7.027*	−1.058	−2.958	−0.870	2.288	3.604	6.763***	4.199*
	(3.643)	(2.490)	(2.935)	(3.210)	(6.798)	(8.898)	(2.115)	(2.325)
Country-industry FE	Yes	No	Yes	No	Yes	No	Yes	No
Firm FE	No	Yes	No	Yes	No	Yes	No	Yes
Maturity FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Rating FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,483	1,220	917	889	1,483	1,220	917	889
R^2	0.165	0.590	0.409	0.545	0.117	0.578	0.633	0.435

Notes: $^{*}p \leq .10$; $^{**}p \leq .05$; $^{***}p \leq .01$

Table A.11: Net issuance by characteristics related to eligibility by eligible firms within subsamples. In Panel A, MeetReq = 1 if the issuance is listed, senior, and investment-grade rated, otherwise MeetReq = 0. We consider subsamples of eligible issuance (columns 1 and 2), ineligible issuance (columns 3 and 4), issuance rated AA- or above (columns 5 and 6), issuance rated from A- to A+ (columns 7 and 8), and issuance rated BBB- to BBB+ (columns 9 and 10). In Panel B, MeetNonRatingReq = 1 if the issuance is listed and senior, otherwise MeetNonRatingReq = 0. We consider subsamples of eligible issuance (columns 1 and 2), ineligible issuance (columns 3 and 4), investment-grade issuance (columns 5 and 6), and non-investment grade issuance (columns 7 and 8). In both panels, Post = 1 after the announcement of the CSPP. We control for an interactions between FirstMonth and indicators for the issuance type, where FirstMonth = 1 for the month in which the CSPP was announced. We include firm-month fixed effects and interactions between firm fixed effects and issuance-type indicators. Odd-numbered columns consider the three months before and after the announcement. Even-numbered columns consider the 10 months before and after the announcement. Regressions are weighted by firms' initial outstanding amount of bonds at the beginning of the sample period. Standard errors are in parentheses and are double-clustered at the country-industry-month and firm level.

PANEL A: ISSUANCE MEETING LISTING, SENIORITY, AND RATING REQUIREMENTS

	Net Issuance by requirements (%)									
	Eligible		Ineligible		AA and above		A		BBB	
	3M	10M	3M	10M	3M	10M	3M	10M	3M	10M
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Post×MeetReq	1.521***	0.665***	0.738*	0.066	2.514**	0.986*	1.221**	0.330	0.953*	0.327
	(0.446)	(0.235)	(0.393)	(0.177)	(1.141)	(0.473)	(0.591)	(0.211)	(0.532)	(0.298)
FirstMonth×MeetReq	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-MeetReq FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,328	7,880	1,632	5,680	216	800	696	2,480	1,308	4,440
R^2	0.596	0.532	0.587	0.538	0.629	0.551	0.618	0.546	0.587	0.531

Notes: $^{*}p \leq .10$; $^{**}p \leq .05$; $^{***}p \leq .01$

PANEL B: ISSUANCE MEETING LISTING AND SENIORITY REQUIREMENTS

	Net Issuance by requirements (%)							
	Eligible		Ineligible		Investment grade		Non-invest. grade	
	3M	10M	3M	10M	3M	10M	3M	10M
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post×MeetNonRatingReq	1.695***	0.530**	0.712*	−0.035	2.174***	0.623**	1.699	−0.860
	(0.481)	(0.246)	(0.369)	(0.212)	(0.595)	(0.305)	(1.169)	(1.062)
FirstMonth×MeetNonRatingReq	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-MeetNonRatingReq FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,328	7,880	1,632	5,680	2,028	6,760	480	2,040
R^2	0.596	0.531	0.589	0.531	0.599	0.529	0.534	0.512

Notes: $^{*}p \leq .10$; $^{**}p \leq .05$; $^{***}p \leq .01$

Table A.12: Net issuance by characteristics related to eligibility around the CSPP announcement for the sample of ineligible firms. In columns 1 and 2, we sort issuance based on whether it is listed, senior, and investment-grade rated (MeetReq = 1) or not (MeetReq = 0). In columns 3 and 4, we sort issuance based on whether it is listed (Listed = 1) or not (Listed = 0). In columns 5 and 6, we sort issuance based on whether it is senior (Senior = 1) or not (Senior = 0). In columns 7 and 8, we sort issuance based on whether it is investment-grade rated (InvGrade = 1) or not (InvGrade = 0). Post = 1 after the announcement of the CSPP. We control for interactions between FirstMonth and indicators for the issuance type, where FirstMonth = 1 for the month in which the CSPP was announced. We include firm-month fixed effects and interactions between firm fixed effects and issuance-type indicators. Odd-numbered columns consider the three months before and after the announcement. Even-numbered columns consider the 10 months before and after the announcement. Regressions are weighted by firms' initial outstanding amount of bonds at the beginning of the sample period. Standard errors are in parentheses and are double-clustered at the country-industry-month and firm level.

	Net issuance by characteristics (%)							
	Requirements		Listing		Seniority		Rating	
	3M	10M	3M	10M	3M	10M	3M	10M
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post×MeetReq	−1.226*	−0.277						
	(0.733)	(0.373)						
Post×Listed			0.793	0.473				
			(0.856)	(0.388)				
Post×Senior					0.330	−0.234		
					(0.800)	(0.358)		
Post×InvGrade							−0.508	0.228
							(0.825)	(0.396)
FirstMonth×IssuanceType	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-IssuanceType FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	31,152	102,520	31,152	102,520	31,152	102,520	31,152	102,520
R^2	0.567	0.515	0.543	0.511	0.579	0.523	0.564	0.515

Notes: $^{*}p \leq .10$; $^{**}p \leq .05$; $^{***}p \leq .01$

Table A.13: Relation between bond characteristics and changes in bond yield spreads after the CSPP announcement and bond betas. We use bonds outstanding in the three months before and after the announcement of the CSPP. The dependent variable is the change in spread in the two days following the CSPP announcement(columns (1)-(3)) and the bond beta (columns (4)-(6)). Unsecured = 1 if the bond is unsecured. NonGuaranteed = 1 if the bond is not guaranteed. BidAsk is the bond's average bid-ask spread relative to the midpoint during the period starting three months before the announcement and ending two weeks before it. Regressions are weighted by the bond's outstanding amount. Standard errors are in parentheses and are clustered at the country-industry level.

	Two-day spread change (bps)			Bond beta		
	(1)	(2)	(3)	(4)	(5)	(6)
Unsecured	-23.798^{***}		-24.731^{***}	0.708^{**}		0.681^{**}
	(7.672)		(8.386)	(0.304)		(0.301)
NonGuaranteed		1.981	3.513		0.146	0.104
		(5.970)	(6.377)		(0.163)	(0.165)
BidAsk	19.871	19.438	20.053	2.845	2.867	2.850
	(60.702)	(60.696)	(60.547)	(2.908)	(2.914)	(2.910)
Country-industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Maturity FE	Yes	Yes	Yes	Yes	Yes	Yes
Rating FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,601	1,601	1,601	1,601	1,601	1,601
R^2	0.104	0.102	0.104	0.113	0.113	0.113
Notes:	$^{*}p \leq .10$; $^{**}p \leq .05$; $^{***}p \leq .01$					

Table A.14: Change in growth rates and R&D from 2015 to 2016 with a 0.5% winsorization. In columns 1-7, the dependent variables are changes in the growth rates of total assets (A), fixed assets (FA), property, plant, and equipment (PPE), intangibles excluding goodwill (IA), long-term financial investments (LTFI), employees (Empl), and cash (Cash). In column 8, the dependent variable is the change in the ratio of R&D expenses to sales. EligibleFirm = 1 if the firm had eligible bonds outstanding at some point during 2015. ΔNetIssuance is the change in total net issuance from the 10 months before to the 10 months after the announcement. EligShift measures the shift toward eligible issuance with the methodology described in section A.2.2. UnsecuredShift measures the shift toward unsecured issuance obtained with a similar methodology. We control for country and industry fixed effects and lagged values of log-assets and log-liabilities. Dependent variables and issuance measures are expressed in units of standard deviation. Regressions are weighted by firms' outstanding amount of bonds. Standard errors are in parentheses and are clustered at the country-sector level.

PANEL A: ELIGIBLE ISSUERS

	A	FA	PPE	IA	LTFI	Empl	Cash	R&D
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ΔNetIssuance	0.567**	0.509**	0.290**	0.241***	0.196	−0.437	0.091	−0.069
	(0.269)	(0.233)	(0.118)	(0.087)	(0.211)	(0.315)	(0.058)	(0.207)
EligibleShift	0.216	0.131	0.001	0.088	0.098	0.373	0.119	−0.316
	(0.192)	(0.151)	(0.076)	(0.072)	(0.104)	(0.303)	(0.084)	(0.250)
FEs and controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	108	108	106	106	107	100	107	107
R^2	0.596	0.585	0.319	0.650	0.753	0.635	0.248	0.339
Notes:	$^{*}p \leq .10$; $^{**}p \leq .05$; $^{***}p \leq .01$							

PANEL B: ALL ISSUERS

	A	FA	PPE	IA	LTFI	Empl	Cash	R&D
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
EligibleFirm	−0.023	−0.024	−0.039	−0.189*	−0.033	−0.135	0.064**	0.066
	(0.032)	(0.093)	(0.046)	(0.107)	(0.050)	(0.372)	(0.026)	(0.056)
ΔNetIssuance	0.216***	0.609**	−0.038	0.224**	0.239**	−0.234	0.081*	0.102**
	(0.074)	(0.301)	(0.081)	(0.105)	(0.105)	(0.422)	(0.044)	(0.051)
UnsecuredShift	−0.168**	−0.557*	−0.112*	−0.121	−0.238**	0.068	0.023	−0.170***
	(0.083)	(0.309)	(0.061)	(0.142)	(0.099)	(0.375)	(0.039)	(0.054)
EligibleFirm×ΔNetIssuance	0.510	0.301	0.336*	−0.051	−0.102	−0.101	0.142	0.134
	(0.323)	(0.501)	(0.193)	(0.450)	(0.266)	(0.953)	(0.339)	(0.261)
EligibleFirm×UnsecuredShift	−0.319	−0.048	−0.116	0.065	0.168	−0.028	−0.138	−0.125
	(0.269)	(0.437)	(0.155)	(0.439)	(0.201)	(0.815)	(0.313)	(0.208)
FEs and controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	455	451	447	433	446	402	451	459
R^2	0.277	0.293	0.114	0.285	0.449	0.529	0.144	0.183
Notes:	$^{*}p \leq .10$; $^{**}p \leq .05$; $^{***}p \leq .01$							

Table A.15: Changes in growth rates and R&D from 2015 to 2016 with a 2.5% winsorization. In columns 1-7, the dependent variables are changes in the growth rates of total assets (A), fixed assets (FA), property, plant, and equipment (PPE), intangibles excluding goodwill (IA), long-term financial investments (LTFI), employees (Empl), and cash (Cash). In column 8, the dependent variable is the change in the ratio of R&D expenses to sales. EligibleFirm = 1 if the firm had eligible bonds outstanding at some point during 2015. ΔNetIssuance is the change in total net issuance from the 10 months before to the 10 months after the announcement. EligShift measures the shift toward eligible issuance with the methodology described in section A.2.2. UnsecuredShift measures the shift toward unsecured issuance obtained with a similar methodology. We control for country and industry fixed effects and lagged values of log-assets and log-liabilities. Dependent variables and issuance measures are expressed in units of standard deviation. Regressions are weighted by firms' outstanding amount of bonds. Standard errors are in parentheses and are clustered at the country-sector level.

PANEL A: ELIGIBLE ISSUERS

	A	FA	PPE	IA	LTFI	Empl	Cash	R&D
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ΔNetIssuance	0.580**	0.541**	0.290**	0.303***	0.277	0.079	0.216	0.182
	(0.267)	(0.249)	(0.118)	(0.111)	(0.299)	(0.171)	(0.158)	(0.222)
EligibleShift	0.239	0.147	0.001	0.126	0.139	0.268	0.287	−0.460*
	(0.202)	(0.156)	(0.076)	(0.085)	(0.147)	(0.193)	(0.203)	(0.240)
FEs and controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	108	108	106	106	107	100	107	107
R^2	0.580	0.581	0.319	0.537	0.578	0.617	0.275	0.486

Notes: $^{*}p \leq .10$; $^{**}p \leq .05$; $^{***}p \leq .01$

PANEL B: ALL ISSUERS

	A	FA	PPE	IA	LTFI	Empl	Cash	R&D
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
EligibleFirm	−0.034	0.070	0.024	−0.192*	−0.149	−0.117	0.183**	0.280
	(0.095)	(0.158)	(0.091)	(0.111)	(0.182)	(0.196)	(0.074)	(0.222)
ΔNetIssuance	0.665***	0.926**	0.219*	0.497***	0.869**	0.312	0.153	0.356**
	(0.241)	(0.372)	(0.130)	(0.165)	(0.365)	(0.337)	(0.101)	(0.165)
UnsecuredShift	−0.491*	−0.823**	−0.262**	−0.496***	−0.822**	−0.449	0.176*	−0.594***
	(0.259)	(0.373)	(0.119)	(0.181)	(0.340)	(0.339)	(0.099)	(0.164)
EligibleFirm×ΔNetIssuance	1.766*	1.172	0.487	0.174	−0.349	1.890**	0.914	0.583
	(1.023)	(1.000)	(0.368)	(0.878)	(0.958)	(0.764)	(0.987)	(0.669)
EligibleFirm×UnsecuredShift	−1.164	−0.567	−0.228	0.180	0.559	−1.402**	−0.875	−0.240
	(0.843)	(0.806)	(0.360)	(0.841)	(0.725)	(0.680)	(0.864)	(0.604)
FEs and controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	455	451	447	433	446	402	451	459
R^2	0.385	0.372	0.195	0.344	0.345	0.503	0.208	0.294

Notes: $^{*}p \leq .10$; $^{**}p \leq .05$; $^{***}p \leq .01$

A.7 Disentangling the Effects of Concurrent Announcements

The CSPP in March 2016 was announced in a policy package that included the expansion of the ECB's public sector QE program, the PSPP, a new round of Targeted Long-Term Financing Operations (TLTRO) for banks, and a interest rate cut of 5 bps. The CSPP was the most novel policy in the package. At the time of the March 2016 announcement, the ECB was already conducting asset purchases totaling €60bn each month combined, with the PSPP constituting the great majority of the total. Moreover, in June 2014, the ECB had already implemented a first round of TLTRO along with a rate cut of 10 bps.

In this Appendix, we exploit the staggered announcement and implementation of previous PSPP and TLTRO-plus-rate-cut policies to show that that these additional policy announcements cannot account for the empirical patterns we observe after the March 2016 announcement. Although we are unable to assess whether the CSPP *in isolation* would have achieved the same results, our empirical analyses indicate that the CSPP was a crucial, at least as an additional policy measure, to drive the results we document in this paper.

We repeat the key tests of our paper for the January 22, 2015 announcement of the PSPP and the June 5, 2014 announcement of a TLTRO and a 10 bps rate cut. These announcements represent larger policy innovations than the March 2016 PSPP and TLTRO-plus-rate-cut policies. In particular, in January 2015, the ECB announced a €60 bn-per-month PSPP program, wheres the March 2016 announcement involved an expansion of €20 bn per month, to be divided between PSPP and CSPP purchases. Moreover, whereas the 2016 TLTRO was similar to the 2014 one, in June 2014 the ECB cut rates by 10 bps, as opposed to the 5 bps rate cut in March 2016.

Results for the 2015 PSPP announcement and the 2014 TLTRO-plus-rate-cut announcement are reported below. In Figures A.12 and A.13 we see spreads *did not* drop, on average, after these two policy announcements. Moreover, there is limited heterogeneity across high-beta and low-beta bonds, suggesting credit risk premia did not substantially drop.

We formally investigate this pattern in Table A.16. Whereas we observe a large and statistically significant baseline drop of 14.107 bps in credit spreads on the day of the March 2016 announcement, credit spreads actually increase, on average, on the day of the PSPP and TLTRO-plus-rate-cut announcements, by respectively 2.522 and 5.325 bps. Moreover, a one-unit increase in a bond's beta was associated with a 5.125 bps further decline in spreads after the March 2016 announcement. After the PSPP announcement, we find no statistically significant relation between bond beta and spreads. After the 2014 TLTRO-

plus-rate-cut announcement, we find a negative and statistically significant relation between bond beta and spread changes. However, the relation is economically marginal and two orders of magnitude smaller than the estimated relation between spread changes and beta we observe after the CSPP announcement. Moreover, results for the 2014 TLTRO-plus-rate-cut announcement indicate that the spreads of bonds with higher beta did not decline. Instead, they *increased less* than the spreads of bonds with lower betas. Overall, these findings indicate the risk channel played a minor role, if any role at all, in easing credit market conditions after the 2015 PSPP announcement and the 2014 TLTRO-plus-rate-cut announcement.

In Tables A.17 and A.18 we repeat the tests of table 3. Whereas in Table 3 we find that, after the CSPP announcement, spreads fell for eligible bonds after controlling for exposure to non-diversifiable risk, we do not observe a similar result after the 2015 PSPP announcement and the 2014 TLTRO-plus-rate-cut announcement. We find no abnormal change in eligible bond spreads compared to ineligible ones after the PSPP announcement. After the TLTRO-plus-rate-cut announcement, eligible bond spreads experienced an abnormal increase compared to ineligible ones. Overall, these results suggest that a scarcity channel did not affect bond spreads after the PSPP and TLTRO-plus-rate-cut announcements, consistent with these policies not generating scarcity of eligible bonds.

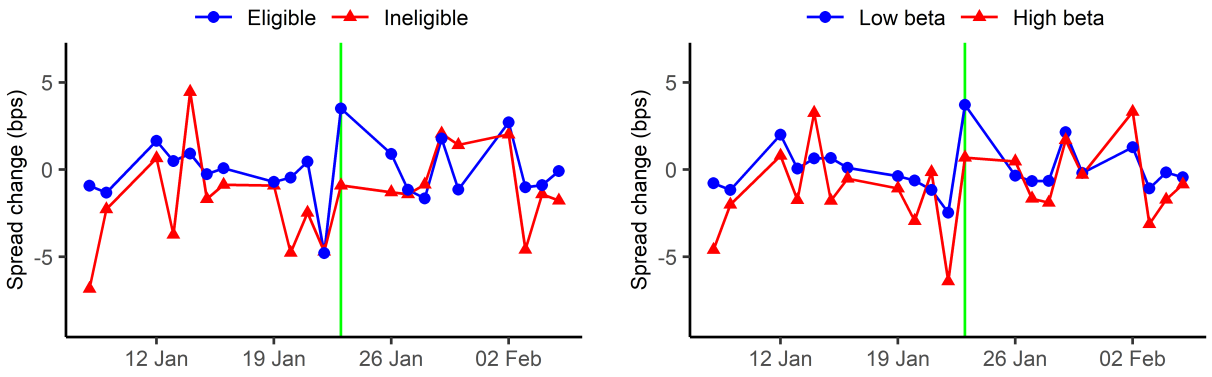
In the subsequent tables, we repeat tests on bond issuance similar to those we conducted for the March 2016 announcement. In Tables A.19 and A.20, we report results of the main tests on substitution across bond characteristics corresponding to results in Tables 5, 6, and 9. Consistent with a lack of a scarcity channel, we find no shift toward eligible bonds and bonds meeting eligibility requirements. Moreover, consistent with a lack of a risk channel, we find no shift toward unsecured and non-guaranteed issuance after the 2014 TLTRO-plus-rate-cut announcement. Although we find a shift toward unsecured and non-guaranteed issuance after the 2015 PSPP announcement, the shift is observed primarily among eligible firms (that is, established investment-grade issuers), whereas the March 2016 announcement had spillover effects also on ineligible issuers.

We then consider total bond issuance. Table A.21 and A.22 correspond to Table 7. Table A.23 corresponds to 8. After the PSPP announcement, we find an increase in the total issuance of eligible firms, but no spillover to ineligible firms. Moreover, when comparing eligible and ineligible firms and controlling for fixed effects, we find no heterogeneous increase in total issuance. Furthermore, we find no relation between total issuance and firm betas. After the TLTRO-plus-rate-cut, we observe no increase in total issuance, nor any statistically significant heterogeneity between eligible and ineligible issuers, or between issuers with different betas. These results are consistent with Figure A.12, Figure

A.13, and Table A.16 which show that bond spreads did not decline after the PSPP and TLTRO-plus-rate-cut announcements, therefore ruling out that a risk channel boosted total issuance after these announcements.

Finally, Tables A.24 and A.25 repeat the tests of Table 10 by studying the revealed preferences of firms suggesting an intention to time the market. Consistent with the lack of evidence regarding a scarcity and risk channel in bond-spread data, we find none of the patterns observed after the March 2016 announcement.

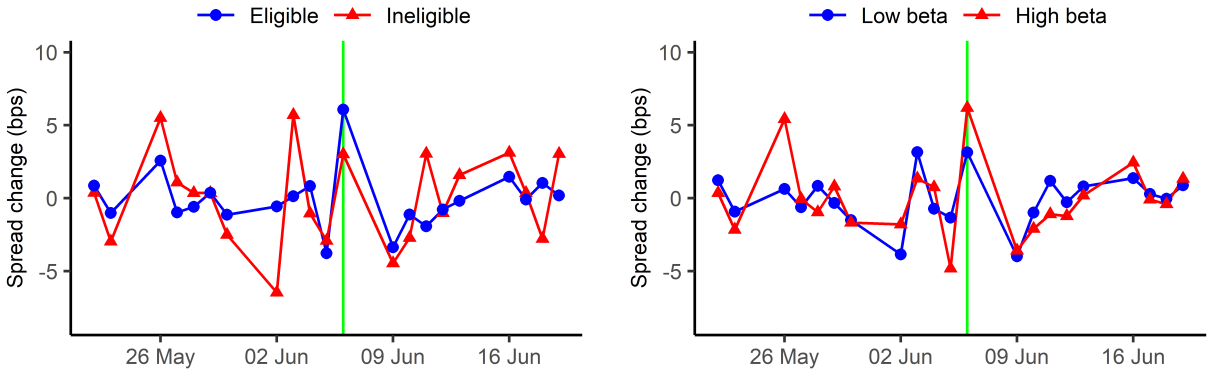
Overall, whereas empirical results around the March 2016 announcement provide systematic evidence of a scarcity and risk channel affecting credit spreads and corporate issuance, we do not find such evidence around the 2015 PSPP announcement and the 2014 TLTRO-plus-rate-cut announcement. Taken together, our study thus indicates the CSPP was crucial in determining the observed credit-market outcomes.



(a) Spreads by eligibility

(b) Spreads by exposure to non-diversifiable risk

Figure A.12: Average change in yield spreads of euro-denominated corporate bonds around the PSPP announcement. Bonds are sorted according to their eligibility as collateral at the ECB and their exposure to non-diversifiable risk. We measure a bond's exposure to non-diversifiable risk in terms of its beta before the announcement. The beta is the slope coefficient in a regression of the daily change in bond spreads on the change in the aggregate bond market's spread. Bonds are classified as high beta if their beta is above the median of the cross-sectional distribution of betas. The vertical line marks the first trading day after the announcement of the PSPP.



(a) Spreads by eligibility

(b) Spreads by exposure to non-diversifiable risk

Figure A.13: Average change in yield spreads of euro-denominated corporate bonds around the 2014 TLTRO-plus-rate-cut announcement. Bonds are sorted according to their eligibility as collateral at the ECB and their exposure to non-diversifiable risk. We measure a bond's exposure to non-diversifiable risk in terms of its beta before the announcement. The beta is the slope coefficient in a regression of the daily change in bond spreads on the change in the aggregate bond market's spread. Bonds are classified as high beta if their beta is above the median of the cross-sectional distribution of betas. The vertical line marks the first trading day after the announcement of the 2014 TLTRO and rate cut.

Table A.16: Daily changes in bond spreads during the CSPP, PSPP, and 2014 TLTRO-plus-rate-cut announcements. In columns 1 and 2, we consider the 2016 CSPP announcement. In columns 3 and 4, we consider the 2015 PSPP announcement. In columns 5 and 6, we consider the 2014 TLTRO-plus-rate-cut announcement. We use bonds outstanding in the three months before and after each announcement. The dependent variable is the daily change in spread in the thirty days before and after the monetary policy announcements. EventDate = 1 on the day of the policy announcement. The BondBeta is the slope coefficient in a regression of the daily change in bond spreads on the change in the aggregate bond market's spread. BondBeta is calculated in the period starting three months before the announcement and ending two weeks before it. EligibleBond = 1 if the bond is eligible to be used as collateral at the ECB as of three months before the policy announcement. BidAsk is the bond's average bid-ask spread relative to the midpoint during the period starting three months before the announcement and ending two weeks before it. Regressions are weighted by the bond's outstanding amount. Standard errors are in parentheses and are clustered at the country-industry level.

	Daily spread change (bps)					
	CSPP		PSPP		2014 TLTRO	
	(1)	(2)	(3)	(4)	(5)	(6)
EventDate	-14.107^{***}		2.522^{***}		5.325^{***}	
	(0.551)		(0.295)		(0.348)	
EventDate×BondBeta	-5.125^{***}	-5.088^{***}	-0.010	0.032	-0.132^{***}	-0.056^{***}
	(0.628)	(0.740)	(0.174)	(0.170)	(0.023)	(0.009)
EventDate×BidAsk	1.007	1.652^{**}	-0.361^{**}	-0.378^{***}	-0.203	2.043^{***}
	(0.661)	(0.777)	(0.137)	(0.119)	(0.519)	(0.472)
Bond FE	Yes	Yes	Yes	Yes	Yes	Yes
Country-industry-day FE	No	Yes	No	Yes	No	Yes
Maturity-day FE	No	Yes	No	Yes	No	Yes
Rating-day FE	No	Yes	No	Yes	No	Yes
Observations	67,650	67,650	58,851	58,851	61,732	61,732
R^2	0.012	0.204	0.023	0.079	0.050	0.538
Notes:	$^{*}p \leq .10$; $^{**}p \leq .05$; $^{***}p \leq .01$					

Table A.17: Changes in bond spreads after the PSPP announcement. We use bonds outstanding in the three months before and after the announcement of the PSPP. The dependent variable is the change in spread (columns 1-4) and the abnormal change in spread (columns 5-8). EligibleBond = 1 if the bond is eligible to be used as collateral at the ECB as of three months before the PSPP announcement. BidAsk is the bond's average bid-ask spread relative to the midpoint during the period starting three months before the announcement and ending two weeks before it. A firm is classified as eligible if it had eligible bonds outstanding at some time during the calendar year before the announcement. Regressions are weighted by the bond's outstanding amount. Standard errors are in parentheses and are clustered at the country-industry level.

	Two-day spread change (bps)				Two-day abnormal spread change (bps)			
	All firms		Eligible firms		All firms		Eligible firms	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
EligibleBond	2.570	9.308	7.681	9.343	5.265	10.634	8.670	10.739
	(3.444)	(6.012)	(5.100)	(6.050)	(3.287)	(6.582)	(5.569)	(6.641)
BidAsk	−0.702	−13.002*	−0.611	−0.840	−1.582**	−12.245**	−1.108	−1.344
	(0.819)	(7.369)	(1.569)	(1.971)	(0.736)	(4.659)	(1.733)	(2.177)
Country-industry FE	Yes	No	Yes	No	Yes	No	Yes	No
Firm FE	No	Yes	No	Yes	No	Yes	No	Yes
Maturity FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Rating FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,486	1,158	830	796	1,486	1,158	830	796
R^2	0.032	0.778	0.409	0.551	0.045	0.812	0.368	0.513

Notes: $^{*}p \leq .10$; $^{**}p \leq .05$; $^{***}p \leq .01$

Table A.18: Changes in bond spreads after the 2014 TLTRO-plus-rate-cut announcement. We use bonds outstanding in the three months before and after the announcement of the 2014 TLTRO and rate cut. The dependent variable is the change in spread (columns 1-4) and the abnormal change in spread (columns 5-8). EligibleBond = 1 if the bond is eligible to be used as collateral at the ECB as of three months before the 2014 TLTRO-plus-rate-cut announcement. BidAsk is the bond's average bid-ask spread relative to the midpoint during the period starting three months before the announcement and ending two weeks before it. A firm is classified as eligible if it had eligible bonds outstanding at some time during the calendar year before the announcement. Regressions are weighted by the bond's outstanding amount. Standard errors are in parentheses and are clustered at the country-industry level.

	Two-day spread change (bps)				Two-day abnormal spread change (bps)			
	All firms		Eligible firms		All firms		Eligible firms	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
EligibleBond	3.786**	3.737*	3.254*	4.602***	2.588	3.145	3.169*	4.437***
	(1.677)	(1.920)	(1.646)	(1.674)	(2.385)	(1.900)	(1.844)	(1.545)
BidAsk	2.991	−5.022*	2.272	1.292	1.693	−3.718	0.444	−0.463
	(1.834)	(2.922)	(2.831)	(2.471)	(1.826)	(3.248)	(3.095)	(2.726)
Country-industry FE	Yes	No	Yes	No	Yes	No	Yes	No
Firm FE	No	Yes	No	Yes	No	Yes	No	Yes
Maturity FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Rating FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,381	1,090	776	744	1,381	1,090	776	744
R^2	0.078	0.530	0.286	0.442	0.067	0.509	0.400	0.481

Notes: $^{*}p \leq .10$; $^{**}p \leq .05$; $^{***}p \leq .01$

Table A.19: Net issuance by characteristics related to eligibility and riskiness around the PSPP announcement. We run separate regressions of net issuance of bonds with and without a certain characteristic on the interaction IssuanceType×Post and controls. IssuanceType = 1 if the issuance has the characteristic being considered. Post = 1 after the announcement of the PSPP. We control for an IssuanceType×FirstMonth interaction, firm-month fixed effects, and firm-IssuanceType fixed effects. For each row, we report the coefficients on the interaction IssuanceType×Post for a different issuance type: Eligible = 1 if the issuance is eligible to be used at collateral at the ECB (row 1); MeetReq = 1 if the issuance is listed, senior, and investment-grade rated (row 2); Listed = 1 if the issuance is listed (row 3); Senior = 1 if the issuance is senior (row 4); InvGrade = 1 if the issuance is investment-grade rated (row 5); Secured = 1 if the issuance is secured (row 6); Guaranteed = 1 if the issuance is guaranteed (row 7). A firm is eligible if it had eligible bonds outstanding in the calendar year before the PSPP announcement. Odd-numbered columns consider the three months before and after the announcement. Even-numbered columns consider the 10 months before and after the announcement. Regressions are weighted by firms' initial outstanding amount of bonds at the beginning of the sample period. Standard errors are in parentheses and are double-clustered at the country-industry-month and firm level.

	Net issuance by type (%)					
	All firms		Eligible firms		Ineligible firms	
	3M	10M	3M	10M	3M	10M
	(1)	(2)	(3)	(4)	(5)	(6)
Eligible×Post			0.157	0.146		
			(0.631)	(0.266)		
MeetReq×Post	0.331	0.368*	0.744	0.530**	−0.652	−0.058
	(0.462)	(0.209)	(0.549)	(0.249)	(1.309)	(0.372)
Listed×Post	1.176**	0.188	0.861	0.287	1.924	−0.073
	(0.464)	(0.226)	(0.579)	(0.259)	(1.300)	(0.436)
Senior×Post	−2.772***	−2.330***	−2.723***	−2.141***	−2.889**	−2.829***
	(0.574)	(0.249)	(0.679)	(0.285)	(1.416)	(0.425)
InvGrade×Post	0.311	0.175	0.787	0.345	−0.819	−0.270
	(0.496)	(0.224)	(0.618)	(0.281)	(1.306)	(0.371)
Unsecured×Post	0.841*	0.322	1.169**	0.275	0.061	0.448
	(0.486)	(0.230)	(0.578)	(0.282)	(1.237)	(0.382)
NonGuaranteed	1.323***	0.544**	1.783***	0.484*	0.232	0.700*
	(0.496)	(0.226)	(0.572)	(0.267)	(1.254)	(0.392)
IssuanceType×FirstMonth	Yes	Yes	Yes	Yes	Yes	Yes
Firm-month FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm-IssuanceType FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	30,840	100,960	2,376	7,880	28,464	93,080

Notes: $^{*}p \leq 0.10$; $^{**}p \leq 0.05$; $^{***}p \leq 0.01$

Table A.20: Net issuance by characteristics related to eligibility and riskiness around the 2014 TLTRO-plus-rate-cut announcement. We run separate regressions of net issuance of bonds with and without a certain characteristic on the interaction IssuanceType×Post and controls. IssuanceType = 1 if the issuance has the characteristic being considered. Post = 1 after the announcement of the 2014 TLTRO and rate cut. We control for an IssuanceType×FirstMonth interaction, firm-month fixed effects, and firm-IssuanceType fixed effects. For each row, we report the coefficients on the interaction IssuanceType×Post for a different issuance type: Eligible = 1 if the issuance is eligible to be used at collateral at the ECB (row 1); MeetReq = 1 if the issuance is listed, senior, and investment-grade rated (row 2); Listed = 1 if the issuance is listed (row 3); Senior = 1 if the issuance is senior (row 4); InvGrade = 1 if the issuance is investment-grade rated (row 5); Secured = 1 if the issuance is secured (row 6); Guaranteed = 1 if the issuance is guaranteed (row 7). A firm is eligible if it had eligible bonds outstanding in the calendar year before the 2014 TLTRO-plus-rate-cut announcement. Odd-numbered columns consider the three months before and after the announcement. Even-numbered columns consider the 10 months before and after the announcement. Regressions are weighted by firms' initial outstanding amount of bonds at the beginning of the sample period. Standard errors are in parentheses and are double-clustered at the country-industry-month and firm level.

	Net issuance by type (%)					
	All firms		Eligible firms		Ineligible firms	
	3M	10M	3M	10M	3M	10M
	(1)	(2)	(3)	(4)	(5)	(6)
Eligible×Post			0.273	−0.624**		
			(0.650)	(0.295)		
MeetReq×Post	0.078	−0.100	0.072	−0.200	0.094	0.154
	(0.516)	(0.236)	(0.643)	(0.273)	(0.757)	(0.535)
Listed×Post	0.438	0.079	0.721	0.113	−0.282	−0.005
	(0.465)	(0.274)	(0.580)	(0.325)	(0.876)	(0.561)
Senior×Post	−0.877*	0.103	−1.138*	−0.168	−0.213	0.788
	(0.455)	(0.302)	(0.602)	(0.360)	(0.692)	(0.573)
InvGrade×Post	0.010	−0.049	0.108	−0.112	−0.241	0.110
	(0.493)	(0.242)	(0.607)	(0.289)	(0.774)	(0.536)
Unsecured×Post	−0.161	−0.043	−0.052	0.078	−0.438	−0.348
	(0.459)	(0.261)	(0.608)	(0.304)	(0.805)	(0.552)
NonGuaranteed×Post	0.383	0.296	0.769	0.533	−0.598	−0.301
	(0.456)	(0.272)	(0.606)	(0.329)	(0.702)	(0.534)
IssuanceType×FirstMonth	Yes	Yes	Yes	Yes	Yes	Yes
Firm-month FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm-IssuanceType FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	29,796	100,280	2,304	7,520	27,492	92,760

Notes: $^{*}p \leq 0.10$; $^{**}p \leq 0.05$; $^{***}p \leq 0.01$

Table A.21: Total Issuance around the PSPP announcement. The dependent variable is total net issuance scaled by the firm's outstanding amount of bonds at the beginning of the sample period. Post = 1 after the announcement of the PSPP. FirstMonth = 1 for the month in which the PSPP was announced. A firm is eligible (EligibleFirm = 1) if it had eligible bonds outstanding in the calendar year before the PSPP announcement. We control for an interaction between FirstMonth and EligibleFirm, where FirstMonth = 1 for the month in which the PSPP was announced. Peer-group fixed effects are created by sorting firms into 20 groups (vigintiles) based on their outstanding amount of bonds in 2014 and by further sorting firms, within each vigintile, into three groups based on their gross issuance in 2014 and three groups based on their net issuance. Odd-numbered columns consider the three months before and after the announcement; even-numbered columns consider the ten months before and after the announcement. Regressions are weighted by firms' outstanding amount of bonds at the beginning of the sample period. Standard errors are in parentheses and are double-clustered at the country-industry-month and firm level.

	Total net issuance (%)							
	Eligible firms		Ineligible firms		All firms			
	3M	10M	3M	10M	3M	10M	3M	10M
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post	1.169**	0.239	0.661	0.381				
	(0.579)	(0.278)	(1.309)	(0.376)				
Post×EligibleFirm					−0.046	−0.161	2.205	1.567*
					(1.859)	(0.797)	(3.005)	(0.910)
FirstMonth	Yes	Yes	-	-	-	-	-	-
FirstMonth interactions	-	-	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-industry-month FE	No	No	No	No	Yes	Yes	Yes	Yes
PeerGroup-month FE	No	No	No	No	No	No	Yes	Yes
Observations	1,188	3,940	14,232	46,540	15,150	49,600	15,150	49,600
R^2	0.101	0.013	0.093	0.043	0.222	0.077	0.244	0.100
Notes:	$^{*}p \leq .10$; $^{**}p \leq .05$; $^{***}p \leq .01$							

Table A.22: Total Issuance around the 2014 TLTRO-plus-rate-cut announcement. The dependent variable is total net issuance scaled by the firm's outstanding amount of bonds at the beginning of the sample period. Post = 1 after the announcement of the 2014 TLTRO and rate cut. FirstMonth = 1 for the month in which the 2014 TLTRO and rate cut were announced. A firm is eligible (EligibleFirm = 1) if it had eligible bonds outstanding in the calendar year before the 2014 TLTRO-plus-rate-cut announcement. We control for an interaction between FirstMonth and EligibleFirm, where FirstMonth = 1 for the month in which the TLTRO and rate cut were announced. Peer-group fixed effects are created by sorting firms into 20 groups (vigintiles) based on their outstanding amount of bonds in 2013 and by further sorting firms, within each vigintile, into three groups based on their gross issuance in 2013 and three groups based on their net issuance. Odd-numbered columns consider the three months before and after the announcement; even-numbered columns consider the ten months before and after the announcement. Regressions are weighted by firms' outstanding amount of bonds at the beginning of the sample period. Standard errors are in parentheses and are double-clustered at the country-industry-month and firm level.

	Total net issuance (%)							
	Eligible firms		Ineligible firms		All firms			
	3M	10M	3M	10M	3M	10M	3M	10M
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post	−0.052	0.070	−0.438	−0.117				
	(0.608)	(0.303)	(0.805)	(0.552)				
Post×EligibleFirm					0.797	1.230	−2.362	1.779
					(1.490)	(0.839)	(1.802)	(1.250)
FirstMonth	Yes	Yes	-	-	-	-	-	-
FirstMonth interactions	-	-	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-industry-month FE	No	No	No	No	Yes	Yes	Yes	Yes
PeerGroup-month FE	No	No	No	No	No	No	Yes	Yes
Observations	1,152	3,760	13,746	46,380	14,622	49,180	14,622	49,180
R^2	0.184	0.016	0.060	0.020	0.152	0.080	0.178	0.092

Notes: $^{*}p \leq .10$; $^{**}p \leq .05$; $^{***}p \leq .01$

Table A.23: Total issuance and changes in bond spreads around the 2015 PSPP and 2014 TLTRO-plus-rate-cut announcements for firms with traded bonds. In the first four columns, we consider the PSPP announcement. In the last four columns, we consider the TLTRO-plus-rate-cut announcement. FirmBeta is the average beta of the firm's outstanding bonds in the three months before the policy announcement. $\Delta^A S^F$ is the average abnormal spread change in the firm's outstanding bonds in the two days following the announcement. EligibleFirm = 1 if the firm had eligible bonds outstanding at some point during the calendar year before the announcement. Post = 1 after the announcement. FirstMonth = 1 for the month in which the policy was announced. Peer-group fixed effects are created by sorting firms into 20 groups (vigintiles) based on their outstanding amount of bonds in the calendar year before the announcement and by further sorting firms, within each vigintile, into three groups based on their gross issuance in that year and three groups based on their net issuance. Less active issuers are firms in the lowest tercile of gross issuance within in each vigintile. Odd-numbered columns consider the three months before and after the announcement. Even-numbered columns consider the 10 months before and after the announcement. Regressions are weighted by the firms' initial outstanding amount of bonds. Standard errors are in parentheses and are double-clustered at the country-industry-month and firm level

	Total net issuance (%)							
	PSPP				TLTRO-plus-rate-cut			
	3M	10M	3M	10M	3M	10M	3M	10M
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post	1.770*	−0.240			−0.163	−0.346		
	(0.919)	(0.413)			(0.785)	(0.499)		
Post×EligibleFirm	−0.655	0.421			0.281	0.331		
	(1.079)	(0.494)			(1.029)	(0.561)		
Post×FirmBeta			−0.110	0.025			0.335	0.115
			(0.084)	(0.019)			(0.287)	(0.134)
Post×$\Delta^A S^F$			−0.159	−0.458**			0.711	−0.180
			(0.650)	(0.221)			(0.551)	(0.168)
Post×FirmBeta×EligibleFirm			−3.338	0.329			−0.363	−0.286
			(3.204)	(1.072)			(0.382)	(0.182)
Post×$\Delta^A S^F$×EligibleFirm			−34.585	0.430			−8.929	−8.358*
			(26.855)	(5.202)			(6.185)	(4.931)
FirstMonth	Yes	Yes	-	-	-	-	-	-
FirstMonth interactions	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-industry-month FE	No	No	Yes	Yes	Yes	Yes	Yes	Yes
EligibleFirm-month FE	No	No	Yes	Yes	Yes	Yes	Yes	Yes
PeerGroup-month FE	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,684	10,840	3,684	10,840	3,330	10,520	3,330	10,520
R^2	0.140	0.043	0.396	0.378	0.122	0.051	0.519	0.450

Notes: $^*p \leq .10$; $^{**}p \leq .05$; $^{***}p \leq .01$

Table A.24: Net issuance by characteristics related to a willingness to time the market after the PSPP announcement.We run separate regressions of net issuance of bonds with and without a certain characteristic on the interaction IssuanceType×Post and controls. IssuanceType = 1 if the issuance has the characteristic being considered. Post = 1 after the announcement of the PSPP. We control for an IssuanceType×FirstMonth interaction, firm-month fixed effects, and firm-IssuanceType fixed effects. For each row, we report the coefficients on the interaction IssuanceType×Post for a different issuance type: CommPaper = 1 if the issuance is commercial paper (row 1); ShortMaturity = 1 if the issuance's maturity is shorter than one year (row 2); FixedCoupon = 1 if the issuance has a fixed coupon rate (row 3); GeneralPurpose = 1 if the issuance prospectus indicates general corporate purposes as the only use of proceeds (row 4); IssuanceProgram = 1 if the issue is part of an issuance program (row 5). A firm is eligible if it had eligible bonds outstanding in the calendar year before the PSPP announcement. Odd-numbered columns consider the three months before and after the announcement. Even-numbered columns consider the 10 months before and after the announcement. Standard errors are in parentheses and are double-clustered at the country-industry-month and firm level.

	Net issuance by type (%)					
	All firms		Eligible firms		Ineligible firms	
	3M	10M	3M	10M	3M	10M
	(1)	(2)	(3)	(4)	(5)	(6)
CommPaper×Post	0.187	0.890***	0.749	0.920***	−1.149	0.811**
	(0.535)	(0.189)	(0.627)	(0.227)	(1.473)	(0.363)
ShortMaturity×Post	−0.038	0.413**	0.683	0.651**	−1.749	−0.214
	(0.522)	(0.209)	(0.651)	(0.255)	(1.331)	(0.391)
FixedCoupon×Post	0.241	−0.115	−0.388	−0.380	1.732	0.583
	(0.479)	(0.195)	(0.608)	(0.237)	(1.257)	(0.363)
GeneralPurpose×Post	0.030	0.177	0.147	0.120	−0.247	0.328
	(0.376)	(0.222)	(0.512)	(0.282)	(0.686)	(0.353)
IssuanceProgram×Post	0.592	−0.001	0.612	−0.030	0.546	0.078
	(0.414)	(0.200)	(0.507)	(0.248)	(0.648)	(0.305)
IssuanceType×FirstMonth	Yes	Yes	Yes	Yes	Yes	Yes
Firm-month FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm-IssuanceType FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	30,840	100,960	2,376	7,880	28,464	93,080
Notes:	$^{*}p \leq 0.10$; $^{**}p \leq 0.05$; $^{***}p \leq 0.01$					

Table A.25: Net issuance by characteristics related to a willingness to time the market after the 2014 TLTRO-plus-rate-cut announcement.We run separate regressions of net issuance of bonds with and without a certain characteristic on the interaction IssuanceType×Post and controls. IssuanceType = 1 if the issuance has the characteristic being considered. Post = 1 after the announcement of the 2014 TLTRO and rate cut. We control for an IssuanceType×FirstMonth interaction, firm-month fixed effects, and firm-IssuanceType fixed effects. For each row, we report the coefficients on the interaction IssuanceType×Post for a different issuance type: CommPaper = 1 if the issuance is commercial paper (row 1); ShortMaturity = 1 if the issuance's maturity is shorter than one year (row 2); FixedCoupon = 1 if the issuance has a fixed coupon rate (row 3); GeneralPurpose = 1 if the issuance prospectus indicates general corporate purposes as the only use of proceeds (row 4); IssuanceProgram = 1 if the issue is part of an issuance program (row 5). A firm is eligible if it had eligible bonds outstanding in the calendar year before the 2014 TLTRO-plus-rate-cut announcement. Odd-numbered columns consider the three months before and after the announcement. Even-numbered columns consider the 10 months before and after the announcement. Standard errors are in parentheses and are double-clustered at the country-industry-month and firm level.

	Net issuance by type (%)					
	All firms		Eligible firms		Ineligible firms	
	3M	10M	3M	10M	3M	10M
	(1)	(2)	(3)	(4)	(5)	(6)
CommPaper×Post	0.454	1.058***	0.430	1.129***	0.515	0.878**
	(0.344)	(0.189)	(0.448)	(0.234)	(0.453)	(0.405)
ShortMaturity×Post	0.735	0.185	1.089	0.528*	−0.166	−0.679
	(0.542)	(0.255)	(0.684)	(0.294)	(0.801)	(0.537)
FixedCoupon×Post	−0.363	0.171	−0.545	0.096	0.101	0.358
	(0.508)	(0.264)	(0.643)	(0.315)	(0.883)	(0.548)
GeneralPurpose×Post	−0.286	−0.080	−0.266	−0.019	−0.338	−0.234
	(0.434)	(0.214)	(0.544)	(0.264)	(0.706)	(0.365)
IssuanceProgram×Post	0.014	0.121	0.152	0.307	−0.337	−0.348
	(0.351)	(0.199)	(0.464)	(0.248)	(0.516)	(0.288)
IssuanceType×FirstMonth	Yes	Yes	Yes	Yes	Yes	Yes
Firm-month FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm-IssuanceType FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	29,796	100,280	2,304	7,520	27,492	92,760
Notes:	$^{*}p \leq 0.10$; $^{**}p \leq 0.05$; $^{***}p \leq 0.01$					

A.8 Eligibility Criteria

Here we report general eligibility criteria for marketable assets that are relevant for our sample of corporate bonds issued by euro-area nonfinancial corporations. We copy them verbatim from Part Four of Guideline (EU) 2015/510 of the European Central Bank of 19 December 2014 on the implementation of the Eurosystem monetary policy framework. Certain types of assets and non-marketable assets may be subject to specific criteria. For details, see the Guideline available at https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX:32014O0060.

Article 62: Principal amount of marketable assets

1. In order to be eligible, until their final redemption, debt instruments shall have:
   (a) a fixed and unconditional principal amount; or
   (b) an unconditional principal amount that is linked, on a flat basis, to only one euro area inflation index at a single point in time, containing no other complex structures.
2. Debt instruments with a principal amount linked to only one euro area inflation index at a single point in time shall also be permissible, given that the coupon structure is as defined in Article 63(1)(b)(i) fourth indent and linked to the same euro area inflation index.
3. Assets with warrants or similar rights attached shall not be eligible.

Article 63: Acceptable coupon structures for marketable assets

1. In order to be eligible, debt instruments shall have either of the following coupon structures until final redemption:
   (a) the reference rate is only one of the following at a single point in time:
      – a euro money market rate, e.g. EURIBOR, LIBOR or similar indices;
      – a constant maturity swap rate e.g. CMS, EIISDA, EUSA;
      – the yield of one or an index of several euro area government bonds that have a maturity of one year or less;
      – a euro area inflation index; and

(b) f (floor), c (ceiling), l (leveraging/deleveraging factor) and x (margin) are, if present, numbers that are either pre-defined at issuance, or may change over time only according to a path pre-defined at issuance, where f and c are greater than or equal to zero and l is greater than zero throughout the entire lifetime of the asset. For floating coupons with an inflation index reference rate, l shall be equal to one.

2. Debt instruments with a floating coupon, as referred to in paragraph 1(b), shall be considered ineligible if at any time following the application of the coupon rate formula, the coupon rate results in a negative value.

3. Any coupon structure that does not comply with paragraphs 1 and 2 shall not be eligible, including instances where only part of the remuneration structure, such as a premium, is non-compliant.

4. For the purpose of this Article, if the coupon is either of a fixed multi-step type or of a floating multi-step type, the assessment of the relevant coupon structure shall be based on the entire lifetime of the asset with both a forward- and backward-looking perspective.

5. Acceptable coupon structures shall have no issuer optionalities, i.e. during the entire lifetime of the asset, based on a forward- and backward-looking perspective, changes in the coupon structure that are contingent on an issuer's decision shall not be acceptable.

Article 64: Non-subordination with respect to marketable assets

Eligible debt instruments shall not give rise to rights to the principal and/or the interest that are subordinated to the rights of holders of other debt instruments of the same issuer.

Article 65: Currency of denomination of marketable assets

In order to be eligible, debt instruments shall be denominated in euro or in one of the former currencies of the Member States whose currency is the euro.

Article 67: Settlement procedures for marketable assets

1. In order to be eligible, debt instruments shall be transferable in book-entry form and shall be held and settled in Member States whose currency is the euro through an account with an NCB or with an SSS that has been positively assessed pursuant to the Eurosystem User Assessment Framework, so that perfection and realisation of collateral are subject to the law of a Member State whose currency is the euro.

2. If the CSD/SSS where the asset is issued and the CSD/SSS where the asset is held, are not identical, for the purposes of eligibility, the two must be connected by an eligible link positively assessed pursuant to the Eurosystem User Assessment Framework in accordance with Article 150.

ARTICLE 68: ACCEPTABLE MARKETS FOR MARKETABLE ASSETS

1. In order to be eligible, debt instruments shall be those which are admitted to trading on a regulated market as defined in Directive 2014/65/EU of the European Parliament and of the Council, or admitted to trading on certain acceptable non-regulated markets.

2. The ECB shall publish the list of acceptable non-regulated markets on its website and shall update it at least once a year.

3. The assessment of non-regulated markets by the Eurosystem shall be based on the following principles of safety, transparency and accessibility.

   (a) Safety refers to certainty with regard to transactions, in particular certainty in relation to the validity and enforceability of transactions.

   (b) Transparency refers to unimpeded access to information on the market's rules of procedure and operation, the financial features of the assets, the price formation mechanism, and the relevant prices and quantities, e.g. quotes, interest rates, trading volumes, outstanding amounts.

   (c) Accessibility refers to the ability of the Eurosystem to take part in and access the market. A market is considered accessible if its rules of procedure and operation allow the Eurosystem to obtain information and conduct transactions when needed for collateral management purposes.

4. The selection process for non-regulated markets shall be defined exclusively in terms of the performance of the Eurosystem collateral management function and should not be regarded as an assessment by the Eurosystem of the intrinsic quality of any market.

ARTICLE 71: CREDIT QUALITY REQUIREMENTS FOR MARKETABLE ASSETS

> In order to be eligible, debt instruments shall meet the credit quality requirements specified in Chapter 2, except where otherwise stated.

Article 71 and Chapter 2 establish that, to be eligible, a bond needs to have a credit rating of BBB- or better from at least one of the four recognized rating agencies (S&P, Moody's, Fitch, DBRS.)

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