

Online Appendix for “A Capital Structure Channel of Monetary Policy”

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Section A. Central bank corporate bond purchases and the effect on debt capital structure of eligible firms

A.1. Descriptive statistics for overall CapitalIQ sample

This table reports summary statistics for the key variables in the Capital IQ sample over the period before CSPP implementation, i.e., Q1-2015 to Q1-2016. All variables are defined in Appendix A.2 in the main paper.

	OVERALL SAMPLE			
	Mean	Median	Std. D.	N
Total Debt / Assets	0.352	0.308	0.230	4,154
Bond Debt / Assets	0.158	0.128	0.142	4,158
Term Loans / Assets	0.132	0.078	0.163	4,157
Revol. Credit / Assets	0.027	0.000	0.061	4,158
ln(Assets)	6.740	6.871	2.484	4,158
Profitability	0.016	0.020	0.032	4,084
Tangibility	0.266	0.225	0.218	4,125
MtB	1.516	1.200	1.384	3,985
Asset Growth	0.007	0.000	0.080	4,109
Δ Cash /lagged Assets	0.002	0.000	0.054	4,101
Δ WorkCap /lagged Assets	0.003	0.000	0.083	4,102
CapEx /lagged Assets	0.010	0.007	0.011	3,737
Acq /lagged Assets	0.003	0.000	0.010	4,108
Share Rep.	0.012	0.000	0.109	4,158

A.2. Effect on debt capital structure: Specifications without control variables

This table reports results from the estimation of a pooled panel regression analyzing the effect of central bank corporate bond purchases on bond financing. The dependent variable is *Bond debt / Assets*, i.e., the sum of senior bonds, subordinated bonds and commercial paper scaled by total assets. *Treated* equals one for eurozone investment grade firms, and zero for the control group (non-investment grade rated eurozone firms with public debt). *Post* equals one after the CSPP announcement, i.e., after Q1-2016, and zero otherwise. The sample period is Q1-2015 to Q1-2017. The regressions include firm-level controls to control for the heterogeneity in firm characteristics, when indicated (cf. Table 2 in the main manuscript). All variables are defined in Appendix A.2 in the main manuscript. The regressions further include firm fixed effects, quarter fixed effects, industry x quarter fixed effects, and country x quarter fixed effects, when indicated. We report t-values based on standard errors clustered at the firm-level in parentheses. ***, **, * denote significance at the 1, 5 and 10 % level, respectively.

Variable:	(1) Bond Debt/ Assets	(2) Bond Debt/ Assets	(3) Bond Debt/ Assets	(4) Bond Debt/ Assets	(5) Bond Debt/ Assets	(6) Bond Debt/ Assets
Treated x Post	0.0109** (2.14)	0.0110** (2.34)	0.0116** (2.44)	0.0158*** (3.17)	0.0160*** (3.21)	0.0201*** (3.61)
Treated	0.0411*** (4.01)	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)
Post	-0.0027 (-0.84)	-0.0015 (-0.52)	(omitted)	(omitted)	(omitted)	(omitted)
2-digit SIC x Quarter FE	No	No	No	No	No	Yes
Country x Quarter FE	No	No	No	Yes	Yes	Yes
Quarter FE	No	No	Yes	No	No	No
Firm FE	No	Yes	Yes	Yes	Yes	Yes
Controls	No	No	No	No	Yes	Yes
Observations	6,611	6,611	6,611	6,611	6,611	6,569

A.3. Effect on debt capital structure of eligible firms: Absolute amounts in USD instead of ratios

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

Variable:	(1) ln(1+Bond Debt)	(2) ln(1+Bond Debt)	(3) ln(1+ Term Loans)	(4) ln(1+ Term Loans)	(5) ln(1+Revolving Credit)	(6) ln(1+Revolving Credit)
Treated x Post	0.2651*** (2.89)	0.2758** (2.53)	-0.3222** (-2.20)	-0.3403** (-1.99)	0.1990 (1.51)	0.1580 (1.12)
2-digit SIC x Quarter FE	No	Yes	No	Yes	No	Yes
Country x Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,611	6,569	6,609	6,567	6,611	6,569

A.4. Effect on debt capital structure of eligible firms: Issue-level data

This table reports results from the estimation of a pooled panel regression analyzing the effect of the CSPP on bond financing. The dependent variable in columns 1-2 is *Bond Issue*, i.e., a dummy variable that equals one if firm *i* issues a bond in quarter *t*, and zero otherwise. The dependent variable in columns 3-4 is $\ln(1 + \#Bond\ Issues)$, i.e., the (log) number of bonds issued by firm *i* in quarter *t*. The dependent variable in columns 5-6 is $\ln(1 + Bond\ Issue\ Amt\ \$)$, i.e., the (log) amount of bond debt issued by firm *i* in quarter *t* in million USD. The dependent variable in columns 7-8 is $\ln(1 + Bond\ Issue\ Amt\ \$) / Assets$, i.e., the amount of bond debt issued by firm *i* in quarter *t* in million USD scaled by lagged total assets. *Treated* equals one for eurozone investment grade firms, and zero for the control group (non-investment grade rated eurozone firms with public debt). *Post* equals one after Q1-2016, and zero otherwise. The sample period is Q1-2015 to Q1-2017. The regressions include firm-level controls to control for the heterogeneity in firm characteristics (cf. Table 2 in the main paper), when indicated. The regressions further include firm fixed effects, industry x quarter fixed effects, and country x quarter fixed effects, when indicated. We report t-values based on standard errors clustered at the firm-level in parentheses. ***, **, * denote significance at the 1, 5 and 10 % level, respectively.

	(1) Bond Issue	(2) Bond Issue	(3) $\ln(1 + \#Bond\ Issues)$	(4) $\ln(1 + \#Bond\ Issues)$
Treated x Post	0.0400** (2.11)	0.0421** (2.15)	0.0545** (2.11)	0.0589** (2.20)
2-digit SIC x Quarter FE	No	Yes	No	Yes
Country x Quarter FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Observations	6,611	6,569	6,611	6,569
	(5) $\ln(1 + Bond\ Issue\ Amt\ \$)$	(6) $\ln(1 + Bond\ Issue\ Amt\ \$)$	(7) Bond Issue Amt \$/ Assets	(8) Bond Issue Amt \$/ Assets
Treated x Post	0.3395** (2.51)	0.3511** (2.52)	0.0031** (2.93)	0.0033*** (2.82)
2-digit SIC x Quarter FE	No	Yes	No	Yes
Country x Quarter FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Observations	6,611	6,569	6,611	6,569

A.5. Treatment based on bond issue instead of issuer rating

In the main paper we use the issuer long-term debt rating (pre-CSPP announcement) as a proxy for CSPP eligibility. However, as discussed in Subsection 2.1 in the main paper, in practice, CSPP eligibility is defined at the *issue* level. An issue is CSPP eligible if it is rated investment grade by at least one of the four rating agencies (S&P, Moody’s, Fitch, and DBRS). Hence, by using the issuer rating to proxy for CSPP eligibility we assume that the issuer rating is highly correlated with issue ratings (which generally seem reasonable). For robustness, we check if our results hold if we use *issue* level rating information from the three main rating agencies (S&P, Moody’s, and Fitch) instead of relying on the issuer rating. In particular, we obtain information on all bonds issued by European firms in the pre-CSPP period (Q1-2015 – 10 March 2016) from the Dealogic database. We do not use bonds originated before 2015 as Dealogic only reports rating information at the time of the bond origination. Hence, ratings of bonds originated before 2015 may not be a good proxy for the credit quality at the time of the CSPP announcement. For each firm, we retain the most recent bond issue in case a firm issued multiple bonds in this period. We assign the *best* issue rating to each issue in case a bond is rated by more than one rating agency (applying the S&P rating scale for all agencies). Bonds that are not rated by any of the three agencies are classified as “not rated”. Next, we match the bond level information from Dealogic to our main firm level sample and assign the issue rating (instead of the issuer rating) to each firm. We only retain firms for which an issue rating can be obtained from Dealogic, i.e., this procedure leaves us with a significantly reduced dataset. The table below documents that our results are robust to using issue level rating information despite the restrictive sample selection procedure and reduced power of the test.

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

	(1) Bond Debt / Assets
AAA-A Rating x Post	0.0070 (0.51)
BBB Rating x Post	0.0296* (1.89)
BB Rating x Post	-0.0089 (-0.31)
B Rating x Post	-0.1185 (-1.66)
Not Rated x Post	(omitted)
2-digit SIC x Quarter FE	Yes
Country x Quarter FE	Yes
Firm FE	Yes
Controls	Yes
Observations	814
Number of Firms	99

A.6. Matching quality of matched samples

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

	TREATED = 1 Mean	TREATED = 0 Mean	Difference (t-value)
Panel A. Matched control group comprised of non-eligible eurozone firms			
Ln(Assets)	9.38	9.31	-0.07 (0.80)
Bond Debt / Assets	0.177	0.179	0.00 (0.23)
Bank Debt / Assets	0.082	0.091	0.01 (1.12)
Profitability	0.026	0.027	0.00 (0.67)
Panel B. Matched control group comprised of non-eurozone investment-grade firms			
Ln(Assets)	10.08	10.08	0.00 (0.01)
Bond Debt / Assets	0.208	0.209	0.00 (0.18)
Bank Debt / Assets	0.053	0.050	-0.03 (0.71)
Profitability	0.030	0.030	0.00 (0.39)

Section B. Central bank corporate bond purchases and the bank lending channel of monetary policy

B.1. Ranking of banks by IG share

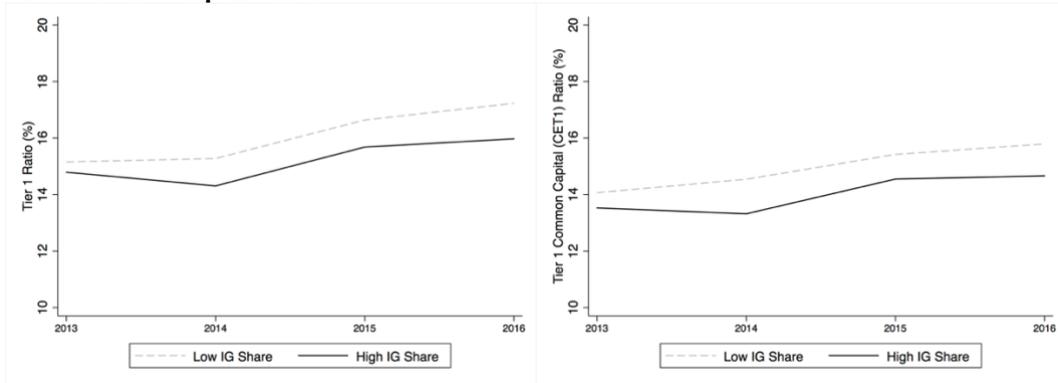
This table reports the names of the top-5 (bottom-5) lenders ranked by IG Share. IG Share is the share of Eurozone investment grade borrowers in the bank's term loan portfolio prior to the CSPP introduction, measured over the 2010 to 2014 period.

Lender name	IG Share
1. DZ Bank	51%
2. Mediobanca	45%
3. Intesa Sanpaolo	43%
4. Portigon (ex WestLB)	42%
5. La Caixa	39%
...	
60. Dexia	0%
61. IKB Deutsche Industriebank	0%
62. Banca Monte dei Paschi di Siena	0%
63. Caja de Ahorros del Mediterraneo	0%
64. Abanca	0%

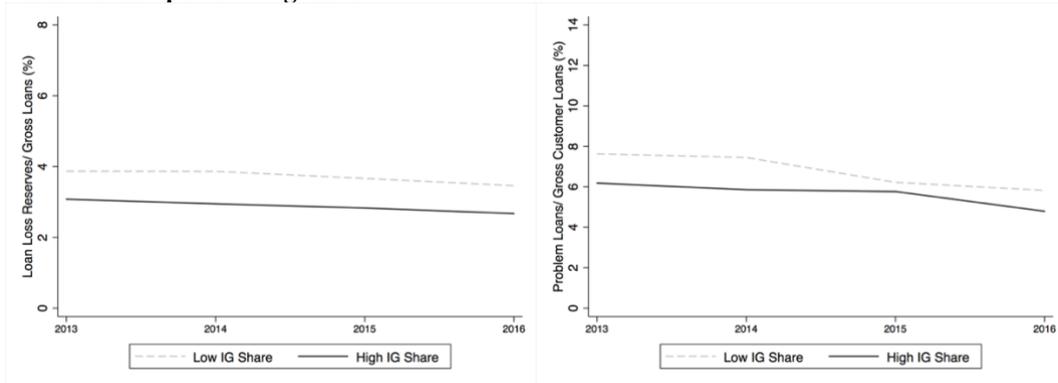
B.2. Parallel trends of low IG share and high IG share banks

In Panel A, we plot the Tier 1 Ratio and Tier 1 Common Capital (CET1) Ratio, Loan Loss Reserves / Gross Loans and Problem Loans / Gross Customer Loans in Panel B and Retail Loans / Total Assets and Corporate Loans / Total Assets in Panel C. The variables are in [%] for all variables and plotted separately by Low IG Share and High IG Share banks. High IG Share banks are banks that have a high (above median) share of Eurozone investment grade borrowers in their term loan portfolio prior to the CSPP introduction. Banks are Low IG Share Banks otherwise.

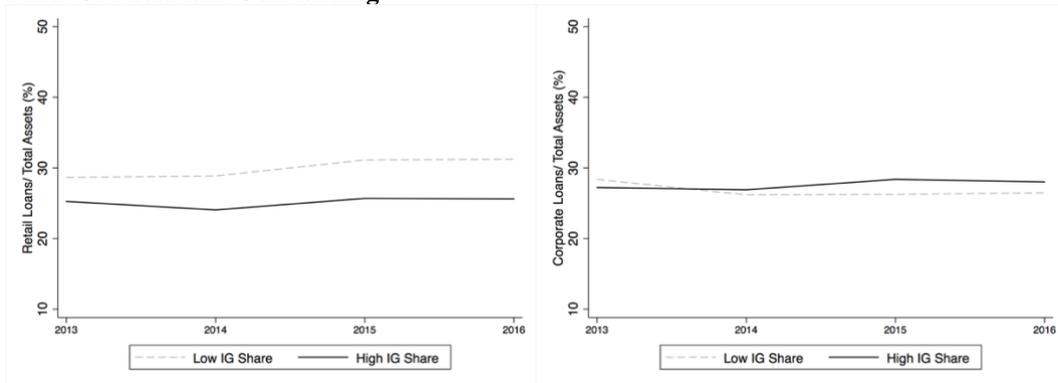
Panel A: Bank capitalization



Panel B: Non-performing loans



Panel C: Retail and C&I lending



B.3 Bank lending to non-eligible firms: banks matched by size

This table mirrors Table 7 columns (1)-(8) in the main paper, however, in contrast, we here match High and Low IG share banks based on bank size [$\ln(\text{total assets})$ as of end-of fiscal year 2015]. The table provides results of difference-in-differences regressions analyzing the probability (and volume) of loan issuances before versus after the introduction of a central bank corporate bond purchase program. The analysis is based on data on the borrower-bank-time level. The sample period is Q1-2015 to Q1-2017. The sample is collapsed to a pre-period and a post-period (loans issued before/after the CSPP announcement on 10 March 2016), i.e., the panel comprises two observations per borrower-firm pair. $\text{pr}(\text{Loan})$ is a dummy variable that equals one if firm i receives a loan in period t from bank j (as lead arranger), and zero otherwise. $\ln(\text{Loan Amount})$ is the logarithm of (one plus) the loan amount in million USD received by firm i in period t from bank j (as lead arranger). IG Share is the share of eurozone investment grade borrowers in the bank's term loan portfolio prior to the CSPP introduction. High IG Share is a dummy variable that equals one for banks that have a high (above median) share of eurozone investment grade borrowers in their term loan portfolio prior to the CSPP introduction, and zero otherwise. Private equals one for private borrowers, and zero otherwise. In Panel A, the sample comprises both public and private borrowers. All variables are defined in Appendix A.2. of the paper. The regressions further include borrower \times bank fixed effects, borrower \times period fixed effects, and bank \times period fixed effects, when indicated. We report t -values based on standard errors clustered at the bank-level in parentheses. ***, **, * denote significance at the 1, 5 and 10 % level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variable:	$\text{pr}(\text{Loan})$	$\text{pr}(\text{Loan})$	$\text{pr}(\text{Loan})$	$\ln(\text{Loan Amount})$	$\text{pr}(\text{Loan})$	$\ln(\text{Loan Amount})$	Private Firms	
							$\text{pr}(\text{Loan})$	$\ln(\text{Loan Amount})$
IG Share \times Private \times Post		0.2659** (2.07)	0.3036** (2.28)	1.1482* (1.89)				
High IG Share \times Private \times Post					0.0742** (2.20)	0.2794* (1.98)		
IG Share \times Post	-0.0185 (-0.35)	-0.1344 (-1.57)						
High IG Share \times Post							0.0430** (2.45)	0.1609** (2.13)
Bank \times Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm \times Period FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank \times Period FE	No	No	Yes	Yes	Yes	Yes	No	No
Observations	6,482	6,482	6,482	6,482	6,482	6,482	3,212	3,212

B. 4. Bank loan spread distribution

This table reports the median of the loan spread distribution in basis points, separately for High IG Share banks and Low IG Share banks for the pre- and post-CSPP period. A bank is assigned to the “High IG Share group” if it has an above median share of eurozone investment grade borrowers in its term loan portfolio prior to the CSPP introduction. It is assigned to the “Low IG Share group” otherwise. The sample period is Q1-2015 to Q4-2016. The pre-period runs from the beginning of the sample period to March 10, 2016, the Post period runs from that date until the end of the sample period. The p-values derive from the standard errors of a nonparametric K-sample test on the equality of medians using a chi-squared test statistic; the p-value for the difference-in-difference estimator derives from the bootstrapped standard errors of a quantile regression of the loan spread on the Post and High IG Share dummies and, specifically, their interaction term post x High IG Share.

Median	Pre	Post	Δ	p-Value
High IG Share	200	275	75	<i>0.000</i>
Low IG Share	225	250	25	<i>0.003</i>
Δ	-25	25	50	
p-Value	<i>0.000</i>	<i>0.007</i>		<i>0.000</i>

B.5. Descriptive statistics for Amadeus sample

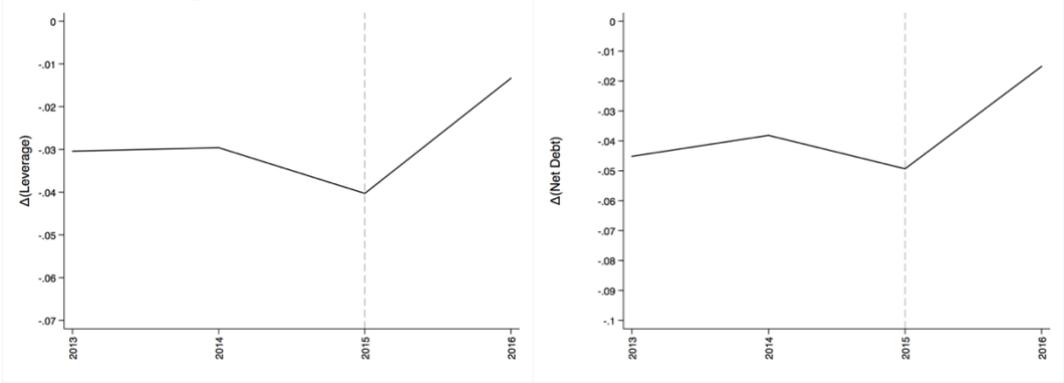
This table reports summary statistics for the key variables in our spillover analysis (Amadeus – Dealscan) sample over the period before CSPP implementation, i.e. 2015. All variables are defined in Appendix A.2 in the main paper.

	PRIVATE FIRMS			
	Mean	Median	Std. D.	N
pr(Loan)	0.206	0.000	0.404	1,458
IG Share	0.174	0.170	0.075	1,458
High IG Share	0.562	1.000	0.496	1,458
Total Assets (mio. €)	1,358.26	250.42	7,915.44	1,072
Leverage	0.710	0.724	0.249	1,072
Tangibility	0.303	0.205	0.303	1,058
Profitability	0.089	0.086	0.083	901
Asset Growth	0.042	0.010	0.266	1,049
CAPEX	0.059	0.026	0.189	1,049

B.6. Parallel trends of private firms borrowing from low IG and high IG share banks

Panel A shows the difference (treatment minus control) in the average leverage and net debt, Panel B shows the difference (treatment minus control) in the average asset growth and investment for firms borrowing from High IG share versus Low IG share banks over time. High IG share banks have a high (above median) share of Eurozone investment grade borrowers in their term loan portfolio prior to the CSPP introduction. They are Low IG share banks otherwise.

Panel A: Leverage



Panel B: Asset growth and investment

