

## **Internet Appendix**

**of**

### **Securities Trading by Banks and Credit Supply: Micro-Evidence from the Crisis**

This internet appendix shows further results on the trading behaviour by banks and their credit supply. In Appendix A, we present the stylized theoretical model that guided our empirical analysis of the paper. Appendix B shows further robustness of the main tables from the paper and Appendix C presents our results without the inclusion of Landesbanks. Appendix D provides additional results on our credit analysis including bank(lender)\*firm(borrower) fixed effects.

## APPENDIX A

As a complement to the theoretical papers we highlighted in the Introduction of our paper, we present a simple model to guide the empirical analysis. The main intuition behind the model is the following. In a crisis, when the expected returns from investing in securities are high, banks with higher trading expertise invest more in securities and cut back on credit in the presence of funding constraints (see Diamond and Rajan, 2011; Shleifer and Vishny, 2010).<sup>1</sup> In addition, trading banks with higher risk-bearing capacity (higher capital ratio) will invest even more in securities and further decrease the supply of credit (much in line with He and Krishnamurthy, 2013). We now proceed to a more detailed exposition.

Assume a two-period world with one security that has random returns. We denote the security's price at  $t = 0$  as  $P_0$ . At  $t = 1$ ,  $P_1$  can be either  $S_H$  or  $S_L$ , with probability  $1/2$  (without loss of generality, we assume  $S_H > S_L$ ). Banks receive a private signal at  $t = 0$  regarding the price of the security at  $t = 1$ . The signal can have two values:  $\sigma_H$  and  $\sigma_L$ . We assume that the signal is informative:  $\Pr(\sigma = \sigma_H | S_H) = \theta = \Pr(\sigma = \sigma_L | S_L) > 1/2$ . We interpret the precision of the signal,  $\theta$ , as the “trading expertise” of banks. That is, banks that have trading expertise receive signals with lower noise.

After receiving the private signal, banks decide on how much to invest in securities at the given price  $P_0$ . If a bank receives a good signal,  $\sigma_H$ , then it buys  $n$  units of this security (otherwise the bank does not buy any unit of the security). If the price of the security at  $t = 1$  is  $S_H$ , the bank obtains the amount  $n(S_H - P_0)$ . The probability of this event happening is  $\Pr(S = S_H | \sigma = \sigma_H) = \theta$ . The bank also obtains  $n(S_L - P_0)$  with probability  $1 - \theta$ .

The bank's optimization problem can be summarized as follows:

$$\max_n n(\theta S_H + (1 - \theta)S_L - P_0) - \frac{1}{\tau} \text{Var} \left( n(\hat{S} - P_0) \right) + g(L)$$
subject to the following funding constraint:  $P_0 n + L \leq W$ , where  $P_0 n$  is the amount invested in securities,  $L$  is the credit supplied to the real economy, and  $W$  is the available funding. The first part of the objective function is the expected return of the risky security, the second part is the variance of this return, and the last part,  $g(L)$ , is the payoff from the lending investment.  $\tau$  can be interpreted as the risk-bearing capacity of the bank, which can come from capital constraints stemming from the market, or regulation, or from risk aversion (see He and Krishnamurthy, 2012, 2013). We assume that the budget constraint  $W$  in the model is binding during a crisis – i.e., banks cannot

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<sup>1</sup> The assumption is that expertise is required to identify profitable trading opportunities in securities markets during the crisis. See also Gorton and Metrick (2012) and Dang, Gorton, and Holmstrom (2013) for papers that argue about breakdown in trading of debt securities during a crisis due to lack of expertise to evaluate the quality of the debt securities.

easily raise more funds to invest.<sup>2</sup> Therefore, banks need to choose how much of their funds ( $W$ ) to allocate to investments in securities ( $P_0n$ ) and how much to allocate to lending ( $L$ ).

The first order condition, assuming that the funding constraint is binding, is:

$$\theta S_H + (1 - \theta)S_L - P_0 - \frac{2n}{\tau}(1 - \theta)\theta(S_H - S_L)^2 - P_0g'(W - P_0n) = 0.$$

Solving for the optimal  $n$ <sup>3</sup>:  $n^* = \frac{\tau \theta S_H + (1 - \theta)S_L - P_0(1 + c)}{2(1 - \theta)\theta(S_H - S_L)^2}$  and  $L^* = W - P_0n^*$

Given these optimality conditions, we obtain the following testable predictions:

**Proposition 1:**  $\frac{\partial n^*}{\partial \theta} > 0$ ,  $\frac{\partial L^*}{\partial \theta} < 0$ . *Banks with higher trading expertise have higher investment in securities and reduce the supply of credit as compared to banks with lower trading expertise.*

**Proposition 2:**  $\frac{\partial^2 n^*}{\partial \theta \partial \tau} > 0$ ,  $\frac{\partial^2 L^*}{\partial \theta \partial \tau} < 0$ . *The trading ability and risk-bearing capacity reinforce each other with regard to investment in securities and consequently, this implies further reduction in credit supplied. Thus, the effects are reinforced with higher bank capital.*

**Proposition 3:**  $\frac{\partial n^*}{\partial P_0} < 0$ ,  $\frac{\partial L^*}{\partial P_0} > 0$ . *A decrease in the initial security price (an increase in the expected return) increases the overall investment in securities and decreases lending.*<sup>4</sup>

**Proposition 4:**  $\frac{\partial^2 n^*}{\partial P_0 \partial \tau} < 0$ ,  $\frac{\partial^2 n^*}{\partial P_0 \partial \theta} < 0$ ,  $\frac{\partial^2 L^*}{\partial P_0 \partial \tau} > 0$ ,  $\frac{\partial^2 L^*}{\partial P_0 \partial \theta} > 0$ . *The effects described in Proposition 3, both in terms of securities investments and lending, are stronger for banks with higher trading expertise and higher risk-bearing capacity.*

It is important to highlight that the negative externality from securities investment by banks to lending relies on three features: (1) an increase in expected returns from investing in securities; (2) funding constraints; and (3) securities markets and lending markets have some

<sup>2</sup> In the periodic survey conducted by ECB, most banks reported funding constraints as an important factor affecting banking operations in the middle of the crisis.

<sup>3</sup> To derive this equation, we have assumed linear loan returns:  $g(L) = cL$ . We have assumed that loans are riskless with constant returns to scale (marginal profit equals  $c$ ). Note that as long as the volatility of a loan portfolio is sufficiently low with respect to the volatility of securities' returns, the main propositions would hold. Note also that we take prices and returns as given in the model and ignore other equilibrium considerations. We also assume that capital and level of funding constraints are independent (see, e.g., He and Krishnamurthy, 2013, and Brunnermeier et al., 2012, for models that relate both).

<sup>4</sup> To get this relation, one needs to further assume that gross returns from investing in securities are below twice of those from investing in loans ( $(\theta S_H + (1 - \theta)S_L)/P_0 < 2(1 + c)$ ). To obtain an interior solution, we also need  $0 \leq n^* \leq W/P_0$ . The first condition,  $0 \leq n^*$ , is satisfied as long as the expected return in securities is higher than the expected return in lending:  $\theta S_H + (1 - \theta)S_L - P_0 \geq P_0c$ . The second condition only states that the bank needs to have enough funds to finance its investment in securities. In other words, the returns from securities investments need to be higher than those from lending so that there is positive investment in securities, but not too high so that there is still some lending.

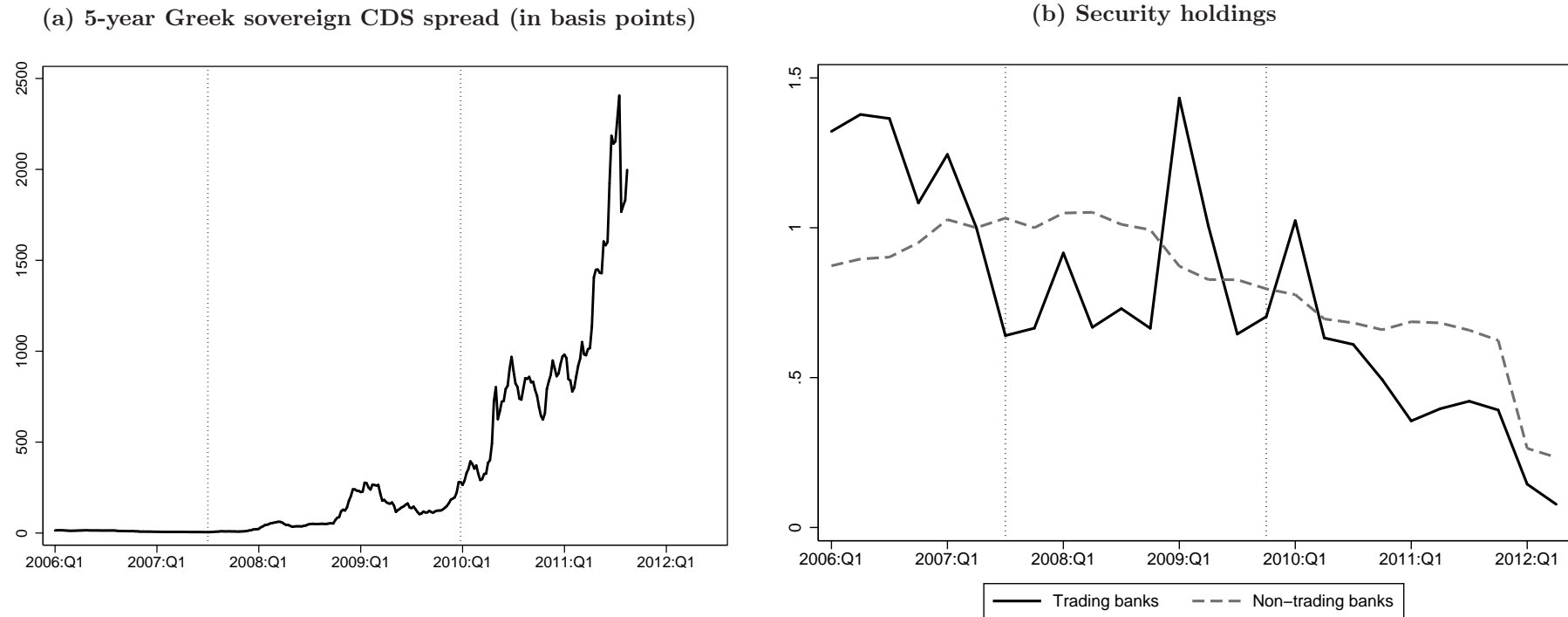
degree of segmentation (i.e., that loan rates do not adjust immediately to being equal to security returns). See Stein (2013) and Diamond and Rajan (2011) for a discussion of the externalities.<sup>5</sup>

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<sup>5</sup> Note that it is also difficult for banks to increase interest rates substantially to compensate for the returns from security investments due to the risk of adverse selection and moral hazard that arise in lending (Stiglitz and Weiss, 1981).

## APPENDIX B

FIGURE B1:  
GREEK GOVERNMENT BONDS



Subfigure (a) shows the spreads (in basis points) of a 5-year Greek sovereign CDS. Subfigure (b) reflects the total notional amount of Greek sovereign bonds as a fraction of total assets for the period from 2006:Q1 through 2012:Q4 (normalized to 2007:Q2). The black solid line refers to 'Trading banks' and the gray dashed line represents 'Non-trading banks'. We classify a bank as a 'Trading bank' (higher trading expertise) when it has membership to the largest fixed income platform in Germany (Eurex Exchange). We define a bank as a 'Non-trading bank' when it has no Eurex Exchange membership. The first vertical line refers to the start of financial crisis in 2007:Q3, and the second vertical line denotes 2009:Q4, the end of the crisis in Germany.

**TABLE B1:**  
**SUMMARY STATISTICS**

<b>PANEL A: LANDESBANKS</b>									
	Pre-crisis			Crisis			Post-crisis		
	Mean	Std.	Obs.	Mean	Std.	Obs.	Mean	Std.	Obs.
Securities holdings/TA	20.41	5.64	50	22.29	6.30	100	20.19	6.02	119
Aaa securities	26.35	14.16	50	24.98	14.29	100	31.62	14.88	119
Domestic securities	52.18	16.17	50	45.44	15.68	100	52.70	14.29	119
Long-term securities	82.54	8.88	50	82.44	10.31	100	82.82	10.36	119
Sovereign securities	23.19	16.64	50	17.46	11.44	100	28.02	12.69	119
Off-balance sheet securities/TA	7.20	4.62	50	7.78	4.58	100	4.69	2.31	119
Central bank borrowing/TA	3.23	2.89	50	4.95	4.39	100	1.88	1.92	119
Buys/TA	3.81	2.32	50	3.04	2.99	100	2.11	1.69	119
Sells/TA	2.14	1.42	50	0.94	0.73	100	0.89	0.88	119
Loans/TA	72.32	6.38	50	71.09	7.23	100	65.28	8.41	119
Capital/TA	3.40	0.80	50	3.42	1.09	100	3.67	1.09	119
Size	18.44	0.85	50	18.54	0.86	100	18.52	0.85	119
Gains on holdings	-0.22	0.12	50	-0.33	0.31	100	0.04	0.24	119
Gains on pre-crisis holdings	-0.18	0.11	50	-0.19	0.11	100	-0.06	0.07	119

This table reports the summary statistics of the variables used in the paper for Landesbanks, across three periods. We define ‘Pre-crisis’ (2006:Q1 - 2007:Q2), ‘Crisis’ (2007:Q3 - 2009:Q4), and ‘Post-crisis’ (2010:Q1 - 2012:Q4). ‘Securities holdings/TA’ measures the total investment in securities as a fraction of total assets (in %). ‘Aaa securities’ measures the total investment in Aaa-rated securities as a fraction of the total investment in securities (in %). ‘Domestic securities’ measures the total investment in securities with German issuer as a fraction of total investment in securities (in %). ‘Long-term securities’ measures the total investment in securities with residual maturity higher than one year as a fraction of the total investment of securities (in %). ‘Sovereign securities’ measures the total investment in securities issued by sovereigns as a fraction of the total investment in securities (in %). ‘Capital/TA’ measures the book value of equity as a fraction of total assets (in %). ‘Size’ refers to the logarithm of total assets (in thousand Euros). ‘Gains on holdings’ measures the (unrealized) gains/losses on all securities in the bank’s portfolio as a fraction of total assets (in %). ‘Gains on pre-crisis holdings’ measures the (unrealized) gains/losses on all securities in the bank’s pre-crisis portfolio with maturing dates after 2009:Q4 as a fraction of total assets (in %). The definition of the other variables can be found in Table D2.

**TABLE B1:**  
**SUMMARY STATISTICS (CONT'D)**

<b>PANEL B: TRADING BANKS</b>									
	Pre-crisis			Crisis			Post-crisis		
	Mean	Std.	Obs.	Mean	Std.	Obs.	Mean	Std.	Obs.
Gains on holdings	-0.24	0.29	150	-0.22	0.40	296	0.16	0.41	353
Gains on pre-crisis holdings	-0.18	0.24	150	-0.19	0.27	296	-0.07	0.13	353

<b>PANEL C: NON-TRADING BANKS</b>									
	Pre-crisis			Crisis			Post-crisis		
	Mean	Std.	Obs.	Mean	Std.	Obs.	Mean	Std.	Obs.
Gains on holdings	-0.23	0.26	2,563	-0.15	0.34	5,083	0.21	0.36	6,098
Gains on pre-crisis holdings	-0.14	0.20	2,563	-0.11	0.20	5,083	-0.02	0.08	6,098

This table reports the summary statistics of the variables presented in Panel C of Table 1, across three periods. We define ‘Pre-crisis’ (2006:Q1 - 2007:Q2), ‘Crisis’ (2007:Q3 - 2009:Q4), and ‘Post-crisis’ (2010:Q1 - 2012:Q4). Panel A reports the summary statistics for ‘Trading banks’. Panel B reports the summary statistics for ‘Non-trading banks’. We classify a bank as a ‘Trading bank’ (higher trading expertise) when it has membership to the largest fixed income platform in Germany (Eurex Exchange). We define a bank as a ‘Non-trading bank’ when it has no Eurex Exchange membership. ‘Gains on holdings’ measures the (unrealized) gains/losses on all securities in the bank’s portfolio as a fraction of total assets (in %). ‘Gains on pre-crisis holdings’ measures the (unrealized) gains/losses on all securities in the bank’s pre-crisis portfolio with maturing dates after 2009:Q4 as a fraction of total assets (in %).

**TABLE B2:**  
**BUYING BEHAVIOR DURING THE CRISIS (ALL SECURITIES)**  
**ROBUSTNESS**

	Dependent variable: Buys				
	(1)	(2)	(3)	(4)	(5)
Trading bank <sub><i>b</i></sub>	2.494*** (0.413)	2.618*** (0.425)	2.272*** (0.377)	2.273*** (0.377)	2.367*** (0.376)
Landesbank <sub><i>b</i></sub>	1.905* (1.073)	2.101** (1.051)	1.151 (1.093)	1.178 (0.979)	1.481 (0.941)
Gains on pre-crisis holdings <sub><i>b,t-1</i></sub>	0.577*** (0.185)	0.532*** (0.176)	0.647*** (0.171)	0.650*** (0.171)	0.665*** (0.165)
Capital/TA <sub><i>b,t-1</i></sub>	-0.041 (0.052)	-0.042 (0.053)	-0.018 (0.040)	-0.018 (0.040)	-0.016 (0.039)
Trading bank <sub><i>b</i></sub> *Gains on pre-crisis holdings <sub><i>b,t-1</i></sub>	1.556*** (0.556)	1.750*** (0.580)	1.783*** (0.405)	1.780*** (0.405)	1.229** (0.492)
Trading bank <sub><i>b</i></sub> *Capital/TA <sub><i>b,t-1</i></sub>	0.408*** (0.133)	0.450*** (0.142)	0.361*** (0.120)	0.362*** (0.121)	0.422*** (0.115)
Landesbank <sub><i>b</i></sub> *Gains on pre-crisis holdings <sub><i>b,t-1</i></sub>	4.879* (2.740)	5.528* (2.831)	2.767 (3.826)	2.782 (3.740)	2.946 (2.828)
Landesbank <sub><i>b</i></sub> *Capital/TA <sub><i>b,t-1</i></sub>	-0.103 (0.295)	-0.084 (0.287)	-0.331 (0.258)	-0.333 (0.256)	-0.280 (0.267)
Public support <sub><i>b</i></sub>	1.814** (0.727)				1.729*** (0.548)
After public support <sub><i>b,t</i></sub>		1.380** (0.666)			
Before public support <sub><i>b,t</i></sub>		2.398*** (0.831)			
Central bank borrowing/TA <sub><i>b,t-1</i></sub>			0.001 (0.006)	0.002 (0.006)	0.003 (0.006)
Central bank borrowing/TA <sub><i>b,t-1</i></sub> * Gains on pre-crisis holdings <sub><i>b,t-1</i></sub>			0.041*** (0.012)	0.041*** (0.012)	0.041*** (0.013)
Trading bank <sub><i>b</i></sub> *Central bank borrowing/TA <sub><i>b,t-1</i></sub>			0.069*** (0.017)	0.069*** (0.016)	0.078*** (0.020)
Landesbank <sub><i>b</i></sub> *Central bank borrowing/TA <sub><i>b,t-1</i></sub>				-0.004 (0.034)	-0.035 (0.058)
Bank controls	Y	Y	Y	Y	Y
Security*Time fixed effects	Y	Y	Y	Y	Y
Observations	281,044	281,044	281,044	281,044	281,044
R-squared	0.306	0.307	0.308	0.308	0.308

This table replicates Table 6 for the entire sample of securities. The dependent variable is the logarithm of the amount bought (in nominal value) by bank  $b$  of security  $i$  during quarter  $t$ , and zero otherwise. ‘Trading bank’ is a binary variable that equals one when bank  $b$  has membership to the largest fixed income platform in Germany (Eurex Exchange), and zero otherwise, which proxies for banks with higher trading expertise. ‘Landesbank’ is a binary variable that equals the value of one if bank  $b$  is a Landesbank, and zero otherwise. ‘Capital/TA<sub>*b,t-1*</sub>’ measures the book value of equity as a fraction of total assets (in %) for bank  $b$  in quarter  $t - 1$ . All regressions are estimated using ordinary least squares. Lagged, time-varying bank controls (Size, Interbank borrowing/TA, Deposits/TA) and fixed effects are either included (‘Y’), not included (‘N’), or spanned by another set of fixed effects (‘-’). The definition of the main independent variables can be found in Table D2. A constant is included, but its coefficient is left unreported. Robust standard errors clustered at bank level following Arellano (1987) are reported in parentheses. \*\*\*: Significant at 1 percent level; \*\*: Significant at 5 percent level; \*: Significant at 10 percent level.



**TABLE B3:**  
**TRADING BEHAVIOR OF SECURITIES WITH THE LARGEST PRICE DROP**  
**AND MARKET MAKING INFORMATION**  
**ROBUSTNESS**

	Dependent variable:			
	Buys	Sells	Buys	Sells
	(1)	(2)	(3)	(4)
Trading bank <sub><i>t</i></sub>	1.979*** (0.556)	1.971*** (0.704)	1.712*** (0.501)	1.711*** (0.568)
Landesbank <sub><i>t</i></sub>	1.742** (0.787)	1.379 (0.955)	1.470** (0.670)	1.081 (0.737)
Bank controls	Y	Y	Y	Y
Security*Time fixed effects	N	N	Y	Y
Observations	4,919	5,004	4,919	5,004
R-squared	0.089	0.092	0.211	0.320

This table tests the robustness of the trading behavior to market making transactions. The sample is restricted to those securities that had the largest price drop (25th percentile) in the previous quarter. We restrict the sample further to those securities for which we have the information on their market maker. The dependent variable for the 'Buys' is the logarithm of the amount bought (in nominal value) by bank *b* of security *i* during quarter *t*, and zero otherwise. For the 'Sells', the dependent variable is the logarithm of the amount sold (in nominal value) by bank *b* of security *i* during quarter *t*, and zero otherwise. For each bank to calculate the buys and sells, we exclude the securities where the bank is a market maker. 'Trading bank' is a binary variable that equals the value of one if bank *b* has membership to the largest fixed income platform in Germany (Eurex Exchange), and zero otherwise, which proxies for banks with higher trading expertise. 'Landesbank' is a binary variable that equals the value of one if bank *b* is a Landesbank, and zero otherwise. All regressions are estimated using ordinary least squares. Lagged, time-varying bank controls (Size, Capital/TA, Interbank borrowing/TA, Deposits/TA) and fixed effects are either included ('Y'), not included ('N'), or spanned by another set of fixed effects ('-'). The definition of the main independent variables can be found in Table D2. A constant is included, but its coefficient is left unreported. Robust standard errors clustered at bank level following Arellano (1987) are reported in parentheses. \*\*\*: Significant at 1 percent level; \*\*: Significant at 5 percent level; \*: Significant at 10 percent level.

**TABLE B4:**  
**BUYING BEHAVIOR OF LEVEL3-RELATED SECURITIES**  
**ROBUSTNESS**

	Dependent variable: Buys			
	(1)	(2)	(3)	(4)
Trading bank <sub><i>b</i></sub>	1.317*** (0.271)	1.286*** (0.238)	1.458*** (0.261)	1.549*** (0.459)
Landesbank <sub><i>b</i></sub>	0.758** (0.330)	0.571* (0.332)	0.616* (0.322)	0.449 (0.321)
Capital/TA <sub><i>b,t-1</i></sub>	0.071** (0.032)	0.027 (0.027)	0.030 (0.027)	0.001 (0.031)
Gains on pre-crisis holdings <sub><i>b,t-1</i></sub>	0.078 (0.187)		0.046 (0.176)	
Trading bank <sub><i>b</i></sub> *Gains on pre-crisis holdings <sub><i>b,t-1</i></sub>	1.001* (0.559)		0.814 (0.553)	
Trading bank <sub><i>b</i></sub> *Capital/TA <sub><i>b,t-1</i></sub>		0.217*** (0.070)	0.192*** (0.072)	0.266*** (0.075)
Tier1 buffer <sub><i>b,t-1</i></sub>				0.025 (0.017)
Trading bank <sub><i>b</i></sub> *Tier1 buffer <sub><i>b,t-1</i></sub>				-0.048 (0.051)
Bank controls	Y	Y	Y	Y
Security*Time fixed effects	Y	Y	Y	Y
Observations	139,274	139,274	139,274	135,938
R-squared	0.676	0.676	0.676	0.680

This table tests the robustness of the trading behavior to Level 3 securities, i.e. securities with no market price. That is, we proxy Level 3 securities using securities with no market price. The dependent variable is the logarithm of the amount bought (in nominal value) by bank  $b$  of security  $i$  during quarter  $t$ , and zero otherwise. ‘Trading bank’ is a binary variable that equals one when bank  $b$  has membership to the largest fixed income platform in Germany (Eurex Exchange), and zero otherwise, which proxies for banks with higher trading expertise. ‘Landesbank’ is a binary variable that equals the value of one if bank  $b$  is a Landesbank, and zero otherwise. ‘Capital/TA<sub>*b,t-1*</sub>’ measures the book value of equity as a fraction of total assets (in %) for bank  $b$  in quarter  $t - 1$ . All regressions are estimated using ordinary least squares. Lagged, time-varying bank controls (Size, Interbank borrowing/TA, Deposits/TA) and fixed effects are either included (‘Y’), not included (‘N’), or spanned by another set of fixed effects (‘-’). The definition of the main independent variables can be found in Table D2. A constant is included, but its coefficient is left unreported. Robust standard errors clustered at bank level following Arellano (1987) are reported in parentheses. \*\*\*: Significant at 1 percent level; \*\*: Significant at 5 percent level; \*: Significant at 10 percent level.

**TABLE B5:**  
**TRADING BEHAVIOR OF SECURITIES WITH THE LARGEST PRICE DROP**  
**ROBUSTNESS**

	Dependent variable:			
	Buys	Sells	Buys	Sells
	(1)	(2)	(3)	(4)
Trading bank <sub><i>b</i></sub>	2.893*** (0.450)	3.431*** (0.458)	3.152*** (0.471)	3.585*** (0.518)
Landesbank <sub><i>b</i></sub>	2.564*** (0.474)	2.660*** (0.381)	2.549*** (0.467)	2.636*** (0.370)
$\Delta\text{Credit}/\text{TA}_{b,t-1}$	0.036 (0.031)	-0.003 (0.023)	0.031 (0.039)	0.006 (0.023)
Capital/ $\text{TA}_{b,t-1}$	0.047 (0.049)	0.025 (0.021)	0.065 (0.059)	0.045 (0.029)
Capital/ $\text{TA}_{b,t-1} * \Delta\text{Credit}/\text{TA}_{b,t-1}$	-0.009 (0.016)	-0.005 (0.014)	-0.007 (0.017)	-0.001 (0.015)
Trading bank <sub><i>b</i></sub> * $\Delta\text{Credit}/\text{TA}_{b,t-1}$	-0.156*** (0.054)	0.048 (0.073)	-0.140** (0.065)	0.017 (0.096)
Landesbank <sub><i>b</i></sub> * $\Delta\text{Credit}/\text{TA}_{b,t-1}$	-0.064 (0.063)	0.072 (0.056)	-0.069 (0.064)	0.077 (0.059)
Trading bank <sub><i>b</i></sub> * Capital/ $\text{TA}_{b,t-1}$	0.253 (0.160)	0.263 (0.162)	0.166 (0.153)	0.183 (0.159)
Trading bank <sub><i>b</i></sub> * Capital/ $\text{TA}_{b,t-1} * \Delta\text{Credit}/\text{TA}_{b,t-1}$	-0.069** (0.032)	-0.030 (0.046)	-0.071** (0.030)	-0.028 (0.049)
Gains on pre-crisis holdings <sub><i>b,t-1</i></sub>			0.577** (0.250)	0.636*** (0.235)
Gains on pre-crisis holdings <sub><i>b,t-1</i></sub> * $\Delta\text{Credit}/\text{TA}_{b,t-1}$			-0.039 (0.082)	0.031 (0.099)
Trading bank <sub><i>b</i></sub> * Gains on pre-crisis holdings <sub><i>b,t-1</i></sub>			2.175*** (0.799)	1.568 (1.203)
Trading bank <sub><i>b</i></sub> * Gains on pre-crisis holdings <sub><i>b,t-1</i></sub> * $\Delta\text{Credit}/\text{TA}_{b,t-1}$			0.174 (0.169)	-0.089 (0.248)
Bank controls	Y	Y	Y	Y
Security*Time fixed effects	Y	Y	Y	Y
Observations	79,530	83,090	79,530	83,090
R-squared	0.293	0.401	0.297	0.403

This table tests the robustness of the trading behavior to change in credit at the bank level. The sample is restricted to those securities that had the largest price drop (25th percentile) in the previous quarter. The dependent variable for the 'Buys' is the logarithm of the amount bought (in nominal value) by bank *b* of security *i* during quarter *t*, and zero otherwise. For the 'Sells', the dependent variable is the logarithm of the amount sold (in nominal value) by bank *b* of security *i* during quarter *t*, and zero otherwise. 'Trading bank' is a binary variable that equals the value of one if bank *b* has membership to the largest fixed income platform in Germany (Eurex Exchange), and zero otherwise, which proxies for banks with higher trading expertise. 'Landesbank' is a binary variable that equals the value of one if bank *b* is a Landesbank, and zero otherwise. 'Capital/ $\text{TA}_{b,t-1}$ ' measures the book value of equity as a fraction of total assets (in %) for bank *b* in quarter *t* - 1. ' $\Delta\text{Credit}/\text{TA}_{b,t-1}$ ' measures the change in total amount of credit as a fraction of total assets (in %) for bank *b* in quarter *t* - 1. All regressions are estimated using ordinary least squares. Lagged, time-varying bank controls (Size, Interbank borrowing/TA, Deposits/TA) and fixed effects are either included ('Y'), not included ('N'), or spanned by another set of fixed effects ('-'). The definition of the main independent variables can be found in Table D2. A constant is included, but its coefficient is left unreported. Robust standard errors clustered at bank level following Arellano (1987) are reported in parentheses. \*\*\*: Significant at 1 percent level; \*\*: Significant at 5 percent level; \*: Significant at 10 percent level.

**TABLE B6:**  
**BUYING BEHAVIOR OF SECURITIES WITH THE LARGEST PRICE DROP (EACH QUARTER)**  
**ROBUSTNESS**

	2007:Q3	2007:Q4	2008:Q1	2008:Q2	2008:Q3	2008:Q4	2009:Q1	2009:Q2	2009:Q3	2009:Q4
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Trading bank <sub><i>b</i></sub>	3.257*** (0.915)	1.570*** (0.528)	1.070** (0.518)	0.640 (0.504)	1.448*** (0.545)	1.008*** (0.335)	0.816*** (0.302)	0.660 (0.427)	1.912*** (0.578)	1.669*** (0.627)
Landesbank <sub><i>b</i></sub>	2.903*** (0.876)	1.154* (0.612)	0.708 (0.558)	1.103 (0.779)	1.392** (0.634)	0.860** (0.414)	0.447 (0.543)	0.200 (0.464)	2.105*** (0.658)	2.236** (0.935)
Bank controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Security fixed effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	8,054	7,786	7,623	7,856	7,971	7,471	7,401	7,414	8,790	9,164
R-squared	0.273	0.277	0.248	0.350	0.276	0.367	0.364	0.312	0.278	0.311

The dependent variable is the logarithm of the amount bought (in nominal value) by bank *b* of security *i* during quarter *t* if the amount is positive, and zero otherwise. ‘Trading bank’ is a binary variable that equals the value of one if bank *b* has membership to the largest fixed income platform in Germany (Eurex Exchange), and zero otherwise, which proxies for banks with higher trading expertise. ‘Landesbank’ is a binary variable that equals the value of one if bank *b* is a Landesbank, and zero otherwise. All regressions are estimated using ordinary least squares. Lagged, time-varying bank controls (Size, Capital/TA, Interbank borrowing/TA, Deposits/TA) and fixed effects are either included (‘Y’), not included (‘N’), or spanned by another set of fixed effects (‘-’). The definition of the main independent variables can be found in Table D2. A constant is included, but its coefficient is left unreported. Robust standard errors clustered at bank level following Arellano (1987) are reported in parentheses. \*\*\*: Significant at 1 percent level; \*\*: Significant at 5 percent level; \*: Significant at 10 percent level.

**TABLE B7:**  
**SELLING BEHAVIOR DURING THE CRISIS (ALL SECURITIES)**  
**ROBUSTNESS**

	Dependent variable: Sells					
	(1)	(2)	(3)	(4)	(5)	(6)
Trading bank <sub><i>b</i></sub>	1.921*** (0.353)	1.939*** (0.351)	1.994*** (0.358)	1.914*** (0.350)	1.786*** (0.349)	1.726*** (0.391)
Landesbank <sub><i>b</i></sub>	1.626*** (0.563)	1.562* (0.897)	1.719** (0.870)	1.576*** (0.550)	1.371** (0.550)	1.260 (0.847)
Capital/TA <sub><i>b,t-1</i></sub>	-0.043 (0.047)	-0.041 (0.046)	-0.042 (0.047)	-0.041 (0.050)	-0.010 (0.049)	-0.011 (0.048)
Trading bank <sub><i>b</i></sub> * Capital/TA <sub><i>b,t-1</i></sub>	0.248** (0.116)	0.252** (0.119)	0.267** (0.119)	0.246** (0.116)	0.202* (0.109)	0.223** (0.111)
Gains on pre-crisis holdings <sub><i>b,t-1</i></sub>	0.803*** (0.196)	0.793*** (0.189)	0.726*** (0.177)	0.817*** (0.203)	1.080*** (0.214)	1.017*** (0.211)
Trading bank <sub><i>b</i></sub> * Gains on pre-crisis holdings <sub><i>b,t-1</i></sub>	0.085 (0.846)	-0.085 (0.771)	0.168 (0.793)	0.031 (0.878)	0.032 (0.791)	0.916 (1.142)
Landesbank <sub><i>b</i></sub> * Gains on pre-crisis holdings <sub><i>b,t-1</i></sub>	1.656 (2.073)	1.524 (1.940)	2.181 (1.911)	1.614 (2.158)	0.933 (2.125)	1.734 (2.236)
Landesbank <sub><i>b</i></sub> * Capital/TA <sub><i>b,t-1</i></sub>	0.079 (0.191)	0.130 (0.231)	0.174 (0.218)	0.088 (0.191)	0.055 (0.188)	0.132 (0.237)
Public support <sub><i>b</i></sub>		1.802*** (0.521)				1.627*** (0.488)
After public support <sub><i>b,t</i></sub>			1.487*** (0.492)			
Before public support <sub><i>b,t</i></sub>			2.130*** (0.573)			
Central bank borrowing/TA <sub><i>b,t-1</i></sub>				0.022** (0.011)	0.033*** (0.013)	0.033*** (0.012)
Central bank borrowing/TA <sub><i>b</i></sub> * Gains on pre-crisis holdings <sub><i>b,t-1</i></sub>					0.050*** (0.017)	0.051*** (0.016)
Public support <sub><i>b</i></sub> * Gains on pre-crisis holdings <sub><i>b,t-1</i></sub>						0.727 (0.930)
Bank controls	Y	Y	Y	Y	Y	Y
Security*Time fixed effects	Y	Y	Y	Y	Y	Y
Observations	319,070	319,070	319,070	319,070	319,070	319,070
R-squared	0.434	0.434	0.434	0.434	0.435	0.435

This table replicates Table 7 for the entire sample of securities. The dependent variable is the logarithm of the amount sold (in nominal value) by bank *b* of security *i* during quarter *t*, and zero otherwise. ‘Trading bank’ is a binary variable that equals one when bank *b* has membership to the largest fixed income platform in Germany (Eurex Exchange), and zero otherwise, which proxies for banks with higher trading expertise. ‘Landesbank’ is a binary variable that equals the value of one if bank *b* is a Landesbank, and zero otherwise. ‘Capital/TA<sub>*b,t-1*</sub>’ measures the book value of equity as a fraction of total assets (in %) for bank *b* in quarter *t* – 1. All regressions are estimated using ordinary least squares. Lagged, time-varying bank controls (Size, Interbank borrowing/TA, Deposits/TA) and fixed effects are either included (‘Y’), not included (‘N’), or spanned by another set of fixed effects (‘-’). The definition of the main independent variables can be found in Table D2. A constant is included, but its coefficient is left unreported. Robust standard errors clustered at bank level following Arellano (1987) are reported in parentheses. \*\*\*: Significant at 1 percent level; \*\*: Significant at 5 percent level; \*: Significant at 10 percent level.

**TABLE B8:**  
**BUYING BEHAVIOR DURING THE CRISIS ACROSS SECURITIES**  
**ROBUSTNESS**

<b>PANEL A: BUYING BEHAVIOR OF SECURITIES WITH THE LARGEST PRICE DROP</b>				
	Dependent variable: Buys			
	Aaa-rated	Below Aaa-rated	Up to 1 Year	Above 1 Year
	(1)	(2)	(3)	(4)
Trading bank <sub><i>t</i></sub>	1.629*** (0.462)	1.347*** (0.423)	1.608*** (0.481)	1.312*** (0.407)
Landesbank <sub><i>t</i></sub>	1.816** (0.717)	1.179** (0.512)	2.088*** (0.697)	1.131** (0.486)
Bank controls	Y	Y	Y	Y
Security*Time fixed effects	Y	Y	Y	Y
Observations	16,164	63,366	10,462	69,068
R-squared	0.298	0.293	0.337	0.292

<b>PANEL B: BUYING BEHAVIOR OF ALL SECURITIES</b>				
	Dependent variable: Buys			
	Aaa-rated	Below Aaa-rated	Up to 1 Year	Above 1 Year
	(1)	(2)	(3)	(4)
Trading bank <sub><i>t</i></sub>	1.751*** (0.480)	1.708*** (0.479)	1.946*** (0.474)	1.618*** (0.497)
Landesbank <sub><i>t</i></sub>	1.605** (0.702)	1.417** (0.583)	1.805*** (0.679)	1.343** (0.576)
Bank controls	Y	Y	Y	Y
Security*Time fixed effects	Y	Y	Y	Y
Observations	77,943	228,016	54,769	251,190
R-squared	0.284	0.286	0.311	0.284

This table reports the buying behavior of banks, split by different ratings and maturities. In Panel A, the sample is restricted to those securities that had the largest price drop (25th percentile) in the previous quarter. Panel B replicates Panel A for the entire sample of securities. The dependent variable is the logarithm of the amount bought (in nominal value) by bank  $b$  of security  $i$  during quarter  $t$ , and zero otherwise. The splits are based on ratings and remaining residual maturity of the securities. 'Trading bank' is a binary variable that equals the value of one if bank  $b$  has membership to the largest fixed income platform in Germany (Eurex Exchange), and zero otherwise, which proxies for banks with higher trading expertise. 'Landesbank' is a binary variable that equals the value of one if bank  $b$  is a Landesbank, and zero otherwise. All regressions are estimated using ordinary least squares. Lagged, time-varying bank controls (Size, Capital/TA, Interbank borrowing/TA, Deposits/TA) and fixed effects are either included ('Y'), not included ('N'), or spanned by another set of fixed effects ('-'). The definition of the main independent variables can be found in Table D2. A constant is included, but its coefficient is left unreported. Robust standard errors clustered at bank level following Arellano (1987) are reported in parentheses. \*\*\*: Significant at 1 percent level; \*\*: Significant at 5 percent level; \*: Significant at 10 percent level.

**TABLE B9:**  
**LENDING BEHAVIOR DURING THE CRISIS**  
**ROBUSTNESS**

	Dependent variable: Change in credit			
	(1)	(2)	(3)	(4)
Trading bank <sub><i>b</i></sub>	-0.062*** (0.021)	-0.055*** (0.019)	-0.062*** (0.021)	-0.039* (0.020)
Landesbank <sub><i>b</i></sub>	-0.018 (0.025)	0.001 (0.020)	-0.009 (0.023)	0.018 (0.022)
Trading bank <sub><i>b</i></sub> * Capital/TA <sub><i>b,t-1</i></sub>	-0.010* (0.005)	-0.009* (0.005)	-0.009* (0.006)	-0.007 (0.006)
Non-trading bank <sub><i>b</i></sub> * Capital/TA <sub><i>b,t-1</i></sub>	-0.000 (0.003)	-0.000 (0.003)	-0.000 (0.003)	-0.002 (0.003)
Landesbank <sub><i>b</i></sub> * Capital/TA <sub><i>b,t-1</i></sub>	-0.007 (0.008)	-0.009 (0.009)	-0.005 (0.008)	0.015 (0.014)
Trading bank <sub><i>b</i></sub> * Gains on pre-crisis holdings <sub><i>b,t-1</i></sub>	-0.009 (0.128)		-0.010 (0.128)	-0.021 (0.127)
Non-trading bank <sub><i>b</i></sub> * Gains on pre-crisis holdings <sub><i>b,t-1</i></sub>	0.056 (0.040)		0.059 (0.040)	0.065 (0.040)
Landesbank <sub><i>b</i></sub> * Gains on pre-crisis holdings <sub><i>b,t-1</i></sub>	-0.210 (0.168)		-0.222 (0.170)	-0.187 (0.176)
Trading bank <sub><i>b</i></sub> * Central bank borrowing/TA <sub><i>b,t-1</i></sub>		-0.000 (0.001)	-0.000 (0.001)	0.001 (0.001)
Non-trading bank <sub><i>b</i></sub> * Central bank borrowing/TA <sub><i>b,t-1</i></sub>		0.001 (0.001)	0.000 (0.001)	0.001 (0.001)
Landesbank <sub><i>b</i></sub> * Central bank borrowing/TA <sub><i>b,t-1</i></sub>		-0.001 (0.001)	-0.002 (0.001)	-0.001 (0.001)
Public support <sub><i>b</i></sub>				-0.051*** (0.016)
Bank controls	Y	Y	Y	Y
Borrower*Time fixed effects	Y	Y	Y	Y
Observations	710,718	710,718	710,718	710,718
R-squared	0.441	0.441	0.441	0.441

The dependent variable is the change in the logarithm of credit granted by bank  $b$  to firm  $j$  during quarter  $t$ . ‘Trading bank’ is a binary variable that equals the value of one if bank  $b$  has membership to the largest fixed income platform in Germany (Eurex Exchange), and zero otherwise, which proxies for banks with higher trading expertise. ‘Non-trading banks’ is a binary variable that equals the value of one if bank  $b$  does not have a direct Eurex Exchange membership and zero otherwise. ‘Landesbank’ is a binary variable that equals the value of one if bank  $b$  is a Landesbank, and zero otherwise. ‘Capital/TA<sub>*b,t-1*</sub>’ measures the book value of equity as a fraction of total assets (in %) for bank  $b$  in quarter  $t - 1$ . All regressions are estimated using ordinary least squares. Lagged, time-varying bank controls (Size, Interbank borrowing/TA, Deposits/TA) and fixed effects are either included (‘Y’), not included (‘N’), or spanned by another set of fixed effects (‘-’). The definition of the main independent variables can be found in Table D2. A constant is included, but its coefficient is left unreported. Robust standard errors clustered at bank level following Arellano (1987) are reported in parentheses. \*\*\*: Significant at 1 percent level; \*\*: Significant at 5 percent level; \*: Significant at 10 percent level.

**TABLE B10:**  
**CORPORATE DEBT ISSUANCE DURING THE CRISIS**  
**ROBUSTNESS**

	Dependent variable: Corporate debt issuance			
	(1)	(2)	(3)	(4)
Change in $\text{credit}_{b,t}$	0.001 (0.001)		0.001 (0.001)	
Change in $\text{credit}_{b,t-1}$		-0.001 (0.001)		-0.001 (0.001)
Time fixed effects	Y	Y	Y	Y
Observations	249,555	249,555	249,555	249,555
R-squared	0.000	0.000	0.000	0.000

The dependent variable in column 1 and 2 is a binary variable that equals the value of one when firm  $j$  issues corporate debt during quarter  $t$ , and zero otherwise. In column 3 and 4, the dependent variable is the logarithm of corporate bond issuance by firm  $j$  during quarter  $t$ . A constant is included, but its coefficient is left unreported. Robust standard errors clustered at firm level following Arellano (1987) are reported in parentheses. \*\*\*: Significant at 1 percent level; \*\*: Significant at 5 percent level; \*: Significant at 10 percent level.



## APPENDIX C

**TABLE C1 PANEL A:  
TRADING BEHAVIOR DURING THE CRISIS**

	Dependent variable:				
	$\Delta\text{Sec}/\text{TA}$	Buys	Sells	Buys	Sells
	(1)	(2)	(3)	(4)	(5)
Trading bank <sub><i>b</i></sub>	5.215** (2.563)	2.419*** (0.571)	2.255*** (0.54)	2.043*** (0.475)	1.837*** (0.411)
Bank controls	Y	Y	Y	Y	Y
Security*Time fixed effects	N	N	N	Y	Y
Bank fixed effects	N	N	N	N	N
Observations	504	248,399	258,731	248,399	258,731
R-squared	0.073	0.114	0.088	0.323	0.476

The dependent variable in column 1 is the change in Securities holdings/TA for each bank from 2007:Q2 to 2009:Q4. The dependent variable for the ‘Buys’ is  $\text{Log}(\text{Amount})_{i,b,t}$ , which is the logarithm of the amount bought (in nominal value) by bank  $b$  of security  $i$  during quarter  $t$ , and zero otherwise. For the ‘Sells’, the dependent variable is the logarithm of the amount sold (in nominal value) by bank  $b$  of security  $i$  during quarter  $t$ , and zero otherwise. ‘Trading bank’ is a binary variable that equals the value of one when bank  $b$  has membership to the largest fixed income platform in Germany (Eurex Exchange), and zero otherwise, which proxies for banks with higher trading expertise. All regressions are estimated using ordinary least squares. Lagged, time-varying bank controls (Size, Capital/TA, Interbank borrowing/TA, Deposits/TA) are either included (‘Y’) or not included (‘N’). The definition of the main independent variables can be found in the Appendix. A constant is included, but its coefficient is left unreported. Fixed effects are either included (‘Y’), not included (‘N’), or spanned by another set of fixed effects (‘-’). Robust standard errors clustered at bank level following Arellano (1987) are reported in parentheses. \*\*\*: Significant at 1 percent level; \*\*: Significant at 5 percent level; \*: Significant at 10 percent level.

**TABLE C1 PANEL B:**  
**BUYING BEHAVIOR DURING THE CRISIS ACROSS SECURITIES**

Dependent variable: Buys					
	All	Aaa-rated	Below Aaa-rated	Up to 1 Year	Above 1 Year
	(1)	(2)	(3)	(4)	(5)
Trading bank <sub><i>b</i></sub> * $\Delta$ price <sub><i>i,t-1</i></sub>	-0.231** (0.113)	-0.160 (0.159)	-0.241* (0.138)	0.164 (0.748)	-0.248*** (0.113)
Bank controls	Y	Y	Y	Y	Y
Security*Time fixed effects	Y	Y	Y	Y	Y
Bank fixed effects	Y	Y	Y	Y	Y
Observations	36,885	11,918	24,967	6,336	30,549
R-squared	0.703	0.682	0.721	0.714	0.708

The estimations report the buying behavior of banks across different securities *conditional on buying*. The dependent variable is  $\text{Log}(\text{Amount})_{i,b,t}$ , which is the logarithm of the amount bought (in nominal value) by bank *b* of security *i* during quarter *t*. The splits are based on ratings and remaining residual maturity of the securities. ‘Trading bank’ is a binary variable that equals the value of one when bank *b* has membership to the largest fixed income platform in Germany (Eurex Exchange), and zero otherwise, which proxies for banks with higher trading expertise. All regressions are estimated using ordinary least squares. The percentage price change of security *i*, ‘ $\Delta$ price<sub>*i,t-1*</sub>’, is demeaned by the sample mean and standardized using the standard deviation of the respective subset of securities in the crisis sample. Lagged, time-varying bank controls (Size, Capital/TA, Interbank borrowing/TA, Deposits/TA) are either included (‘Y’) or not included (‘N’). The definition of the main independent variables can be found in the Appendix. A constant is included, but its coefficient is left unreported. Fixed effects are either included (‘Y’), not included (‘N’), or spanned by another set of fixed effects (‘-’). Robust standard errors clustered at bank level following Arellano (1987) are reported in parentheses. \*\*\*: Significant at 1 percent level; \*\*: Significant at 5 percent level; \*: Significant at 10 percent level.

**TABLE C1 PANEL C:  
SELLING BEHAVIOR DURING THE CRISIS ACROSS SECURITIES**

	Dependent variable: Sells				
	All	Aaa-rated	Below Aaa-rated	Up to 1 Year	Above 1 Year
	(1)	(2)	(3)	(4)	(5)
Trading bank <sub><i>b</i></sub> * $\Delta$ price <sub><i>i,t-1</i></sub>	0.073 (0.075)	0.159 (0.258)	0.057 (0.085)	0.162 (0.188)	0.058 (0.086)
Bank controls	Y	Y	Y	Y	Y
Security*Time fixed effects	Y	Y	Y	Y	Y
Bank fixed effects	Y	Y	Y	Y	Y
Observations	48,546	14,682	33,864	16,055	32,491
R-squared	0.658	0.663	0.665	0.620	0.688

The estimations report the selling behavior of banks across different securities *conditional on selling*. The dependent variable is  $\text{Log}(\text{Amount})_{i,b,t}$ , which is the logarithm of the amount sold (in nominal value) by bank *b* of security *i* during quarter *t*. The splits are based on ratings and remaining residual maturity of the securities. ‘Trading bank’ is a binary variable that equals the value of one when bank *b* has membership to the largest fixed income platform in Germany (Eurex Exchange), and zero otherwise, which proxies for banks with higher trading expertise. The percentage price change of security *i*, ‘ $\Delta$ price<sub>*i,t-1*</sub>’, is demeaned by the sample mean and standardized using the standard deviation of the respective subset of securities in the crisis sample. All regressions are estimated using ordinary least squares. Lagged, time-varying bank controls (Size, Capital/TA, Interbank borrowing/TA, Deposits/TA) are either included (‘Y’) or not included (‘N’). The definition of the main independent variables can be found in the Appendix. A constant is included, but its coefficient is left unreported. Fixed effects are either included (‘Y’), not included (‘N’), or spanned by another set of effects (‘-’). Robust standard errors clustered at bank level following Arellano (1987) are reported in parentheses. \*\*\*: Significant at 1 percent level; \*\*: Significant at 5 percent level; \*: Significant at 10 percent level.

**TABLE C2:**  
**BUYING BEHAVIOR DURING THE CRISIS BASED ON CAPITAL**

	Dependent variable: Buys							
	Trading banks				Non-trading banks			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Capital/TA <sub><i>b,t-1</i></sub>	0.111*				0.027			
	(0.061)				(0.068)			
Capital/TA <sub><i>b,t-1</i></sub> *Δprice <sub><i>i,t-1</i></sub>	-0.061***	-0.049*	-0.049*	-0.061**	-0.013***	-0.010***	-0.010***	-0.035
	(0.018)	(0.027)	(0.027)	(0.025)	(0.005)	(0.003)	(0.003)	(0.101)
Cumulative gains/TA <sub><i>b,i,t-1</i></sub>	6.184	6.380	6.227	6.663	0.0125	0.369	0.307	0.000
	(5.444)	(5.817)	(5.824)	(13.98)	(0.356)	(0.356)	(0.364)	0.000
Capital/TA <sub><i>b,t-1</i></sub> *Cumulative gains/TA <sub><i>b,i,t-1</i></sub>			-0.166	5.776			-0.176	0.000
			(0.585)	(8.482)			(0.139)	(0.000)
Bank controls	Y	-	-	-	Y	-	-	-
Security*Time fixed effects	Y	Y	Y	Y	Y	Y	Y	Y
Bank fixed effects	Y	-	-	-	Y	-	-	-
Bank*Time fixed effects	N	Y	Y	Y	N	Y	Y	Y
Observations	90,167	90,167	90,167	20,088	141,430	141,430	141,430	8,051
R-squared	0.502	0.507	0.507	0.793	0.340	0.375	0.375	0.958

The dependent variable is the  $\text{Log}(\text{Amount})_{i,b,t}$ , which is the logarithm of the amount bought (in nominal value) by bank  $b$  of security  $i$  during quarter  $t$ , and zero otherwise, and column 4 and 8 report the results of the estimations conditional on buying a security. Columns 1 to 4 report the results for trading banks, and columns 5 to 8 for the other banks. ‘Capital/TA<sub>*b,t-1*</sub>’ measures the book value of equity as a fraction of total assets (in %) for bank  $b$  in quarter  $t - 1$ . The percentage price change of security  $i$ , ‘Δprice<sub>*i,t-1*</sub>’, is demeaned by the sample mean and standardized using its standard deviation in the crisis sample. All regressions are estimated using ordinary least squares. Lagged, time-varying bank controls (Size, Capital/TA, Interbank borrowing/TA, Deposits/TA) are either included (‘Y’) or not included (‘N’). The definition of the main independent variables can be found in the Appendix. A constant is included, but its coefficient is left unreported. Fixed effects are either included (‘Y’), not included (‘N’), or spanned by another set of effects (‘-’). Robust standard errors clustered at bank level following Arellano (1987) are reported in parentheses. \*\*\*: Significant at 1 percent level; \*\*: Significant at 5 percent level; \*: Significant at 10 percent level.

**TABLE C3:**  
**BUYING BEHAVIOR DURING THE CRISIS ACROSS DIFFERENT TYPES OF SECURITIES**  
**BASED ON CAPITAL**

<b>PANEL A: TRADING BANKS</b>						
Dependent variable: Buys						
Trading banks						
	Aaa-rated	Aa to A rated	Bbb-rated and below	Up to 1 Year	1 to 5 Year	5 to 10 Year
	(1)	(2)	(3)	(4)	(5)	(6)
Capital/TA <sub>b,t-1</sub> *Δprice <sub>i,t-1</sub>	0.023 (0.038)	-0.085*** (0.032)	-0.062** (0.030)	-0.037 (0.045)	-0.102*** (0.028)	-0.111*** (0.032)
Security*Time fixed effects	Y	Y	Y	Y	Y	Y
Bank*Time fixed effects	Y	Y	Y	Y	Y	Y
Observations	29,037	25,791	23,860	17,615	52,182	21,603
R-squared	0.417	0.486	0.533	0.497	0.468	0.452

<b>PANEL B: NON-TRADING BANKS</b>						
Dependent variable: Buys						
Non-trading banks						
	Aaa-rated	Aa to A rated	Bbb-rated and below	Up to 1 Year	1 to 5 Year	5 to 10 Year
	(1)	(2)	(3)	(4)	(5)	(6)
Capital/TA <sub>b,t-1</sub> *Δprice <sub>i,t-1</sub>	-0.086* (0.045)	-0.011 (0.025)	-0.001 (0.005)	-0.007 (0.006)	-0.010 (0.008)	-0.021 (0.014)
Security*Time fixed effects	Y	Y	Y	Y	Y	Y
Bank*Time fixed effects	Y	Y	Y	Y	Y	Y
Observations	35,679	41,539	40,181	27,094	87,135	29,164
R-squared	0.516	0.456	0.490	0.530	0.415	0.516

The dependent variable is the  $Log(Amount)_{i,b,t}$ , which is the logarithm of the amount bought (in nominal value) by bank  $b$  of security  $i$  during quarter  $t$ , and zero otherwise. The splits are based on ratings and remaining residual maturity of the securities. Panel A shows the results for trading banks and Panel B for the other banks. 'Capital/TA<sub>b,t-1</sub>' measures the book value of equity as a fraction of total assets (in %) for bank  $b$  in quarter  $t-1$ . The percentage price change of security  $i$ , 'Δprice<sub>i,t-1</sub>', is demeaned by the sample mean and standardized using the standard deviation of the respective subset of securities in the crisis sample. All regressions are estimated using ordinary least squares. Lagged, time-varying bank controls (Size, Capital/TA, Interbank borrowing/TA, Deposits/TA) are either included ('Y') or not included ('N'). The definition of the main independent variables can be found in the Appendix. A constant is included, but its coefficient is left unreported. Fixed effects are either included ('Y'), not included ('N'), or spanned by another set of effects ('-'). Robust standard errors clustered at bank level following Arellano (1987) are reported in parentheses. \*\*\*: Significant at 1 percent level; \*\*: Significant at 5 percent level; \*: Significant at 10 percent level.

**TABLE C4:**  
**SELLING BEHAVIOR DURING THE CRISIS BASED ON CAPITAL**

	Dependent variable: Sells							
	Trading banks				Non-trading banks			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Capital/TA <sub><i>b,t-1</i></sub>	0.011 (0.054)				0.013 (0.128)			
Capital/TA <sub><i>b,t-1</i></sub> *Δprice <sub><i>i,t-1</i></sub>	0.0002 (0.026)	-0.005 (0.033)	-0.003 (0.033)	0.008 (0.018)	-0.025** (0.010)	-0.003 (0.009)	0.001 (0.008)	-0.024 (0.054)
Cumulative gains/TA <sub><i>b,i,t-1</i></sub>	0.054 (0.326)	-0.097 (0.312)	-0.227 (0.328)	-0.949 (0.675)	-0.248*** (0.094)	-0.171* (0.098)	-0.221* (0.130)	-2.391*** (0.335)
Capital/TA <sub><i>b,t-1</i></sub> *Cumulative gains/TA <sub><i>b,i,t-1</i></sub>			-0.136** (0.064)	-0.027 (0.312)			-0.139 (0.119)	-0.419** (0.171)
Bank controls	Y	-	-	-	Y	-	-	-
Security*Time fixed effects	Y	Y	Y	Y	Y	Y	Y	Y
Bank fixed effects	Y	-	-	-	Y	-	-	-
Bank*Time fixed effects	N	Y	Y	Y	N	Y	Y	Y
Observations	96,033	96,033	96,033	30,877	146,708	146,708	146,708	13,781
R-squared	0.537	0.542	0.542	0.722	0.639	0.678	0.678	0.893

The dependent variable is the  $\text{Log}(\text{Amount})_{i,b,t}$ , which is the logarithm of the amount sold (in nominal value) by bank  $b$  of security  $i$  during quarter  $t$ , and zero otherwise, and columns 4 and 8 report the results of the estimations conditional on selling a security. ‘Capital/TA<sub>*b,t-1*</sub>’ measures the book value of equity as a fraction of total assets (in %) for bank  $b$  in quarter  $t - 1$ . The percentage price change of security  $i$ , ‘Δprice<sub>*i,t-1*</sub>’, is demeaned by the sample mean and standardized using its standard deviation in the crisis sample. All regressions are estimated using ordinary least squares. Lagged, time-varying bank controls (Size, Capital/TA, Interbank borrowing/TA, Deposits/TA) are either included (‘Y’) or not included (‘N’). The definition of the main independent variables can be found in the Appendix. A constant is included, but its coefficient is left unreported. Fixed effects are either included (‘Y’), not included (‘N’), or spanned by another set of effects (‘-’). Robust standard errors clustered at bank level following Arellano (1987) are reported in parentheses. \*\*\*: Significant at 1 percent level; \*\*: Significant at 5 percent level; \*: Significant at 10 percent level.

TABLE C5:

## LENDING AND INVESTMENT BEHAVIOR IN THE PRE-CRISIS AND POST-CRISIS PERIOD

<b>PANEL A: LENDING BEHAVIOR</b>						
	Dependent variable: Change in credit					
	Pre-crisis			Post-crisis		
	(1)	(2)	(3)	(4)	(5)	(6)
Trading bank <sub><i>b</i></sub>	-0.007 (0.0066)			-0.007 (0.005)		
Trading bank <sub><i>b</i></sub> * Capital/TA <sub><i>b,t-1</i></sub>	-0.001 (0.002)	0.014 (0.014)	0.012 (0.020)	-0.0001 (0.002)	-0.001 (0.003)	0.001 (0.004)
Non-trading bank <sub><i>b</i></sub> * Capital/TA <sub><i>b,t-1</i></sub>	0.001 (0.002)	-0.016 (0.010)	-0.022 (0.013)	0.001 (0.001)	-0.0001 (0.003)	0.006 (0.003)
Trading bank <sub><i>b</i></sub> * Future Default <sub><i>j,t</i></sub>			0.018 (0.039)			-0.004 (0.021)
Cumulative Gains/TA <sub><i>b,t-1</i></sub>	-0.795 0.558	-0.619 (1.559)	-0.933 (1.930)	0.273 (0.191)	-0.233 (0.355)	-0.002 (0.004)
Bank controls	Y	Y	Y	Y	Y	Y
Borrower*Time fixed effects	Y	Y	Y	Y	Y	Y
Bank fixed effects	N	Y	N	N	Y	N
Observations	192,051	192,051	192,051	689,124	689,124	689,124
R-squared	0.546	0.548	0.673	0.533	0.535	0.613

<b>PANEL B: INVESTMENT BEHAVIOR</b>		
	Dependent variable: $\Delta\text{Sec}/\text{TA}$	
	Pre-crisis	Post-crisis
	(1)	(2)
Trading bank <sub><i>b</i></sub>	-1.596 (1.559)	1.670 (1.806)
Bank controls	Y	Y
Observations	502	501
R-squared	0.026	0.013

The dependent variable in Panel A is  $\Delta \text{Log}(\text{Credit})_{b,j,t}$ , which is the change in the log of credit granted by bank  $b$  to firm  $j$  during quarter  $t$ . In Panel B, the dependent variable is the change in Securities/Total Assets for each bank over the respective period. 'Trading bank' is a binary variable that equals the value of one when bank  $b$  has membership to the largest fixed income platform in Germany (Eurex Exchange), and zero otherwise, which proxies for banks with higher trading expertise. 'Non-trading banks' is a binary variable that equals the value of one when bank  $b$  has not a direct Eurex Exchange membership, and zero otherwise. 'Capital/TA<sub>*b,t-1*</sub>' measures the book value of equity as a fraction of total assets (in %) for bank  $b$  in quarter  $t - 1$ . All regressions are estimated using ordinary least squares. Lagged, time-varying bank controls (Size, Capital/TA, Interbank borrowing/TA, Deposits/TA) are either included ('Y') or not included ('N'). The definition of the main independent variables can be found in the Appendix. A constant is included, but its coefficient is left unreported. Fixed effects are either included ('Y'), not included ('N'), or spanned by another set of effects ('-'). Robust standard errors clustered at bank level following Arellano (1987) are reported in parentheses. \*\*\*: Significant at 1 percent level; \*\*: Significant at 5 percent level; \*: Significant at 10 percent level.

## APPENDIX D

**TABLE D1:**  
**LENDING BEHAVIOR DURING THE CRISIS**

	Dependent variable: Change in credit							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Trading bank <sub><i>b</i></sub>	-0.050*	-0.061**	-0.058**	-0.058**				-0.022***
	(0.027)	(0.026)	(0.026)	(0.026)				(0.002)
Trading bank <sub><i>b</i></sub> *Capital/TA <sub><i>b,t-1</i></sub>		-0.014**	-0.014***	-0.014***	-0.017*	-0.018**	-0.017*	
		(0.006)	(0.005)	(0.005)	(0.009)	(0.007)	(0.010)	
Non-trading bank <sub><i>b</i></sub> *Capital/TA <sub><i>b,t-1</i></sub>		0.0041	0.0039	0.0039	0.0094	0.002	0.0094	
		(0.003)	(0.003)	(0.003)	(0.025)	(0.028)	(0.025)	
Trading bank <sub><i>b</i></sub> *Future default <sub><i>j,t</i></sub>							-0.0863	
							(0.070)	
Cumulative gains/TA <sub><i>b,t-1</i></sub>				0.002	-0.005**	-0.003**	-0.005**	
				(0.003)	(0.002)	(0.001)	(0.002)	
Bank controls	N	N	Y	Y	Y	Y	Y	N
Borrower*Time fixed effects	Y	Y	Y	Y	Y	N	Y	N
Bank*Borrower fixed effects	N	N	N	N	Y	Y	Y	
Time fixed effects	-	-	-	-	-	Y	-	Y
Observations	502,243	502,243	502,243	501,786	501,786	501,786	501,786	228,547
R-squared	0.499	0.499	0.499	0.5	0.642	0.272	0.636	0.003

The dependent variable from columns 1 to 7 is  $\Delta \text{Log}(\text{Credit})_{b,j,t}$ , which is the change in the log of credit granted by bank  $b$  to firm  $j$  during quarter  $t$ , whereas in column 8, the dependent variable is the change in log of the total firm credit of firm  $j$  during quarter  $t$  by all banks. The independent variable for column 8 is the fraction of borrowing of a firm from banks with trading expertise before the crisis (2007:Q2). ‘Trading bank’ is a binary variable that equals the value of one when bank  $b$  has membership to the largest fixed income platform in Germany (Eurex Exchange), and zero otherwise, which proxies for banks with higher trading expertise. ‘Non-trading banks’ is a binary variable that equals the value of one when bank  $b$  does not have a direct Eurex Exchange membership and zero otherwise. ‘Capital/TA<sub>*b,t-1*</sub>’ measures the book value of equity as a fraction of total assets (in %) for bank  $b$  in quarter  $t - 1$ . All regressions are estimated using ordinary least squares. Lagged, time-varying bank controls (Size, Capital/TA, Interbank borrowing/TA, Deposits/TA) are either included (‘Y’) or not included (‘N’). The definition of the main independent variables can be found in the Appendix. A constant is included, but its coefficient is left unreported. Fixed effects are either included (‘Y’), not included (‘N’), or spanned by another set of effects (‘-’). Robust standard errors clustered at bank level following Arellano (1987) are reported in parentheses. \*\*\*: Significant at 1 percent level; \*\*: Significant at 5 percent level; \*: Significant at 10 percent level.



**TABLE D2:**  
**DEFINITION OF MAIN INDEPENDENT VARIABLES**

Variable name	Definition
Trading bank <sub><i>b</i></sub>	Binary variable that equals the value of one if bank <i>b</i> has membership to the largest fixed income platform in Germany (Eurex Exchange), and zero otherwise.
Non-trading bank <sub><i>b</i></sub>	Binary variable that equals the value of one if bank <i>b</i> does not have membership to the largest fixed income platform in Germany (Eurex Exchange), and zero otherwise.
Landesbank <sub><i>b</i></sub>	Binary variable that equals the value of one if bank <i>b</i> is a Landesbank, and zero otherwise.
Public support <sub><i>b</i></sub>	Binary variable that equals the value of one if bank <i>b</i> received any form of public support during our sample, and zero otherwise.
After public support <sub><i>b,t</i></sub>	Binary variable that equals the value of one in all periods after bank <i>b</i> received public support (including the actual period of receiving the support), and zero in the periods before.
Before public support <sub><i>b,t</i></sub>	Binary variable that equals the value of one in all periods before bank <i>b</i> received public support, and zero in the periods after.
% $\Delta price_{i,t-1}$	Percentage price change of security <i>i</i> from <i>t</i> - 2 to <i>t</i> - 1.
Capital/TA <sub><i>b,t-1</i></sub>	Measures the book value of equity as a fraction of total assets (in %) for bank <i>b</i> in quarter <i>t</i> - 1.
Tier1-buffer <sub><i>b,t-1</i></sub>	Measures the difference between the Tier1 capital ratio of bank <i>b</i> at quarter <i>t</i> - 1 and the required regulatory ratio.
Central bank borrowing/TA <sub><i>b,t-1</i></sub>	Measures the total borrowing from the Deutsche Bundesbank (German central bank) as a fraction of total assets (in %) for bank <i>b</i> in quarter <i>t</i> - 1.
$\Delta$ Credit/TA <sub><i>b,t-1</i></sub>	Measures the change in total amount of credit as a fraction of total assets (in %) for bank <i>b</i> in quarter <i>t</i> - 1.
Subprime exposure/TA <sub><i>b</i></sub>	Measures the subprime securities holdings (CDOs, MBSs, and ABSs) as a fraction of total assets (in %) that bank <i>b</i> held in 2006:Q2.
Off-balance sheet exposure/TA <sub><i>b</i></sub>	Measures the off-balance sheet holdings as a fraction of total assets (in %) that bank <i>b</i> held in 2006:Q2.
Gains on securities <sub><i>b,i,t-1</i></sub>	Unrealized gains/losses that a bank <i>b</i> generates with holding the security <i>i</i> in quarter <i>t</i> - 1 as a fraction of total assets (in %). We compute profits by multiplying the change of the market-to-book ratio of security <i>i</i> with the amount held (in nominal values) by bank <i>b</i> in quarter <i>t</i> - 1. We further cumulate the profits of this security from the quarter, in which it has been purchased, until quarter <i>t</i> - 1.
Gains on holdings <sub><i>b,t-1</i></sub>	Unrealized gains/losses on all securities in the bank's portfolio up to quarter <i>t</i> - 1 as a fraction of total assets (in %). We compute this by aggregating the cumulative gains for individual securities held by the bank (described above) at the bank level.
Gains on pre-crisis holdings <sub><i>b,t-1</i></sub>	Unrealized gains/losses on all securities up to the quarter <i>t</i> - 1 that the bank held in its pre-crisis portfolio and had maturing dates after 2009:Q4 as a fraction of total assets (in %). We compute this by aggregating the cumulative gains for individual securities held by the bank (described above) at the bank level.
Gains on pre-crisis subprime holdings <sub><i>b,t-1</i></sub>	Unrealized gains/losses on all subprime securities (CDO, MBS, and ABS) that the bank held in its pre-crisis portfolio up to the quarter <i>t</i> - 1 as a fraction of total assets (in %). We compute this by aggregating the cumulative gains for individual securities held by the bank (described above) at the bank level.
Profits from derivative trading/TA <sub><i>b,t-1</i></sub>	Net profits that bank <i>b</i> generates from its derivatives trading as a fraction of total assets (in %) in quarter <i>t</i> - 1.
Profits from overall trading/TA <sub><i>b,t-1</i></sub>	Net profits that bank <i>b</i> generates from all its trading activities as a fraction of total assets (in %) in quarter <i>t</i> - 1.
Future default <sub><i>j,t</i></sub>	Binary variable that equals the value of one if borrower <i>j</i> defaults on its loan over the subsequent two years of the credit contract after quarter <i>t</i> , and zero otherwise.
Rating <sub><i>i,t</i></sub>	Credit rating of security <i>i</i> in quarter <i>t</i> , where rating equals a numeric scale of Moody's rating codes that range from category 'Aaa' through 'C'.
Maturity <sub><i>i,t</i></sub>	Number of months remaining (residual maturity) from quarter <i>t</i> onwards until security <i>i</i> matures.