

Flight to Where? Evidence from Bank Investments During the Financial Crisis

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Motivation (1)

- Recent financial and sovereign debt crisis as a shock to
 - Individual banks
 - Financial system as a whole
- Significantly deteriorating quality in a variety of asset classes
 - Questions about many banks' solvency and liquidity
 - Stalling interbank lending market
 - Vastly growing demand for intermediation and injections by governments and central banks around the world

Motivation (2)

- Recent academic literature: Banks' reaction to the crisis in terms of their lending to corporate and retail consumers
- Less known about banks' investment decisions during crises
 - Banks required less to publicly disclose their investment than their loan decisions
 - In particular at the disaggregated (portfolio) level
- Important because financial assets are
 - Major part of banks' balance sheets
 - Most direct and immediate way in which a bank can change its overall asset structure

Open Questions

- Where do banks go and where do they invest their money following a deterioration in their situation?
- Which dimensions such as liquidity, quality, or home bias are the main drivers of their decisions?
- In the cross-section, which banks behave in which way?
- To what extent does a bank's behavior depend on its characteristics such as the strength of its deposit base, its capital structure, and its health?

Related Literature

1. Effect of bank characteristics on credit availability
 - Bernanke and Gertler (1987)
 - Bernanke and Blinder (1988)
 - Holmstrom and Tirole (1997)
 - Diamond and Rajan (2011)
2. Banks' lending behavior during crises
 - Ivashina and Scharfstein (2010)
 - Jimenez, Ongena, Peydro, and Saurina (2011)
 - Puri, Rocholl, and Steffen (2011)
3. Investors' portfolio rebalancing under economic distress
 - Beber, Brandt, and Kavejecz (2009)

Data (I)

- Bundesbank securities statistics (Depotstatistik)
 - *All* securities in *all* German banks' portfolios
 - Quarterly data from 2006Q1 until 2011Q1 (1792 portfolios per quarter on average)
- Wertpapiermitteilungen Datenservice
 - Information on security type and issuer
- Bundesbank banking statistics (BISTA)
 - Balance sheet and P&L information
- Other Bundesbank data
 - Eligibility of securities for ESCB operations
 - Supervisory ratings for savings banks and cooperatives

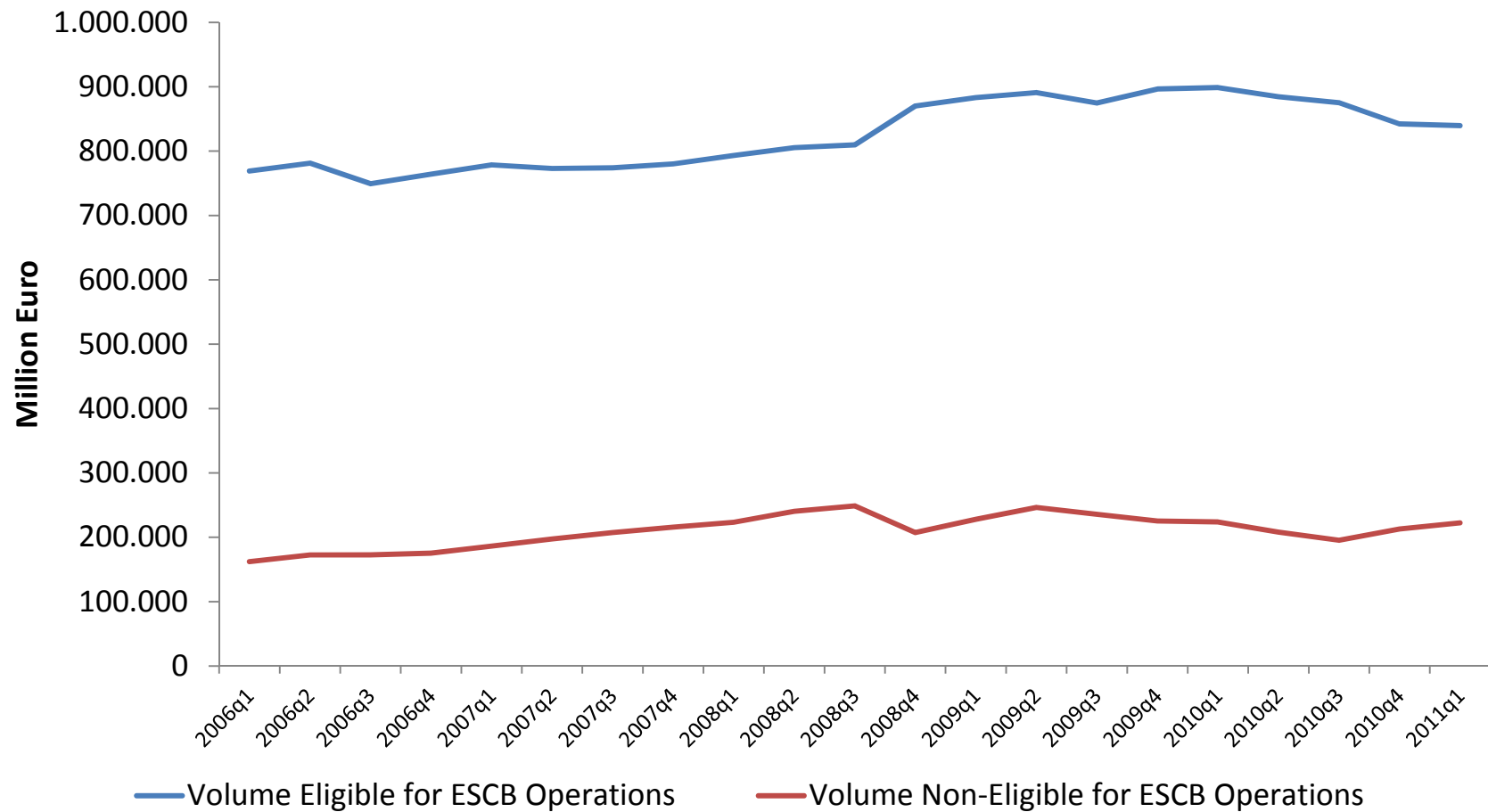
Data (II)

- Six groups of banks according to Bundesbank classification
 - Big banks (5)
 - Regional banks and other commercial banks (128)
 - Landesbanken (11)
 - Savings banks (440)
 - Regional institutions of credit cooperatives (2)
 - Credit cooperatives (1207)
- No branches of foreign banks, mortgage banks, special purpose banks, and building and loan associations
- No retail investment certificates (minor aggregate value)

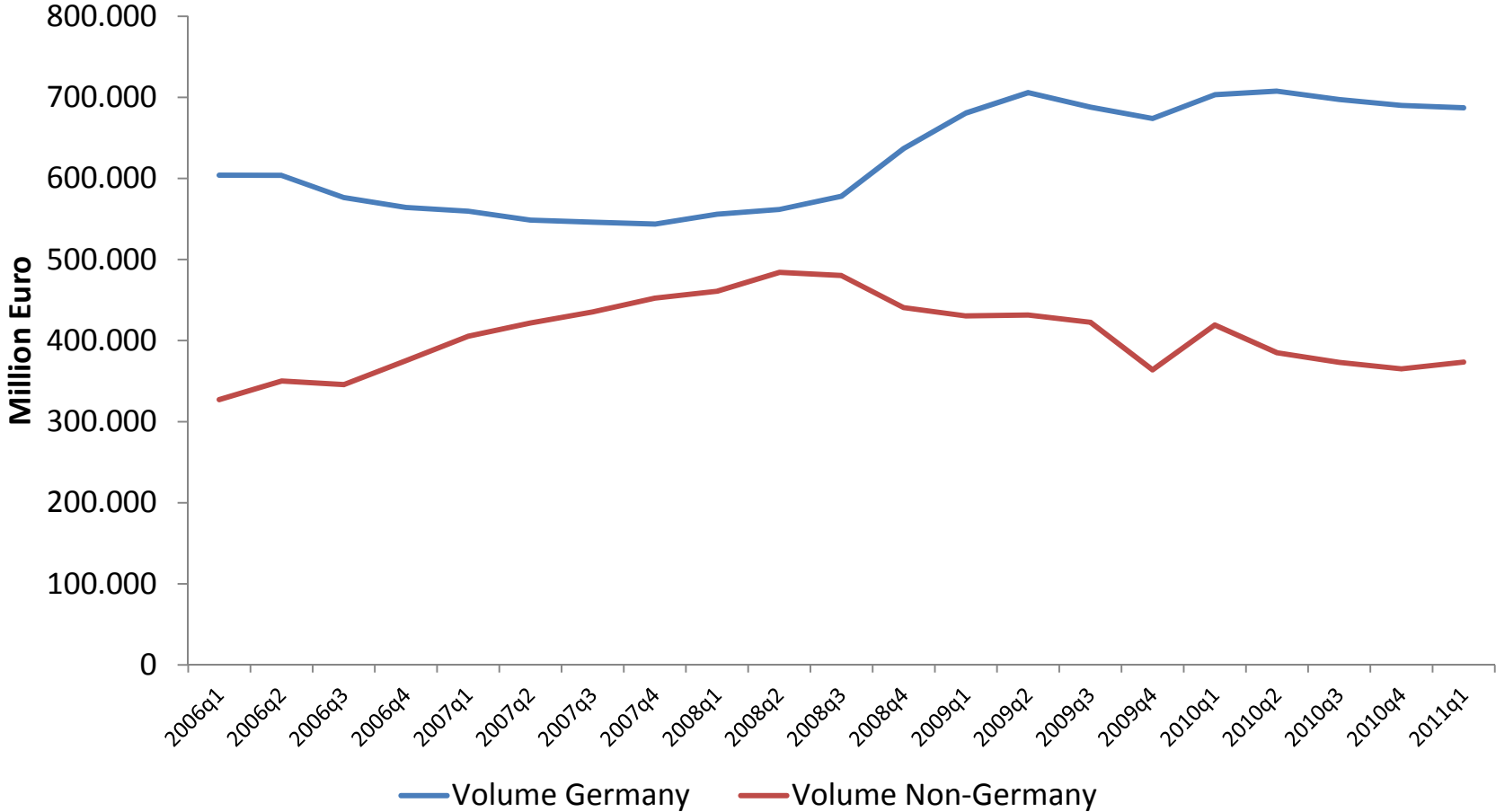
Summary Statistics

- Total volume
 - Securities (nominal): €1.04 trillion per quarter
 - Total assets: €4.77 trillion per quarter
- About 80 % eligible for ESCB operations
- Breakdown by issuer country
 - 60.5 % Germany
 - 15.5 % Italy, Spain, Greece, Portugal, Ireland,
 - 12.5 % remaining Euro area
- Breakdown by sector
 - About 80 % financial sector
 - 11.3 % German government sector
 - 7.0 % foreign government sector

Eligibility for ESCB Operations



German vs. Non-German Securities



Methodology

- Dependent variables
 - Share of securities eligible for ESCB operations
 - Share of German securities
 - Share of securities from the financial sector
- Cross-sectional regressions (between effects)
 - Regress means (over time) of the dependent variable on means (over time) of independent variables
- Panel regressions
 - Difference-in-Difference approach
 - Treatment Group defined on the basis of 2008Q3 characteristics: bank type, asset size, high share of problematic assets, etc.

Eligibility for ESCB Operations (1)

	No Interaction Effect	After x High Share of Securities	After x High Deposit Ratio	After x High Equity Ratio	After x High Return on Assets	After x High Write- offs & Provisions	After x High ln(Assets)	Multiple Interaction Effects	After x Top 50% Bank	After x High Share of PIIGS Securities	After x High Share of Greek Securities	After x High Share of ABS	After x High Share of Certain US + DE Securities
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
<u>Bank Group</u>													
Big Bank	9.529*	9.067*	8.875	9.589*	9.185	9.235	10.700*	9.753*	8.037	9.262	7.899	9.274	9.566*
	(1.68)	(1.69)	(1.57)	(1.71)	(1.64)	(1.61)	(1.89)	(1.81)	(0.98)	(1.64)	(1.39)	(1.64)	(1.69)
Regional Bank	4.137	4.381	4.531*	4.739*	5.390**	5.967**	4.879*	6.140**	5.634**	4.747*	4.824*	4.843*	5.037*
	(1.61)	(1.64)	(1.70)	(1.80)	(2.01)	(2.24)	(1.85)	(2.30)	(2.13)	(1.78)	(1.81)	(1.82)	(1.89)
Landesbank	15.506***	15.646***	14.696***	15.520***	15.684***	16.204***	16.038***	15.815***	14.517***	15.618***	14.217***	15.550***	15.770***
	(3.85)	(3.55)	(3.27)	(3.47)	(3.51)	(3.64)	(3.56)	(3.55)	(2.82)	(3.51)	(3.20)	(3.51)	(3.55)
Reg. Inst. of Credit Coop.	8.730	8.336	7.050	8.161	8.498	8.886	8.174	7.879	6.644	8.359	7.497	8.323	8.727
	(1.47)	(1.41)	(1.19)	(1.38)	(1.43)	(1.50)	(1.43)	(1.38)	(1.64)	(1.41)	(1.16)	(1.41)	(1.47)
Credit Cooperative	5.341***	5.165***	5.374***	5.197***	4.856***	5.147***	5.477***	5.892***	9.091***	5.031***	5.251***	4.75***	5.270***
	(4.03)	(3.89)	(4.01)	(3.90)	(3.65)	(3.89)	(4.12)	(4.35)	(9.47)	(3.80)	(3.98)	(3.59)	(3.97)
<u>Main Effects</u>													
Share of Securities (%)	0.729***	0.753***	0.750***	0.739***	0.742***	0.742***	0.752***	0.771***	0.742***	0.740***	0.745***	0.740***	0.738***
	(16.48)	(16.80)	(16.80)	(16.66)	(16.49)	(16.58)	(16.82)	(17.19)	(16.60)	(16.56)	(16.70)	(16.61)	(16.53)
Deposit Ratio (%)	0.036	0.012	0.016	0.029	0.031	0.031	0.006	-0.017	0.061	0.035	0.031	0.038	0.034
	(0.88)	(0.29)	(0.39)	(0.69)	(0.73)	(0.73)	(0.15)	(-0.41)	(1.46)	(0.84)	(0.75)	(0.91)	(0.8)
Equity Ratio (%)	-0.286***	-0.300***	-0.315***	-0.302***	-0.262**	-0.259**	-0.325***	-0.288***	-0.186*	-0.295***	-0.303***	-0.295***	-0.290***
	(-2.98)	(-2.97)	(-2.94)	(-2.96)	(-2.56)	(-2.55)	(-3.09)	(-2.87)	(-1.91)	(-2.85)	(-2.89)	(-2.86)	(-2.82)
Return on Assets (%)	-0.033	-0.030	-0.034	-0.034	-0.002	-0.026	-0.044	-0.045	-0.011	-0.027	-0.025	-0.028	-0.030
	(-1.07)	(-0.95)	(-1.17)	(-1.14)	(-0.75)	(-0.96)	(-1.40)	(-1.51)	(-0.43)	(-0.95)	(-0.88)	(-0.99)	(-1.03)
Write-offs & provisions (%)	0.179	0.420	0.384	0.512	0.532	0.651	0.442	0.423	0.453	0.512	0.483	0.513	0.516
	(0.59)	(1.22)	(1.18)	(1.41)	(1.34)	(1.45)	(1.28)	(1.18)	(1.27)	(1.38)	(1.34)	(1.39)	(1.40)
ln(Assets)	-2.409***	-2.488***	-2.513***	-2.504***	-2.447***	-2.417***	-2.834***	-2.840***		-2.411***	-2.405***	-2.498***	-2.377***
	(-4.41)	(-4.61)	(-4.54)	(-4.58)	(-4.53)	(-4.48)	(-5.1)	(-5.18)		(-4.48)	(-4.46)	(-4.66)	(-4.40)
Top 50%-Bank									-17.795***				
									(-2.69)				

Eligibility for ESCB Operations (2)

	No Interaction Effect	After x High Share of Securities	After x High Deposit Ratio	After x High Equity Ratio	After x High Return on Assets	After x High Write- offs & Provisions	After x High In(Assets)	Multiple Interaction Effects	After x Top 50% Bank	After x High Share of PIIGS Securities	After x High Share of Greek Securities	After x High Share of ABS	After x High Share of Certain US + DE Securities
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
<i>Interaction Effects: After x ...</i>													
High Share of Securities		-3.589*** (-6.59)						-3.295*** (-5.96)					
High Deposit Ratio			-2.941*** (-5.40)					-1.709*** (-3.03)					
High Equity Ratio				-1.786*** (-3.32)				-1.429** (-2.45)					
High ROA					0.822 (1.53)			0.250 (0.44)					
High Write-offs & provis.						1.790*** (3.33)		1.751*** (3.41)					
High In(Assets)							3.080*** (5.64)	1.977*** (3.14)					
Top 50%-Bank									8.384*** (3.22)				
High Share PIIGS										0.165 (0.31)			
High Share Greek Sec.											2.846*** (2.60)		
High Share ABS												1.591*** (3.04)	
High Share Troubled Asts.													1.267** (2.35)
Constant	101.414*** (8.12)	104.326*** (8.39)	104.545*** (8.25)	103.664*** (8.25)	102.288*** (8.27)	101.439*** (8.19)	111.610*** (8.77)	112.497*** (8.97)	48.116*** (15.82)	101.417*** (8.18)	101.376*** (8.19)	103.136*** (8.36)	100.682*** (8.10)
N	31,947	31,482	31,581	31,581	31,416	31,416	31,581	31,416	31,466	31,482	31,482	31,482	31,482
N _g	1,884	1,789	1,805	1,805	1,781	1,781	1,805	1,781	1,789	1,789	1,789	1,789	1,789
R ² (within)	0.16	0.18	0.17	0.17	0.17	0.17	0.17	0.19	0.17	0.17	0.17	0.17	0.17
R ² (between)	0.23	0.23	0.22	0.22	0.23	0.23	0.22	0.22	0.22	0.24	0.24	0.23	0.24
R ² (overall)	0.22	0.22	0.22	0.22	0.22	0.21	0.22	0.21	0.20	0.22	0.22	0.21	0.22

Eligibility for ESCB Operations (3)

After the beginning of the financial crisis, pronounced flight to liquidity for banks with

- Less securities
- Less deposits
- Less capital
- Higher write-offs and provisions
- Large asset size
- Larger exposure to Greek government bonds
- Larger exposure to Asset Backed Securities
- Larger exposure to troubled German and US securities

Home Bias (1)

	No Interaction Effect	After x High Share of Securities	After x High Deposit Ratio	After x High Equity Ratio	After x High Return on Assets	After x High Write-offs & Provisions	After x High ln(Assets)	Multiple Interaction Effects	After x Big Bank (1 of approx. 20)	After x High Share of PIIGS Securities	After x High Share of Greek Securities	After x High Share of ABS	After x High Share of Certain US + DE Securities
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
<i>Bank Group</i>													
Big Bank	-21.234*** (-4.88)	-21.373*** (-4.94)	-21.303*** (-4.91)	-20.473*** (-4.56)	-21.205*** (-4.84)	-21.255*** (-4.94)	-18.435*** (-4.28)	-19.342*** (-4.47)	-25.969*** (-3.93)	-21.808*** (-5.27)	-24.139*** (-5.76)	-21.486*** (-5.01)	-21.111*** (-4.87)
Regional Bank	-21.020*** (-7.42)	-18.414*** (-6.69)	-19.523*** (-6.84)	-19.108*** (-6.67)	-17.955*** (-6.60)	-17.880*** (-6.53)	-18.882*** (-6.53)	-16.956*** (-6.17)	-17.691*** (-6.43)	-18.267*** (-6.76)	-18.051*** (-6.55)	-18.146*** (-6.58)	-18.071*** (-6.58)
Landesbank	-21.067*** (-4.73)	-21.589*** (-4.96)	-22.255*** (-5.07)	-21.614*** (-4.95)	-21.687*** (-4.98)	-20.926*** (-4.82)	-20.560*** (-4.65)	-20.919*** (-4.78)	-25.440*** (-5.04)	-21.857*** (-5.18)	-24.588*** (-5.53)	-21.865*** (-5.05)	-21.545*** (-4.96)
Reg. Inst. of Credit Coop.	-19.689*** (-3.11)	-19.777*** (-3.11)	-20.819*** (-3.3)	-19.961*** (-3.19)	-19.949*** (-3.11)	-19.078*** (-3.00)	-19.749*** (-3.29)	-20.142*** (-3.33)	-23.703*** (-3.8)	-19.87*** (-3.13)	-21.6*** (-2.91)	-19.968*** (-3.16)	-19.594*** (-3.07)
Credit Cooperative	-18.437*** (-15.05)	-18.474*** (-14.76)	-18.242*** (-14.41)	-18.239*** (-14.36)	-18.435*** (-14.68)	-18.489*** (-14.81)	-17.831*** (-13.95)	-17.314*** (-13.64)	-15.709*** (-17.46)	-18.124*** (-15.69)	-18.137*** (-14.38)	-18.776*** (-15.27)	-18.422*** (-14.77)
<i>Main Effects</i>													
Share of Securities (%)	-0.086** (-2.00)	-0.074* (-1.68)	-0.069 (-1.59)	-0.080* (-1.85)	-0.080* (-1.83)	-0.081* (-1.84)	-0.057 (-1.32)	-0.046 (-1.07)	-0.076* (-1.75)	-0.090** (-2.10)	-0.073* (-1.67)	-0.084* (-1.93)	-0.083* (-1.91)
Deposit Ratio (%)	0.172*** (3.63)	0.159*** (3.17)	0.154*** (3.18)	0.163*** (3.32)	0.175*** (3.45)	0.174*** (3.44)	0.126** (2.53)	0.124** (2.43)	0.184*** (3.78)	0.174*** (3.63)	0.164*** (3.3)	0.175*** (3.53)	0.171*** (3.41)
Equity Ratio (%)	-0.08 (-0.51)	-0.046 (-0.24)	-0.081 (-0.46)	-0.065 (-0.36)	-0.040 (-0.20)	-0.041 (-0.20)	-0.108 (-0.58)	-0.080 (-0.39)	0.028 (0.15)	-0.034 (-0.19)	-0.061 (-0.33)	-0.040 (-0.21)	-0.040 (-0.21)
Return on Assets (%)	-0.049 (-0.88)	-0.052 (-0.90)	-0.056 (-1.02)	-0.060 (-1.04)	-0.059 (-0.95)	-0.060 (-0.98)	-0.077 (-1.27)	-0.092 (-1.36)	-0.039 (-0.73)	-0.041 (-0.75)	-0.046 (-0.89)	-0.050 (-0.91)	-0.052 (-0.92)
Write-offs & provisions (%)	0.101 (0.50)	-0.006 (-0.02)	-0.072 (-0.28)	0.053 (0.21)	-0.007 (-0.03)	0.095 (0.37)	-0.067 (-0.26)	-0.142 (-0.53)	-0.033 (-0.13)	0.030 (0.12)	-0.016 (-0.06)	0.045 (0.18)	0.048 (0.19)
ln(Assets)	-1.725*** (-3.07)	-1.754*** (-3.09)	-1.882*** (-3.25)	-1.920*** (-3.33)	-1.671*** (-2.94)	-1.709*** (-3.02)	-2.501*** (-4.34)	-2.368*** (-4.21)		-1.525*** (-3.07)	-1.718*** (-3.05)	-1.762*** (-3.21)	-1.696*** (-3.00)
Top 50%-Bank									-14.050*** (-3.00)				

Home Bias (2)

	No Interaction Effect	After x High Share of Securities	After x High Deposit Ratio	After x High Equity Ratio	After x High Return on Assets	After x High Write- offs & Provisions	After x High In(Assets)	Multiple Interaction Effects	After x Big Bank (1 of approx. 20)	After x High Share of PIIGS Securities	After x High Share of Greek Securities	After x High Share of ABS	After x High Share of Certain US + DE Securities
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
<i>Interaction Effects: After x ...</i>													
High Share of Securities		-2.040*** (-3.13)						-1.890*** (-2.77)					
High Deposit Ratio			-2.940*** (-4.53)					-1.642** (-2.39)					
High Equity Ratio				-3.194*** (-4.93)				-2.033*** (-3.02)					
High ROA					-0.747 (-1.15)			-0.666 (-0.98)					
High Write-offs & provis.						1.837*** (2.83)		1.703*** (2.63)					
High In(Assets)							5.242*** (8.03)	3.930*** (5.43)					
Top 50%-Bank									16.601*** (4.31)				
High Share PIIGS										-1.231* (-1.90)			
High Share Greek Sec.											6.037*** (4.95)		
High Share ABS												1.620** (2.45)	
High Share Troubled Asts.													0.667 (1.02)
Constant	115.759*** (8.84)	116.851*** (8.79)	119.781*** (8.87)	119.986*** (8.92)	114.173*** (8.58)	114.999*** (8.66)	133.840*** (9.92)	130.687*** (9.87)	77.870*** (24.64)	111.160*** (9.47)	115.631*** (8.77)	116.233*** (9.01)	114.948*** (8.68)
N	31,937	31,473	31,571	31,571	31,407	31,407	31,571	31,407	31,457	31,473	31,473	31,473	31,473
N _g	1,884	1,789	1,805	1,805	1,781	1,781	1,805	1,781	1,789	1,789	1,789	1,789	1,789
R ² (within)	0.10	0.10	0.1	0.11	0.10	0.10	0.12	0.12	0.10	0.10	0.10	0.10	0.10
R ² (between)	0.18	0.17	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.18	0.15	0.15	0.16
R ² (overall)	0.15	0.15	0.15	0.14	0.15	0.14	0.15	0.15	0.15	0.16	0.14	0.14	0.15

Home Bias (3)

Pronounced flight home for banks with

- Less securities
- Less deposits
- Less capital
- Higher write-offs and provisions
- Large asset size
- Larger exposure to Greek government bonds
- Larger exposure to Asset Backed Securities

Ratings of Savings Banks / Credit Cooperatives

	Eligibility for ESCB operations (in %)	Issued in Germany (in %)	Issued in Germany, Fin. Sector (in %)	Issued outside Germany, Fin. Sector (in %)	Issued in Germany, Gov. Sector (in %)	Issued outside Germany, Gov. Sector (in %)
	(1)	(2)	(3)	(4)	(5)	(6)
<u>Bank Group</u>						
Cooperative Bank	4.410*** (3.35)	-17.931*** (-14.84)	-14.084*** (-10.55)	18.704*** (17.97)	-3.773*** (-7.57)	-1.274*** (-4.43)
<u>Main Effects</u>						
Share of Securities (%)	0.761*** (16.73)	-0.066 (-1.56)	-0.024 (-0.54)	0.088** (2.29)	0.004 (0.23)	-0.018 (-1.48)
Deposit Ratio (%)	0.082* (1.74)	0.214*** (4.11)	0.207*** (3.67)	-0.199*** (-4.07)	0.046** (2.03)	-0.008 (-0.57)
ln(Assets)	-2.487*** (-4.95)	-1.357*** (-2.71)	-1.161** (-2.13)	1.609*** (3.62)	0.412** (1.99)	-0.168 (-1.59)
Rating						
1	0.953*** (3.27)	0.513 (1.42)	0.510 (1.28)	-0.390 (-1.14)	0.001 (0.00)	-0.021 (-0.23)
2	1.717*** (3.65)	1.123** (2.20)	0.732 (1.29)	-0.867* (-1.83)	0.333 (1.22)	0.014 (0.10)
3	1.531** (2.39)	0.333 (0.48)	-0.24 (-0.31)	-0.348 (-0.54)	0.613 (1.53)	0.324 (1.58)
4	3.302*** (3.41)	0.228 (0.23)	-0.484 (-0.46)	0.139 (0.15)	0.738 (1.42)	0.057 (0.22)
<u>Interaction Effect: After x ...</u>						
Rating: 3/4	2.039*** (3.73)	0.231 (0.36)	-0.467 (-0.65)	-0.265 (-0.45)	0.645** (2.00)	0.102 (0.53)
Constant	96.806*** (8.45)	103.433*** (9.08)	92.376*** (7.28)	-12.932 (-1.27)	-5.776 (-1.18)	6.301** (2.57)
N	27,094	27,086	27,094	27,094	27,094	27,094
N _g	1,625	1,625	1,625	1,625	1,625	1,625
R ² (within)	0.19	0.1	0.09	0.11	0.03	0.01
R ² (between)	0.25	0.15	0.09	0.19	0.08	0.01
R ² (overall)	0.24	0.14	0.09	0.17	0.06	0.01

Conclusion

- Financial crisis induces banks to substantially change their investment strategies
- Invest more in securities that can be used as collateral in central bank liquidity operations and in domestic securities
- Most pronounced for banks closest to financial distress and with low ratings
- More pronounced for larger banks with more liquidity needs
- Banks with larger exposure to troubled assets (ABS, Greek government bonds, certain U.S. and German securities)
- Portfolios rebalanced towards more liquidity and a larger home bias