Online Appendix to: Lending Effects of the ECB's Asset Purchases[☆]

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Abstract

Between 2010 and 2012, the European Central Bank absorbed €218 billion worth of government securities from five EMU countries under the Securities Markets Programme (SMP). Detailed security holdings data at the bank level affirms an effective lending stimulus due to the SMP. Exposed banks contract household lending, but increase commercial lending substantially. Holding non-SMP securities from stressed EMU countries amplifies the commercial lending response. The SMP also improved liquidity buffers and profitability without compromising credit quality.

Keywords: Unconventional monetary policy, SMP, bank lending
JEL: C30, C78, G21, G28, L51

Online appendix A. Further details on SMP holdings in Germany

Figures OA.1 and OA.2 visualize the monthly evolution of banks' total earning assets by asset class and the components of customer lending, respectively. The left panels show treated banks whereas the left panel illustrate developments of the control group.

The analysis in the main body of the paper uses regional cooperative and savings banks because these are most suited to isolate causal lending effects due to the SMP. This online appendix provides further data for regional banks including also small commercial banks. The group of large banks comprises large commercial banks,[1] head institutions of the savings bank sector, so-called Landesbanken, and central co-operative banks.

Figure OA.3 shows that large, multinational German banks with sizeable capital markets operations held even more SMP securities compared to the regional cooperative and savings banks shown in Figure 1 in the main body of the paper. The median share of SMP securities is now slightly larger as shown in Figure OA.4. Large banks are much more active in re-allocating their SMP security portfolios compared to regional banks as illustrated in Figure OA.5. Figure OA.6 shows the share of buy-side and sell-side trades involving SMP securities during a quarter relative to the stock of SMP securities at the end of the quarter. Figure OA.7 contrasts direct and indirect exposures of German banks to the stressed EMU member economies over the lifetime of the SMP. The left panel shows the quarterly stock of SMP securities' book value. The right panel depicts the aggregate book value of all other securities, stocks and bonds, from the five SMP countries that were, however, not part of the asset purchases of the ECB.

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[1]Commerzbank, Deutsche Bank, Dresdner Bank, Hypo Vereinsbank, and Postbank.

Online appendix B. Additional Figures

Figure OA.1: **Evolution of asset components of SMP and non-SMP banks**
This Figure shows the evolution of assets and their composition for savings and cooperative banks. The left panel depicts asset compositions for banks that held SMP securities whereas the left panel shows the same for non-SMP banks. All variables are measured in millions of euro. The quarters during which the ECB bought sovereign debt securities from Greece, Italy, Ireland, Portugal, and Spain are q2:2010 until q1:2012.
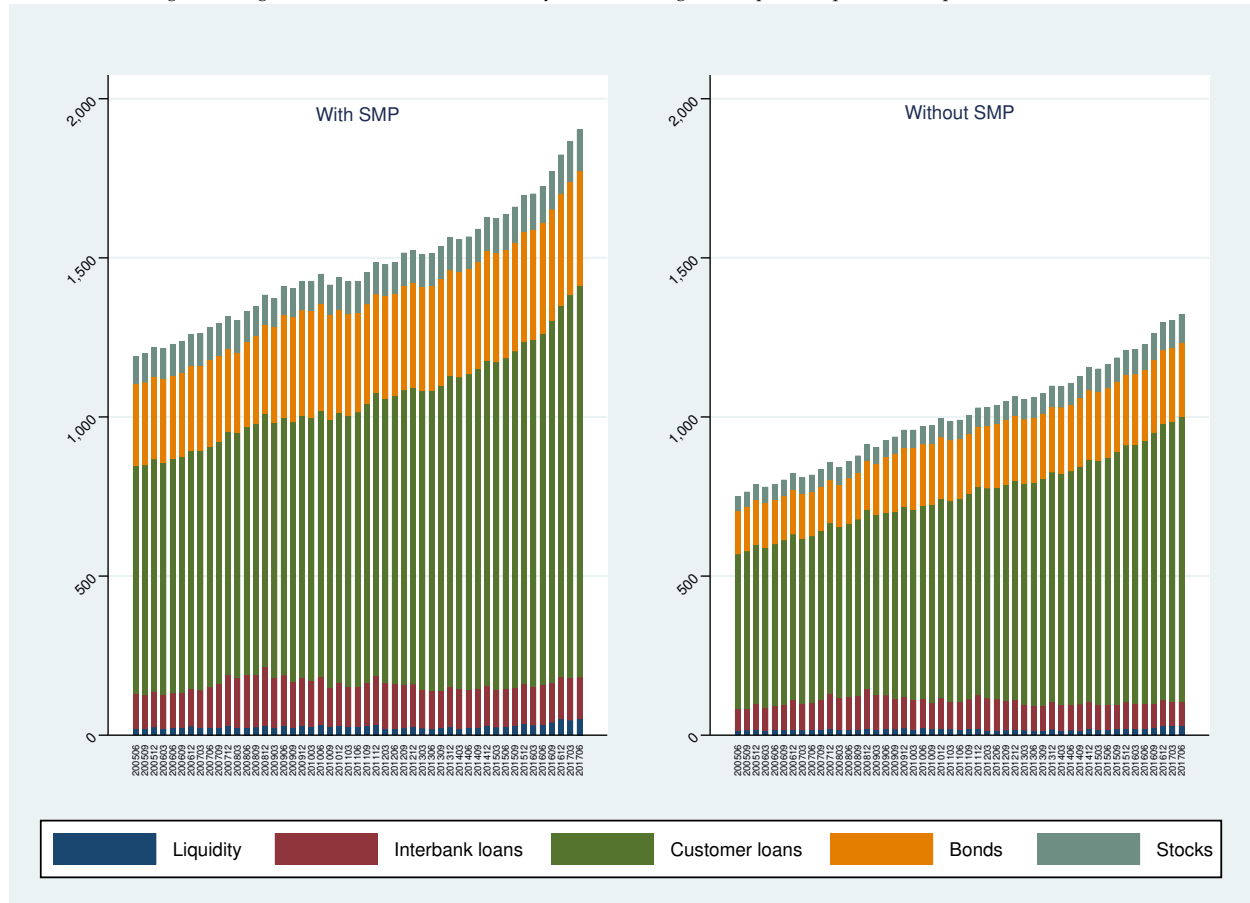
Figure OA.2: **Customer lending components over time by SMP and non-SMP savings and cooperative banks**
This Figure shows the evolution of customer lending components for banks that held SMP securities (left panel) and banks that did not hold SMP securities (right panel). Commercial lending are loans extended to both publicly listed as well as privately incorporated non-bank firms. Retail loans comprise credit to households and consist for a large part of mortgage loans. Government loans consist of lending to county, state, and federal government authorities. Foreign lending includes credit to any non-German, non-financial firm. All variables are measured in millions of euro. The quarters during which the ECB bought sovereign debt securities from Greece, Italy, Ireland, Portugal, and Spain are q2:2010 until q1:2012, which are indicated on the horizontal axis.
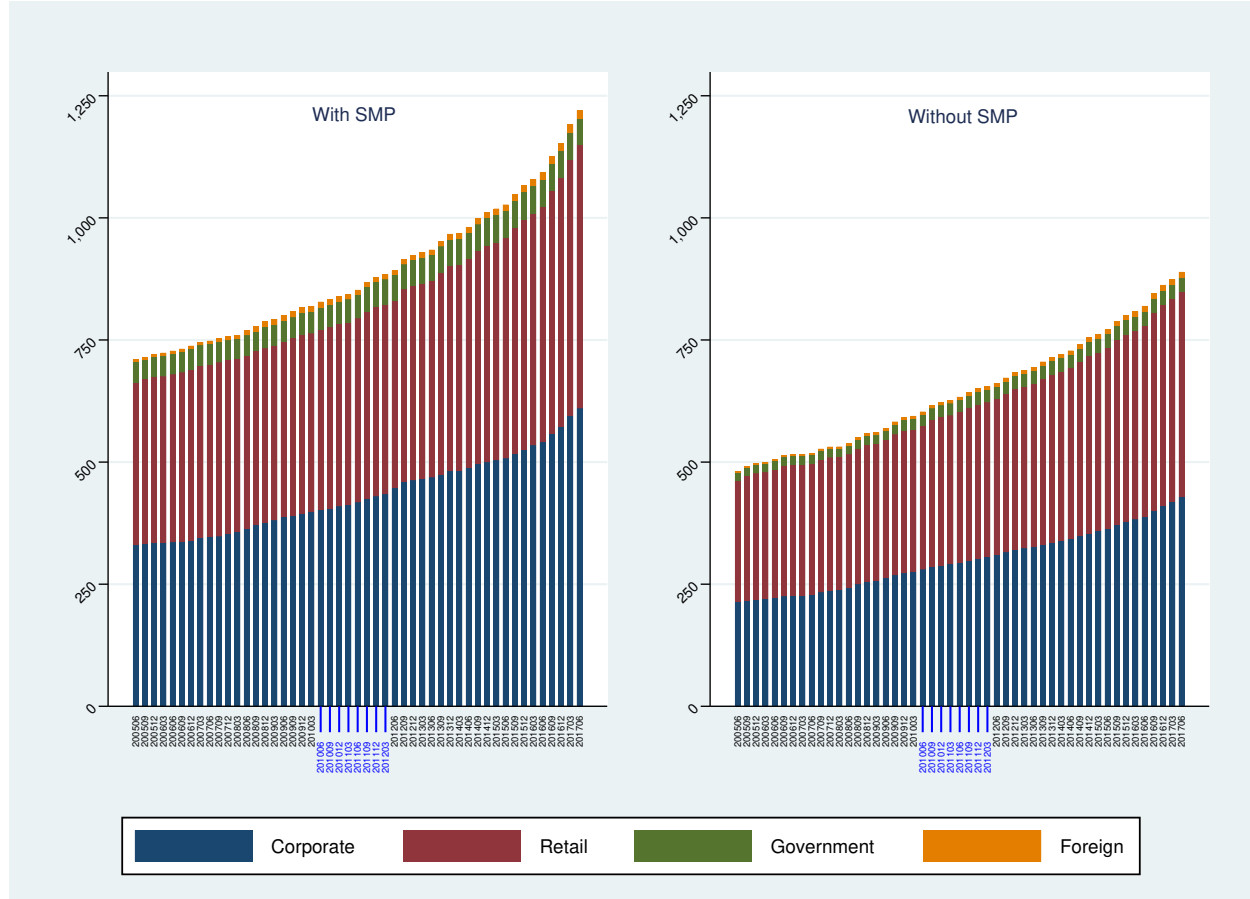
Figure OA.3: **Number of banks holding SMP securities**
This Figure shows the number of banks that held and did not hold securities purchased by the European Central Bank under the Securities Purchase Program (SMP) between q2:2010 and q1:2012. The distinguished banking groups follow the three-pillar taxonomy of Deutsche Bundesbank. Small regional banks include savings, cooperative, and commercial banks. Large banks comprise the five largest commercial banks, head institutions of the savings banks ("Landesbanken"), and central institutions of cooperatives.

Note: Large banks include commercial banks, central savings institutions, central cooperative banks, and mortgage banks.
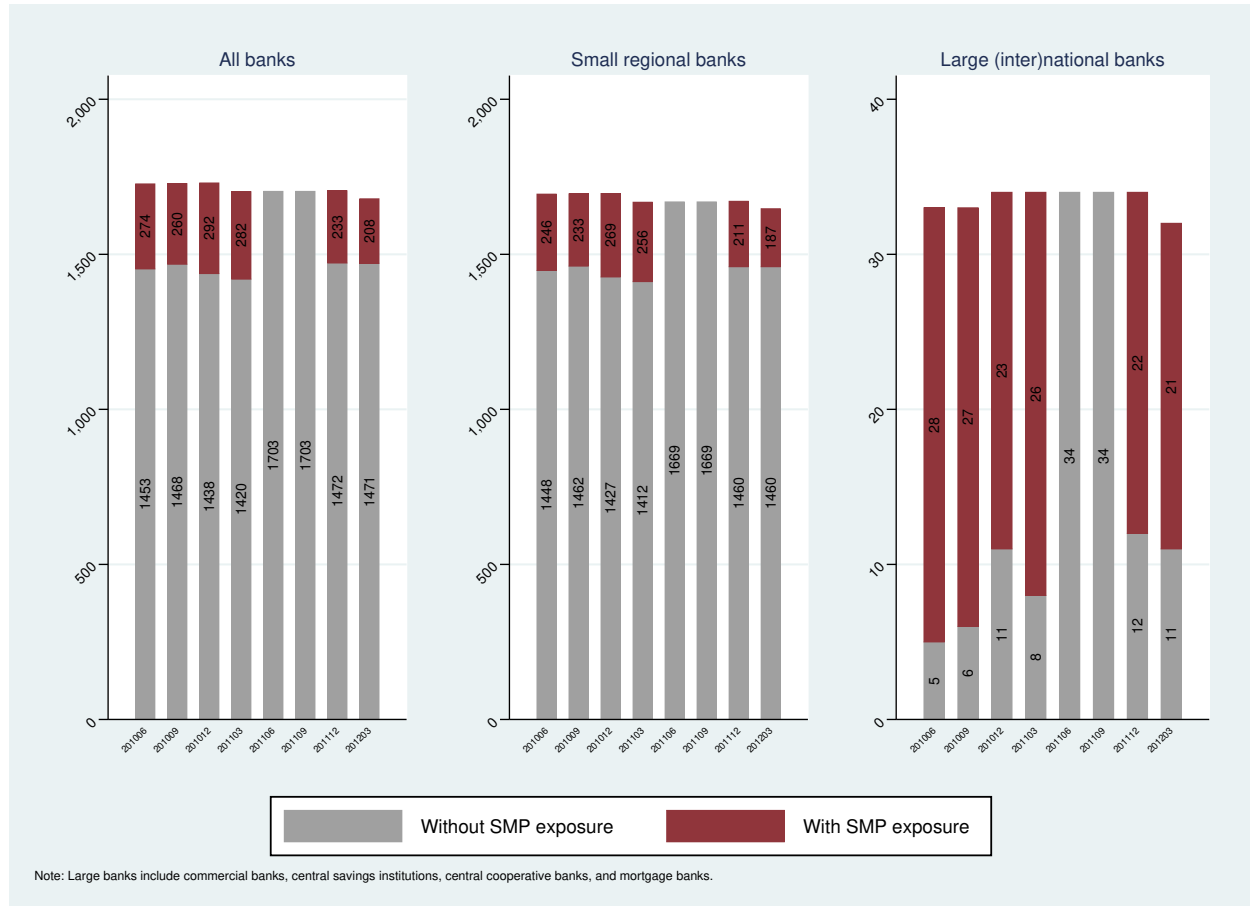
Figure OA.4: **Share of SMP securities in banks' portfolios**
This Figure shows box plots for the percentage share of SMP securities relative to the total portfolio of banks. Security portfolios and SMP securities are measured in nominal value and book values, respectively. The distinguished banking groups follow the three-pillar taxonomy of Deutsche Bundesbank. Small regional banks include savings, cooperative, and commercial banks. Large banks comprise the five largest commercial banks, head institutions of the savings banks ("Landesbanken"), and central institutions of cooperatives.

Note: Large banks include commercial banks, central savings institutions, central cooperative banks, and mortgage banks. Outside values excluded.

Figure OA.5: **Number of banks reducing, holding, or increasing SMP securities**
This Figure shows the number of banks reducing, holding, or increasing the number of SMP securities between Q2:2010 and Q2:2012. Transactions are derived from the change in the reported number of SMP securities between quarters. Reductions are calculated as the quarter-on-quarter change of observed SMP security holdings. Increases are measured likewise as the quarter-on-quarter positive differences in banks' holdings of SMP securities. The distinguished banking groups follow the three-pillar taxonomy of Deutsche Bundesbank. Small regional banks include savings, cooperative, and commercial banks. Large banks comprise the five largest commercial banks, head institutions of the savings banks ("Landesbanken"), and central institutions of cooperatives.


Note: Large banks include commercial banks, central savings institutions, central cooperative banks, and mortgage banks.

Figure OA.6: **Mean shares of sell and buy trades of SMP securities**
This Figure shows the mean shares of sell and buy trades of SMP securities during the quarter, relative to the nominal value of SMP security holdings in percentages. Transactions are derived from the change in reported security holdings per security between quarters. Reductions are calculated as the quarter-on-quarter change of reported nominal values of SMP security holdings. Increases are measured likewise as the quarter-on-quarter positive differences in banks' nominal holdings of SMP securities. The distinguished banking groups follow the three-pillar taxonomy of Deutsche Bundesbank. Small regional banks include savings, cooperative, and commercial banks. Large banks comprise the five largest commercial banks, head institutions of the savings banks ("Landesbanken"), and central institutions of cooperatives.
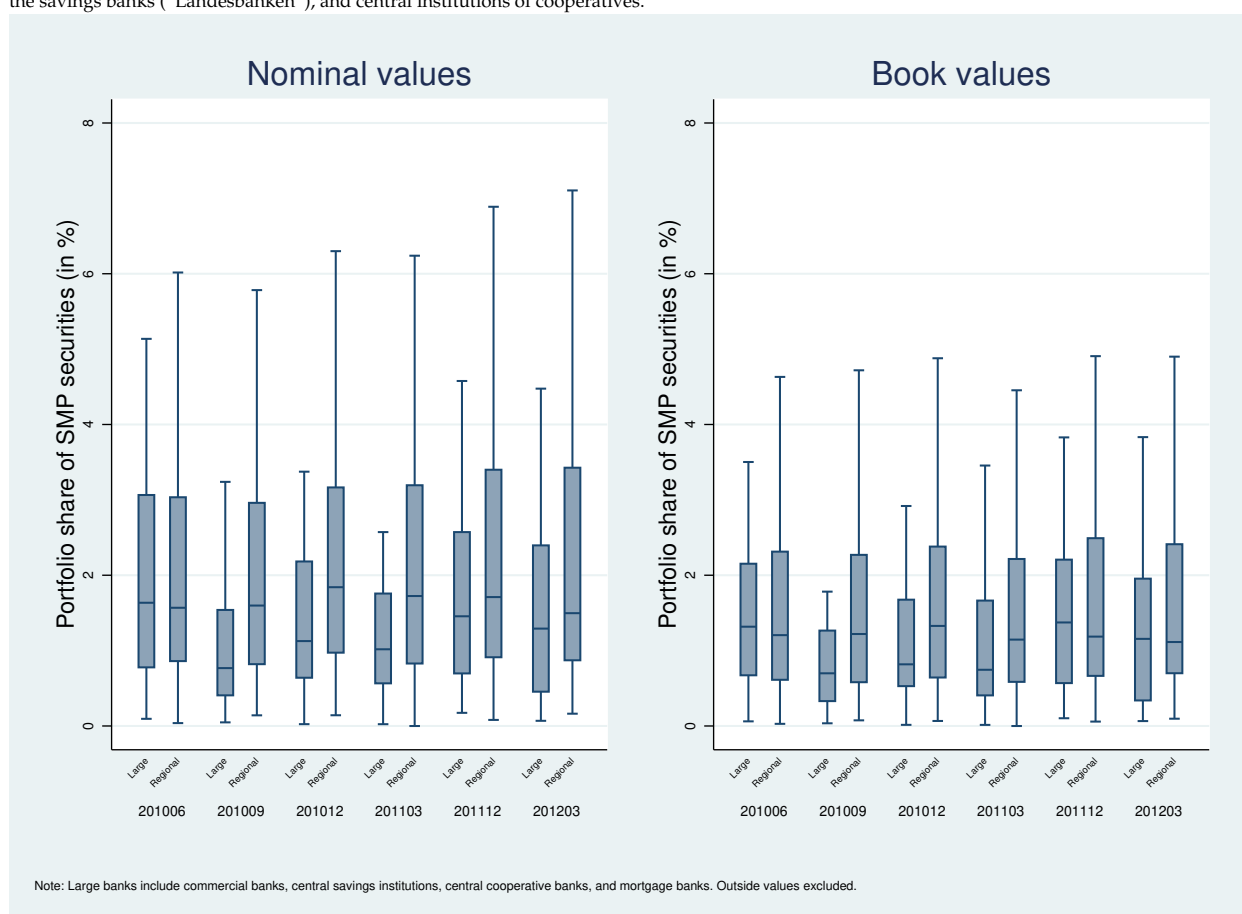

Note: Large banks include commercial banks, central savings institutions, central cooperative banks, and mortgage banks.
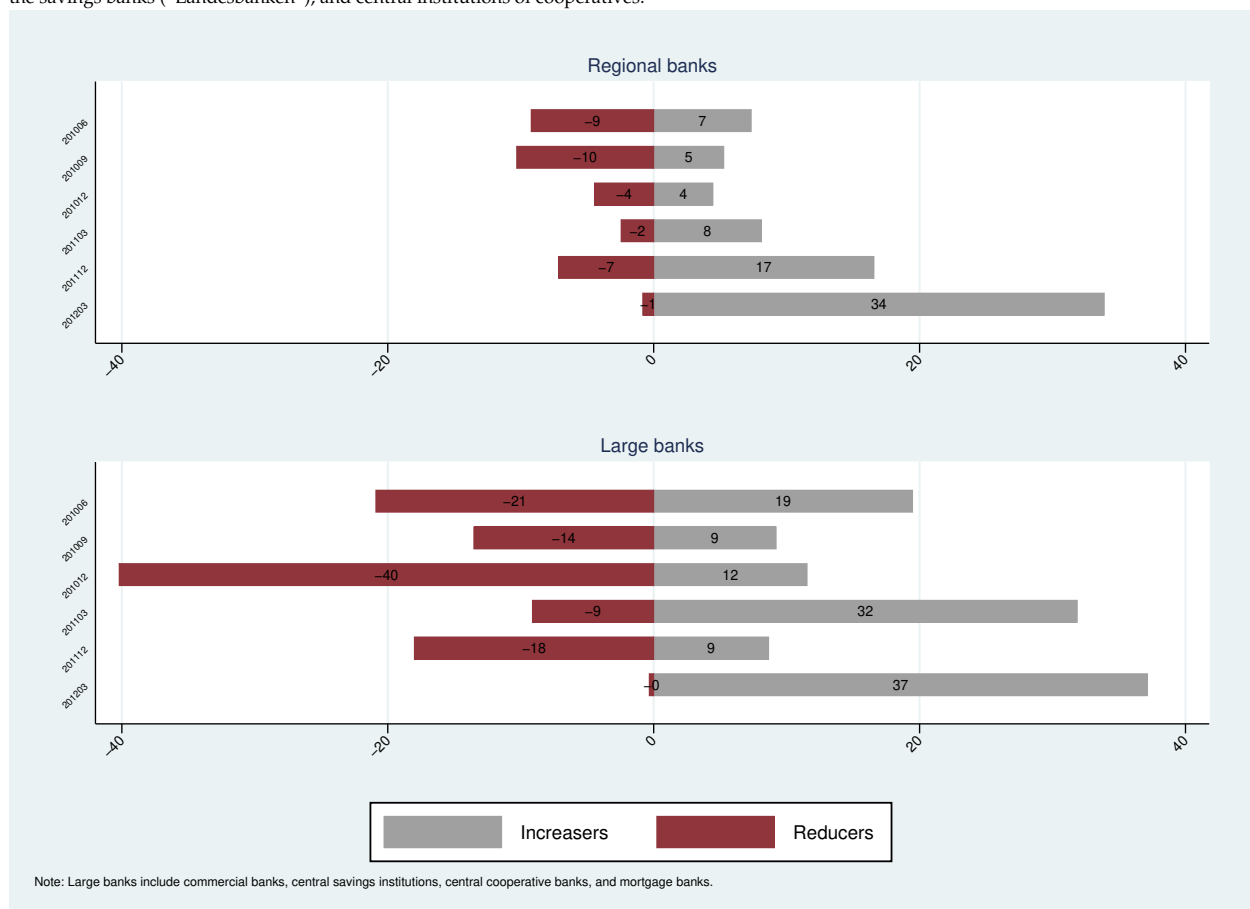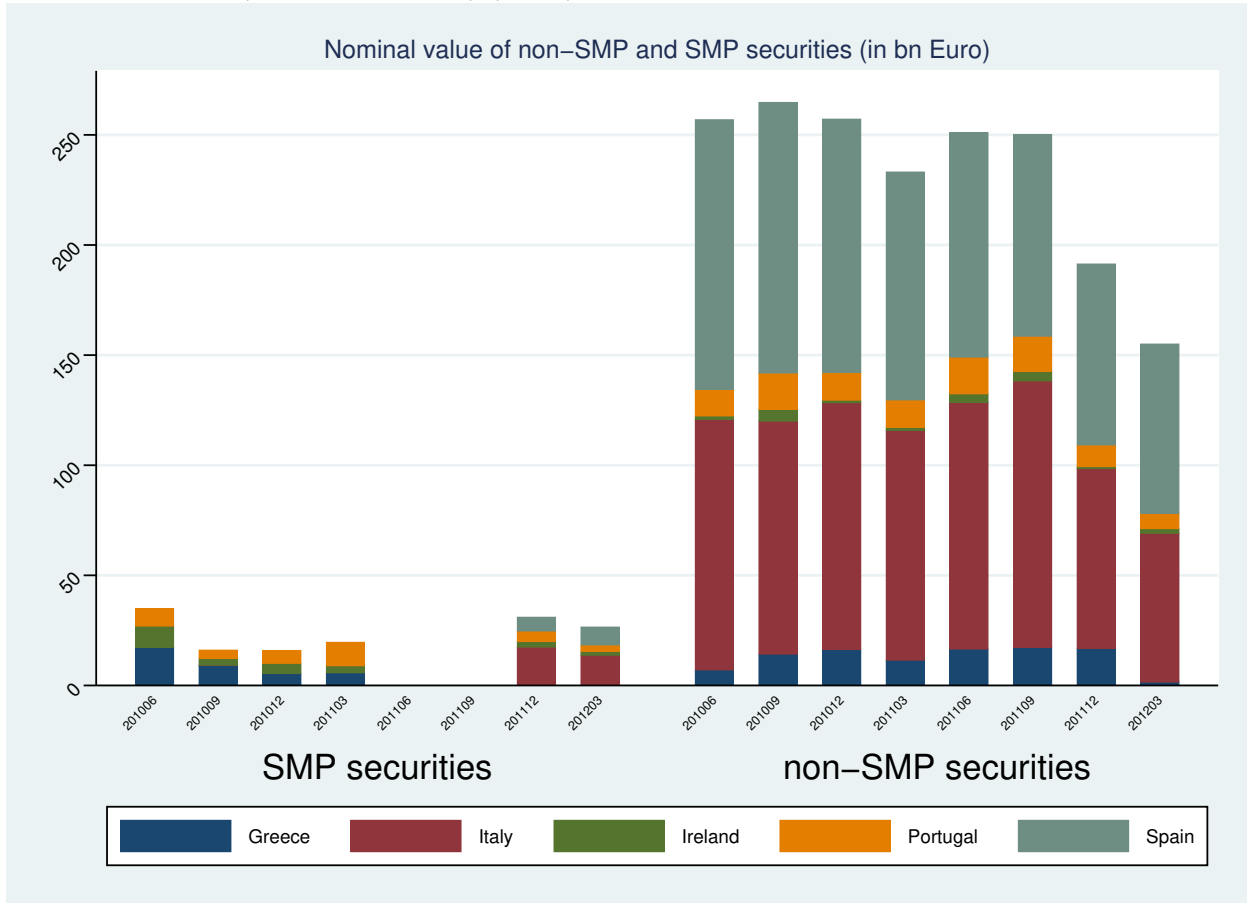
Figure OA.7: **Quarterly stock of SMP securities per country**
This Figure shows the stock of SMP securities purchased by the European Central Bank under the Securities Market Program (SMP) between Q2:2010 and Q2:2012 that were held by all German banks, country-by-country.

1 Online appendix C. Additional Tables

Table C.1: Frequency and type of SMP transactions at security level

This Table provides the number of transactions per security and the number of individual securities eligible for the SMP that remained unchanged in banks' portfolios. Frequencies are calculated on the basis of the bank-security-quarter sample. "Equal" indicates the number of securities held by all banks at the time that were purchased during the quarter by the ECB. "Increase" indicates the number of securities, which increased relative to the preceding quarter. "Initial" denotes the number of securities that were purchased by banks in the indicated quarter for the first time since the start of the securities holding statistics, q5:2005. "Previous" shows the number of securities purchased by banks during the quarter earlier than the preceding quarter. "Reduction" indicates the number of securities reduced from one quarter to the other. Regional banks include local savings and cooperatives as well as small commercial banks. Large banks comprise the five largest commercial banks, central banks of the savings bank sector ("Landesbanken"), and the cooperative banking sector.

Date	Number of transactions					Total
	Equal	Increase	Initial	Previous	Reduction	
All banks						
201006	476	108	60	26	158	828
201009	419	73	45	33	83	653
201012	563	89	35	16	110	813
201103	516	92	43	25	92	768
201112	457	143	56	36	195	887
201203	313	156	104	32	110	715
Regional banks						
201006	393	17	32	1	31	474
201009	342	5	39	3	17	406
201012	466	3	27		16	512
201103	425	17	34	5	3	484
201112	364	3	33	1	15	416
201203	262	16	88	4	9	379
Large banks						
201006	83	91	28	25	127	354
201009	77	68	6	30	66	247
201012	97	86	8	16	94	301
201103	91	75	9	20	89	284
201112	93	140	23	35	180	471
201203	51	140	16	28	101	336

Table C.2: Number and volume of periphery and non-SMP periphery securities

This Table provides the number and the volume of periphery securities in billions of Euro per quarter that German banks held and that were either excluded from the SMP (left panel) or part of the program at some time (right panel). The data are differentiated by issuer country based on the ISIN code. Securities include both fixed income and stocks. The ISIN codes XS are excluded.

Date	Non-SMP securities					SMP-securities				
Country	ES	GR	IE	IT	PT	ES	GR	IE	IT	PT
Number of securities										
201006	4,211	207	825	2,081	799		459	183	3	235
201009	4,286	243	1,027	2,121	880		416	89	2	170
201012	4,172	270	896	2,284	770		369	218		271
201103	4,183	274	1,125	2,401	749		349	182		293
201106	4,149	570	1,351	2,416	929					
201109	3,903	519	1,333	2,365	924					
201112	3,503	481	1,047	1,894	655	211		184	372	202
Aggregate book value of securities in billions of Euro										
201006	120.3	3.5	2.6	120.5	10.7		12.07	9.45	0.05	7.60
201009	123.7	8.2	6.1	115.2	14.3		7.53	2.82	0.04	3.56
201012	108.8	8.8	2.1	117.3	10.3		4.22	3.73		5.34
201103	98.3	6.4	2.2	110.3	9.9		4.22	2.42		9.33
201106	96.2	8.3	3.7	114.7	12.1					
201109	88.3	6.1	4.9	112.7	11.1					
201112	77.2	3.9	1.6	72.0	6.7	6.22		2.28	16.30	3.04
Aggregate nominal (face) value of securities in billions of Euro										
201006	122.4	7.1	1.6	113.7	12.1		17.2	9.7	0.1	7.9
201009	122.8	14.2	5.4	105.8	16.5		9.1	3.1	0.1	3.8
201012	114.9	16.3	1.1	112.1	12.7		5.4	4.6		5.9
201103	103.5	11.5	1.4	104.4	12.4		5.8	3.2		10.7
201106	101.9	16.5	3.9	112.0	16.7					
201109	91.6	17.4	4.3	120.8	16.1					
201112	82.1	16.8	0.9	81.6	9.9	6.3		2.7	17.4	4.6

Table C.3: Probit estimation results propensity score matching

This Table provides the estimation results of a propensity score matching procedure based on a probit model to conduct a one-to-one nearest neighbor matching according to the routine of **?**. Propensity scores of SMP treatment are estimated using all co-variates that are described in Table 1 in the quarter before the SM program was launched, i.e. in q1:2010. All observations in this cross-section are on the common support and the average propensity score of treated banks is 24%.

	Coefficient	SE	p-value
logTA	0.093	0.032	0.003
Equityratio	0.004	0.028	0.875
Interbank	-0.003	0.003	0.342
Securities	0.021	0.003	0.000
Market funding	0.021	0.012	0.069
Credit lines	0.005	0.011	0.664
Liquidity	-0.080	0.051	0.119
Constant	-2.474	0.500	0.000
Diagnostics			
Pseudo R2	0.042		
Log likelihood	-807.3		
Observations	1,580		
Untreated	1,224		
Treated	356		

Table C.4: Descriptive statistics of covariates used for propensity score matching

This Table describes outcome and control variables for the quarter preceding the launch of the SMP that are used to conduct the propensity score matching. The last two columns depict the difference of each variable between the control group and the treatment group together with the p-value from a test if the difference is equal to zero. The upper panel describes the data of the complete cross-section in q1:2010. The lower panel depicts the one-to-one matched sample based on propensity scores obtained from the probit model shown in Table C.3.

Variable	Control group		Treatment group		Difference	p-value
	Mean	SD	Mean	SD	Difference	p-value
Unmatched sample						
Banks	**1224**		**356**			
Customer loans	598665	1232916	827812	2187957	-229147	0.011
Corporate loans	275236	639375	398423	1393132	-123187	0.019
Retail loans	291613	595908	365335	713747	-73723	0.050
Mortgage loans	240781	496849	300660	593602	-59879	0.056
Government loans	21902	73561	44223	145720	-22322	0.000
Foreign loans	5670	21436	11281	62180	-5612	0.008
logTA	12.947	1.313	13.307	1.336	-0.360	0.000
Equityratio	5.637	1.425	5.391	1.491	0.246	0.005
Interbank	-3.562	12.267	-4.940	11.125	1.378	0.057
Securities	24.031	11.130	28.728	11.434	-4.697	0.000
Market funding	1.999	2.939	2.494	3.595	-0.495	0.008
Credit lines	4.921	2.974	5.342	3.739	-0.421	0.027
Liquidity	2.175	0.755	2.124	0.707	0.051	0.252
One-to-one matched nearest neighbor sample						
Banks	**356**		**356**			
Customer loans	789737	1738747	827812	2187957	-38075	0.797
Corporate loans	370511	943154	398423	1393132	-27913	0.754
Retail loans	366325	719308	365335	713747	990	0.985
Mortgage loans	301124	602204	300660	593602	464	0.992
Government loans	36650	117048	44223	145720	-7573	0.445
Foreign loans	8339	32146	11281	62180	-2942	0.428
logTA	13.273	1.349	13.307	1.336	-0.033	0.739
Equityratio	5.352	1.227	5.391	1.491	-0.040	0.697
Interbank	-5.189	10.843	-4.940	11.125	-0.249	0.762
Securities	28.674	11.738	28.728	11.434	-0.054	0.950
Market funding	2.397	3.281	2.494	3.595	-0.096	0.709
Credit lines	5.070	2.701	5.342	3.739	-0.272	0.266
Liquidity	2.089	0.652	2.124	0.707	-0.035	0.496

Table C.5: Variable definition

This Table provides the variable definitions. BBK abbreviates Deutsche Bundesbank.

Variable name	Source	Unit	Description
Dependent variables: customer lending and components			
Customer lending	BBK	ln T€	The sum of all lending to non-financial firms
Commercial lending	BBK	ln T€	Loans to non-financial firms and sole proprietorships
Retail lending	BBK	ln T€	Loans to domestic households
Mortgage lending	BBK	ln T€	Real estate loans to domestic households
Government lending	BBK	ln T€	Loans to federal, state, and county government
Foreign lending	BBK	ln T€	Loans to non-domestic, non-financial counterparties
Alternative dependent variables			
Market shares	BBK	%	commercial and retail lending per bank relative to the county aggregate
Growth rates	BBK	%	Quarter on quarter growth rates of commercial and retail loans
Equity buffers	BBK	ln T€	Log-level of gross equity levels
Liquidity buffers	BBK	ln T€	Log-level of cash and short-term assets
Return on RWA	BBK	%	Operating profit relative to risk-weighted assets
NPL shares	BBK	%	Non-performing loans relative to total loans
Quarterly control variables lagged by one quarter			
log Total assets	BBK	log	Natural logarithm of monthly gross total assets (TA) in million Euros
Equity ratio	BBK	%	Total balance sheet equity to gross total assets
Net interbank lending	BBK	%	Interbank assets minus interbank liabilities relative to TA
Security share	BBK	%	Stocks and bonds relative to TA
Market funding	BBK	%	Issued bonds and money market instruments to total liabilities
Credit lines	BBK	%	Sum of irrevocable credit and other commitments to TA
Liquidity	BBK	%	Cash and net balances with central banks to TA