Internet Appendix for

"Does a Larger Menu Increase Appetite? Collateral Eligibility and Credit Supply"

Sjoerd Van Bekkum

Erasmus University Rotterdam

Marc Gabarro

University of Mannheim

Rustom M. Irani

University of Illinois at Urbana-Champaign

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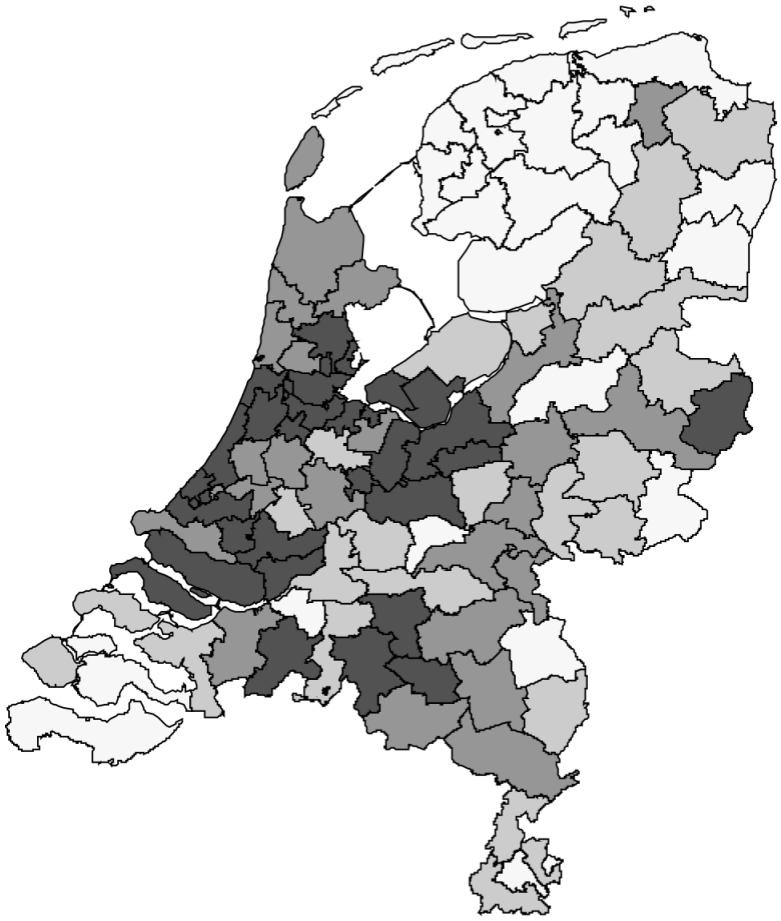
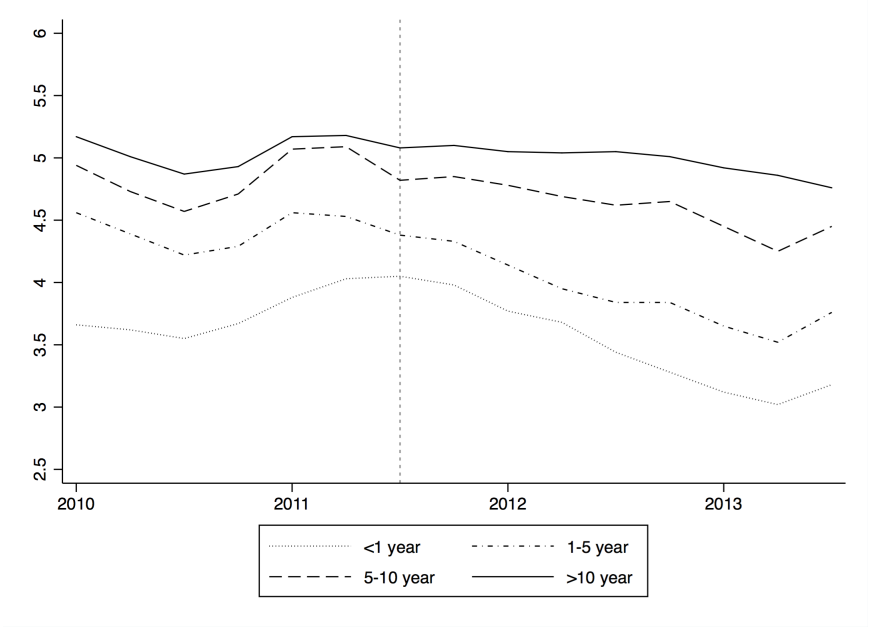
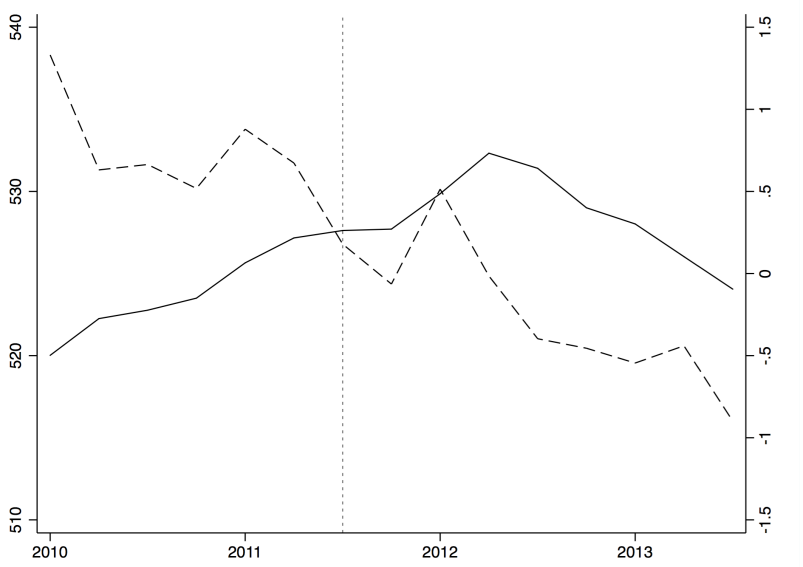


Appendix IA.I. Geography of mortgage originations in the Netherlands. Number of mortgage originations in our sample overlaid on two-digit postal codes in the Netherlands. Darker shading indicates a greater number of originations. White areas are bodies of water.

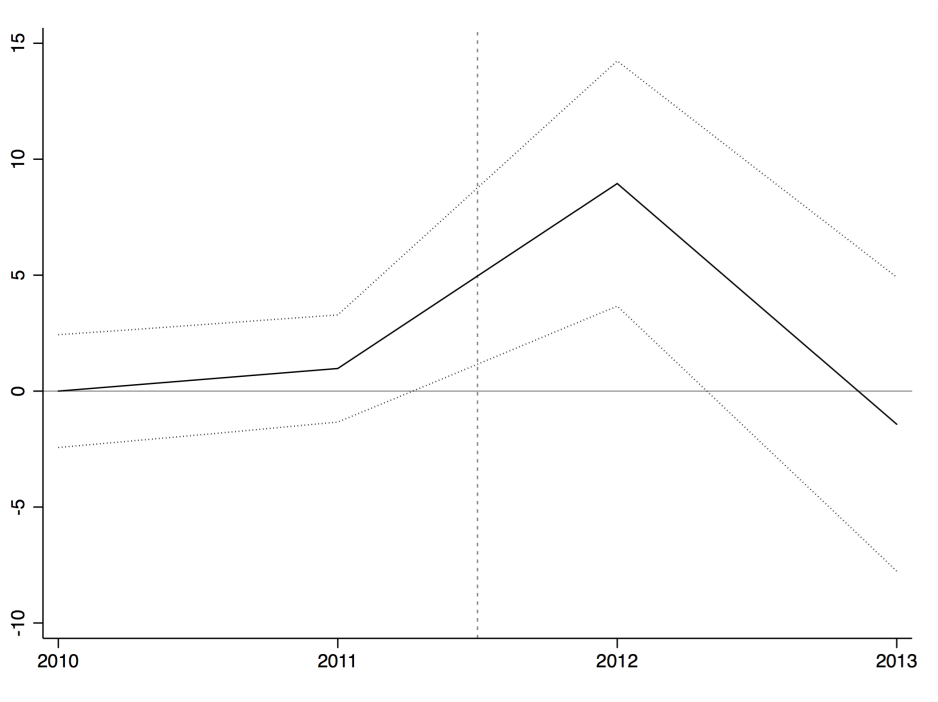


(a) Interest rates



(b) Loan volumes

Appendix IA.II. Aggregate trends in mortgage lending in the Netherlands. This figure plots loans for house purchase granted by monetary financial institutions to Dutch households. The top and bottom panels show interest rates on fixed-rate mortgage originations in percent by rate reset period and loan volumes in billions of euros in terms of stocks (solid line, left y-axis) and flows (dashed line, right y-axis), respectively. The vertical line corresponds to the December 2011 change in ECB collateral eligibility. The source of the underlying data is the Monetary and Financial Statistics for the Netherlands published by the Dutch National Bank.



Appendix IA.III. Dynamics of Class 2 and 3 securities issuance. This figure plots the estimated percentage point difference in Class 2/3 securities (as a share of deal size) issuance among Class 2/3 issuer and other banks over the event window. The series is normalized so that the first observation is equal to zero. The vertical line corresponds to the December 2011 change in ECB collateral eligibility. The point estimates correspond to the year-by-year interaction terms based on the regressions shown in Column (3) of Table 2 with 95% confidence intervals around them.

Appendix IA.IV. Alternative clustering of standard errors

This table examines impact of the change in European Central Bank collateral eligibility policy on credit supply under alternative clustering of standard errors. The unit of observation in each regression is either a loan or bank/postal code/month, and the dependent variable is either the *Interest Rate* or *Loan Volume* (columns (1) to (4) and (5) to (8), respectively). *Class 2/3 Issuer* banks have an above-median share of RMBS rated Class 2 or 3 out of total issuance in the before period. Where indicated, regressions control for loan characteristics at origination and various fixed effects. Loan-level regressions include indicator variables equal to one whenever a given loan characteristic is missing. Volume regressions control for loan characteristics at origination averaged across loans within each bank/postal code/month–level cell. All variables are defined in Appendix A. Standard errors (in parentheses) are clustered at a level indicated in each column. ***, **, and * denote 1%, 5%, and 10% statistical significance, respectively.

Dependent variable:	*Interest Rate*				*Loan Volume*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
After × Class 2/3 Issuer	–0.097***	–0.097***	–0.097***	–0.097***	1.357***	1.357***	1.357***	1.357***
	(0.004)	(0.021)	(0.009)	(0.005)	(0.169)	(0.303)	(0.212)	(0.069)
Level of clustering	Zip	Bank-month	Bank-zip	Month-zip	Zip	Bank-month	Bank-zip	Month-zip
Loan controls	Y	Y	Y	Y	Avg.	Avg.	Avg.	Avg.
Employment status fixed effects	Y	Y	Y	Y	N/A	N/A	N/A	N/A
Payment type fixed effects	Y	Y	Y	Y	N/A	N/A	N/A	N/A
Mortgage purpose fixed effects	Y	Y	Y	Y	N/A	N/A	N/A	N/A
Bank fixed effects	Y	Y	Y	Y	Y	Y	Y	Y
Postal code × origination month fixed effects	Y	Y	Y	Y	Y	Y	Y	Y
N	426,864	426,864	426,864	426,864	33,129	33,129	33,129	33,129
R^2	0.294	0.294	0.294	0.294	0.541	0.541	0.541	0.541

Appendix IA.V. Collapsing time series dimension

This table examines the robustness of the credit supply estimates to potential serial dependence of model errors by collapsing the time-series dimension of the data. The unit of observation in each regression is a bank–postal code, recorded once in the before and once in the after period. The before period is from January 2010 to December 2011 and the after period is from January 2012 to December 2013. The dependent variable is either the average *Interest Rate* or *Loan Volume* in Columns (1) and (2), respectively. *Class 2/3 Issuer* banks have an above-median share of RMBS rated Class 2 or 3 out of total issuance in the before period. Where indicated, regressions control for loan characteristics at origination and various fixed effects. Each regression controls for loan characteristics at origination averaged across loans within each bank–postal code cell in the period before and after December 2011. All variables are defined in Appendix A. Heteroscedasticity-robust standard errors are clustered at the postal code level and shown in parentheses. ***, **, and * denote 1%, 5%, and 10% statistical significance, respectively.

Dependent variable:	*Interest Rate*	*Loan Volume*
	(1)	(2)
After × *Class 2/3 Issuer*	–0.092***	1.069***
	(0.029)	(0.217)
Loan controls	Avg.	Avg.
Employment status fixed effects	Avg.	N/A
Payment type fixed effects	Avg.	N/A
Mortgage purpose fixed effects	Avg.	N/A
Bank fixed effects	Y	Y
Postal code × *After* fixed effects	Y	Y
N	2,407	2,407
R^2	0.568	0.587

Appendix IA.VI. Sensitivity of estimates to outliers

This table examines the sensitivity of the estimates to outliers of the impact of the change in European Central Bank collateral eligibility policy on credit supply. *Class 2/3 Issuer* banks have an above-median share of RMBS rated Class 2 or 3 out of total issuance in the before period. The before period is from January 2010 to December 2011 and the after period is from January 2012 to December 2013. Trimming and winsorizing are conducted at the 1% and 99% levels. Where indicated, regressions control for loan characteristics at origination and various fixed effects. Regressions containing loan characteristics also include corresponding indicator variables equal to one whenever the characteristic is missing. Volume regressions control for loan characteristics at origination averaged across loans within each bank/postal code/month–level cell. All variables are defined in Appendix A. Heteroscedasticity-robust standard errors are clustered at the origination month level and shown in parentheses. ***, **, and * denote 1%, 5%, and 10% statistical significance, respectively.

Panel A: Interest rates

Outlier treatment:	None		Winsorize (1% level)		Trim (1% level)	
Dependent variable:	*Rate*	*Log(Rate)*	*Rate*	*Log(Rate)*	*Rate*	*Log(Rate)*
	(1)	(2)	(3)	(4)	(5)	(6)
After × Class 2/3 Issuer	–0.097***	–0.024***	–0.094***	–0.023***	–0.085***	–0.020***
	(0.023)	(0.005)	(0.022)	(0.005)	(0.019)	(0.004)
Loan controls	Y	Y	Y	Y	Y	Y
Employment status fixed effects	Y	Y	Y	Y	Y	Y
Payment type fixed effects	Y	Y	Y	Y	Y	Y
Mortgage purpose fixed effects	Y	Y	Y	Y	Y	Y
Bank fixed effects	Y	Y	Y	Y	Y	Y
Postal code × origination month fixed effects	Y	Y	Y	Y	Y	Y
N	426,864	426,864	426,864	426,864	418,034	418,034
R^2	0.295	0.287	0.301	0.298	0.299	0.296

Panel B: Loan volumes

Outlier treatment:	None		Winsorize (1% level)		Trim (1% level)	
Dependent variable:	*Volume*	*Log(Volume)*	*Volume*	*Log(Volume)*	*Volume*	*Log(Volume)*
	(1)	(2)	(3)	(4)	(5)	(6)
After × Class 2/3 Issuer	1.357***	0.191***	1.063***	0.178***	0.799***	0.169**
	(0.238)	(0.067)	(0.201)	(0.066)	(0.173)	(0.067)
Loan controls	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.
Bank fixed effects	Y	Y	Y	Y	Y	Y
Postal code × origination month fixed effects	Y	Y	Y	Y	Y	Y
N	33,129	33,129	33,129	33,129	32,467	32,467
R^2	0.541	0.846	0.634	0.844	0.635	0.828

Appendix IA.VII. Falsification and alternative measurement

In this Appendix, we conduct three tests to rule out alternative explanations of our main results on credit supply and loan performance. The results of this analysis are shown in the table below.

We first consider the possibility that affected banks behave differently during recessions, irrespective of collateral policy. Second, it is possible that our assignment of banks into affected and control groups is merely picking up a weak-bank effect. Third, we examine whether affected banks are simply liquidity-strained and tapping ECB loans for reasons unrelated to RMBS issuance.

The results of these tests are shown in Panel A of the table. In the first test, we examine the behavior of the Class 2/3 issuer (affected) and the other (control) banks in a prior recession in the early 2000s. Since all of the banks in our sample are present, we maintain the same classification as in our baseline analysis. We then falsely assume that the rule change occurred at this point, when the ECB implemented traditional monetary policy measures (that is, policy rate cuts), but did not alter RMBS collateral eligibility. We redefine the $After_t$ dummy variable to take a value of one for the period from September 4, 2000, to March 12, 2003. During this period, the Dutch stock market index dropped from 703 to 218 points. As a before period ($After_t$ equal to zero), we take the period from the launch of the euro (January 4, 1999) up to the beginning of the after period (August 31, 2000).

Columns (1) to (3) show the results with this alternative timing. Column (1) shows that the point estimate for interest rates is now positive, small (0.013), and statistically insignificant. In Column (2), we examine loan volumes and now find the estimated effect of the policy change is negative (-0.126) and statistically insignificant. Thus, affected banks had similar lending behavior as control banks during the prior recession, casting doubt on a selection-based explanation, whereby affected banks always cut rates during bad times. Similar results follow when we examine loan performance.

In our second test, we examine the behavior of undercapitalized banks around the rule change. The policy to relax collateral eligibility may have been in response to weak economic conditions and, during such times, undercapitalized banks may have incentives to gamble for resurrection. We test this alternative by classifying affected banks to be those with book value of equity scaled by assets less than 3% (Acharya and Steffen 2014).

We rerun our estimation on the full sample of loans under this alternative capital-based classification. Columns (4) to (6) show that neither the coefficient of interest for the interest rate nor the loan volume model is statistically insignificant at conventional levels. This finding reassures us that we are not simply picking up a risk-shifting effect, whereby weak banks expand loan supply following the rule change in order to gamble for resurrection. Similar results follow when we examine loan performance.

Third, we examine participation by banks in the ECB's three-year long-term refinancing opera-

tions (LTRO). While the policy intervention targeted bank lending and liquidity in weak peripheral eurozone countries—Portugal, Ireland, Italy, Greece, and Spain—and banks from those countries took up the lion's share of the loans (Carpinelli and Crosignani 2015; Krishnamurthy et al. 2015), a handful of Dutch banks did participate and may have increased credit supply as a consequence. If these banks are among the set of Class 2/3 issuer banks, then it may be difficult to isolate the effects of the change in RMBS eligibility from LTRO utilization due to ex post liquidity needs. We define an indicator variable for LTRO participation and rerun our regressions, sorting banks into affected and control groups accordingly.[1] Columns (7) and (9) show that these banks did not increase credit supply, which indicates that RMBS issuance and securitization incentives play an important role.

In Panel B of the table, we also consider two alternative definitions of measures of banks' exposure to the change in collateral policy. First, we calculate banks' exposure based on their total issuance of RMBS of Class 2 and 3 scaled by bank assets to eliminate concerns regarding bank size effects. Then, we label a bank as affected if it is ranked above median. Second, we sort banks into groups based on whether they have issued and fully retained an RMBS with a Class 2 or 3 security ("self-securitization"), which captures net exposure to newly eligible collateral. For each measure, we label a bank as affected if it is ranked above median. Based on these classification schemes, we repeat our baseline estimation. In both cases, the estimate of β is similar to the baseline estimate in terms of size and statistical significance. This indicates that the lending behavior is driven by banks' exposure to Class 2 and 3 RMBS in general and is not an artifact of particular modeling choices.

[1]We thank Matteo Crosignani for sharing data on LTRO participation.

Falsification and alternative measurement

Panel A presents falsification tests for the estimates of the impact of the change in European Central Bank (ECB) collateral eligibility policy on mortgage credit supply and performance. Columns (1) to (3) consider the previous recession as an alternative timing, where the before and after periods are defined from January 1999 to August 2000 and from September 2000 to March 2003, respectively. *Class 2/3 Issuer* banks have an above-median share of RMBS rated Class 2 or 3 out of total issuance in the before period. Columns (4) to (6) redefines affected banks as those with book value of equity divided by assets less than 3% (undercapitalized banks) with the standard before period from January 2010 to December 2011 and after period from January 2012 to December 2013. Columns (7) to (9) redefine affected banks as those obtaining loans under the long-term refinancing operations (LTRO) of the ECB. Panel B presents estimates based on alternative measurement of affected banks' exposure. Columns (1) to (3) redefine banks as affected if they have an above-median share of RMBS rated Class 2 or 3 out of total assets in the before period. Columns (4) to (6) redefine banks as affected if they have issued and fully retained deals with RMBS of Class 2 or 3 (self-securitization) in the before period. Where indicated, regressions control for loan characteristics at origination and various fixed effects. Loan-level regressions containing loan characteristics also include corresponding indicator variables equal to one whenever the characteristic is missing. Volume regressions control for loan characteristics at origination averaged across loans within each bank/postal code/month–level cell. All variables are defined in Appendix A. Heteroscedasticity-robust standard errors are clustered at the origination month level and shown in parentheses. ***, **, * denotes 1%, 5%, and 10% statistical significance.

Panel A: Falsification tests

Falsification test:	Prior recession			Undercapitalized banks			LTRO participant		
Dependent variable:	*Rate*	*Volume*	*Arrears*	*Rate*	*Volume*	*Arrears*	*Rate*	Volume	*Arrears*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
After × Class 2/3 Issuer	0.013	–0.126	–0.002	–0.005	0.632	–0.003	0.196***	0.097	–0.011**
	(0.020)	(0.076)	(0.002)	(0.022)	(0.414)	x(0.002)	(0.027)	(0.304)	(0.004)
Loan controls	Y	Avg.	Y	Y	Avg.	Y	Y	Avg.	Y
Employment status fixed effects	Y	N/A	Y	Y	N/A	Y	Y	N/A	Y
Payment type fixed effects	Y	N/A	Y	Y	N/A	Y	Y	N/A	Y
Mortgage purpose fixed effects	Y	N/A	Y	Y	N/A	Y	Y	N/A	Y
Bank fixed effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
Postal code × origination month fixed effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
N	168,119	17,705	168,119	366,029	27,209	366,029	426,864	33,129	426,864
R^2	0.191	0.656	0.049	0.307	0.555	0.026	0.294	0.535	0.026

Panel B: Alternative measurement of bank exposure

Affected definition:	Issuance/Assets			Self-securitization		
Dependent variable:	*Rate*	*Volume*	*Arrears*	*Rate*	*Volume*	*Arrears*
	(1)	(2)	(3)	(4)	(5)	(6)
After × Class 2/3 Issuer	–0.111***	2.349***	0.005***	–0.096***	1.358***	0.005***
	(0.029)	(0.390)	(0.001)	(0.023)	(0.238)	(0.002)
Loan controls	Y	Avg.	Y	Y	Avg.	Y
Employment status fixed effects	Y	N/A	Y	Y	N/A	Y
Payment type fixed effects	Y	N/A	Y	Y	N/A	Y
Mortgage purpose fixed effects	Y	N/A	Y	Y	N/A	Y
Bank fixed effects	Y	Y	Y	Y	Y	Y
Postal code × origination month fixed effects	Y	Y	Y	Y	Y	Y
N	426,864	33,129	426,864	426,864	33,129	426,864
R^2	0.295	0.548	0.026	0.294	0.541	0.026

Appendix IA.VIII. Credit supply by three phases of collateral eligibility

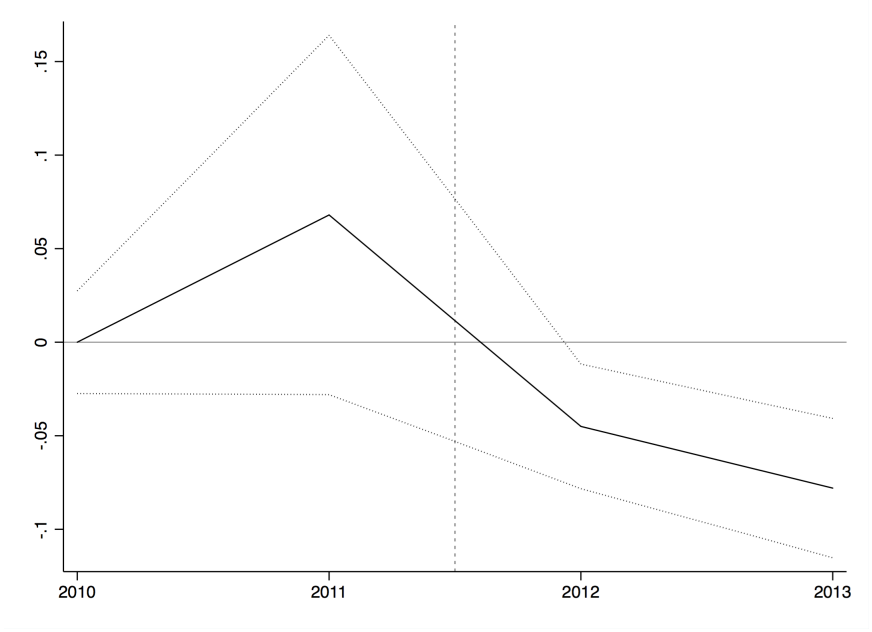
In this Appendix, we more closely examine the stepwise changes in collateral eligibility implemented by the ECB. The results of this analysis are shown in the table below.

As described in Section 1, the ECB relaxed RMBS requirements as follows: first, from January 2012 to May 2012, only Class 2 securities were temporarily eligible; second, from June 2012 to July 2012, both Class 2 and 3 securities were temporarily eligible; and, third, from August 2012 to the end of the sample (December 2013), where Class 2 securities became permanently eligible and haircuts on Class 2 and 3 securities were reduced. Rather than bundling these changes into $After_t$, we instead split the after period into three phases and rerun our baseline regression analysis. The results of this estimation indicate that credit supply is elevated in each of these phases. While there is no statistically significant incremental increase in volume in response to Class 3 RMBS becoming eligible for the first time, this is likely to reflect a power issue, as this second phase is only one month long. Thus, in economic terms, the credit supply effects become stronger as the regulatory intervention becomes more permanent and enlarges the set of newly eligible RMBS.

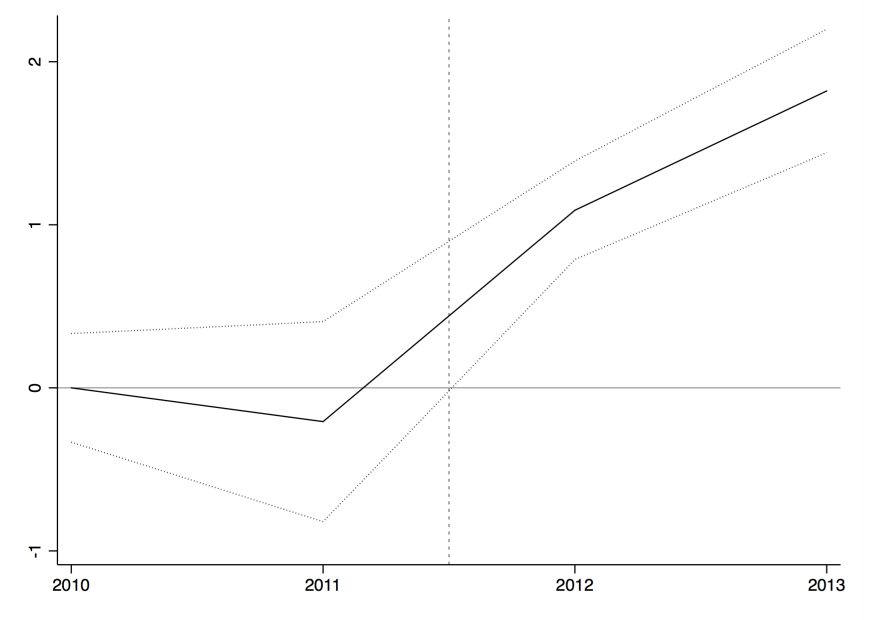
Credit supply by three phases of collateral eligibility

This table presents estimates of the impact of three changes in European Central Bank collateral eligibility policy on credit supply. *Class 2/3 Issuer* banks have an above-median share of RMBS rated Class 2 or 3 out of total issuance in the before period. The before period is from January 2010 to December 2011. The after period is separated into three phases: first, from January 2012 to May 2012 where Class 2 securities were temporarily eligible; second, from June 2012 to July 2012 where Class 2 and 3 securities were temporarily eligible; and third, from August 2012 to the end of the sample (December 2013) where Class 2 securities became permanently eligible and haircuts on Class 2 and 3 securities were reduced. Where indicated, regressions control for loan characteristics at origination and various fixed effects. Regressions containing loan characteristics also include corresponding indicator variables equal to one whenever the characteristic is missing. Volume regressions control for loan characteristics at origination averaged across loans within each bank/postal code/month–level cell. All variables are defined in Appendix A. Heteroscedasticity-robust standard errors are clustered at the origination month level and shown in parentheses. ***, **, and * denote 1%, 5%, and 10% statistical significance, respectively.

Dependent variable:	*Rate*	*Volume*
	(1)	(2)
Class 2/3 Issuer × *After* × *Class 2 Temporarily Eligible*	–0.055**	0.740***
	(0.024)	(0.192)
Class 2/3 Issuer × *After* × *Class 2/3 Temporarily Eligible*	–0.098***	0.761
	(0.028)	(0.586)
Class 2/3 Issuer × *After* × *Class 2 Permanently Eligible*	–0.112***	1.634***
	(0.024)	(0.251)
Loan controls	Y	Avg.
Employment status fixed effects	Y	N/A
Payment type fixed effects	Y	N/A
Mortgage purpose fixed effects	Y	N/A
Bank fixed effects	Y	Y
Postal code × origination month fixed effects	Y	Y
N	426,864	33,129
R^2	0.295	0.542



(c) Interest rates



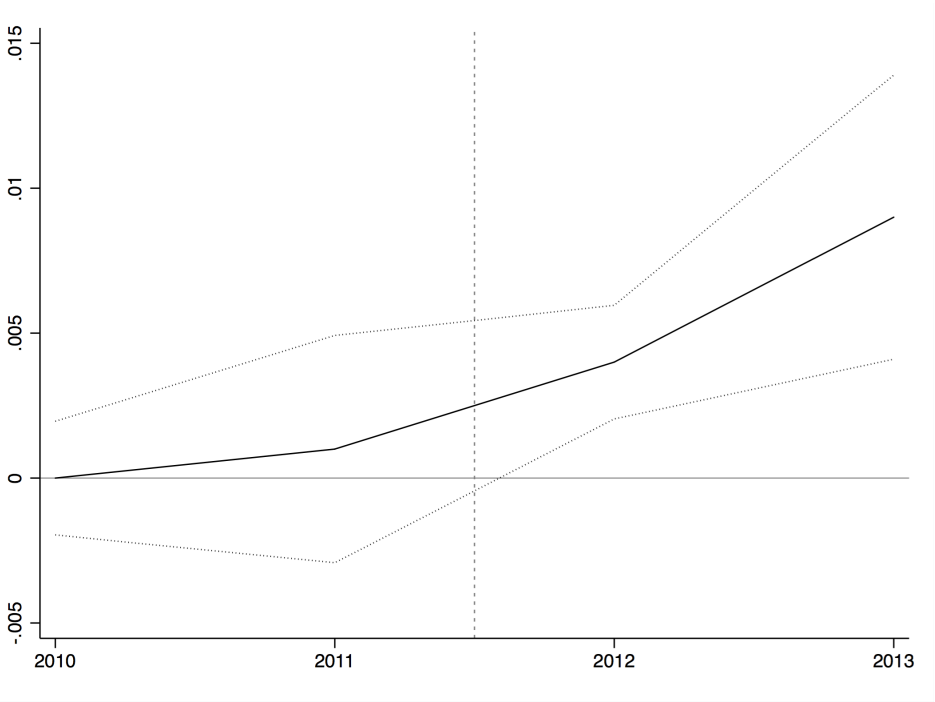
(d) Loan volumes

Appendix IA.IX. Dynamics of mortgage credit supply for full sample (annual frequency). This figure plots the estimated difference in lending behavior among Class 2/3 issuer and other banks over the event window. The top and bottom panels show the differences in loan-level interest rates (percentage points) and postal code–level loan volumes (millions of euros), respectively. Each series is normalized so that the first observation is equal to zero. The vertical line corresponds to the December 2011 change in ECB collateral eligibility. The point estimates correspond to the year-by-year interaction terms in Columns (5) and (10) of Table 5 with 95% confidence intervals around them.

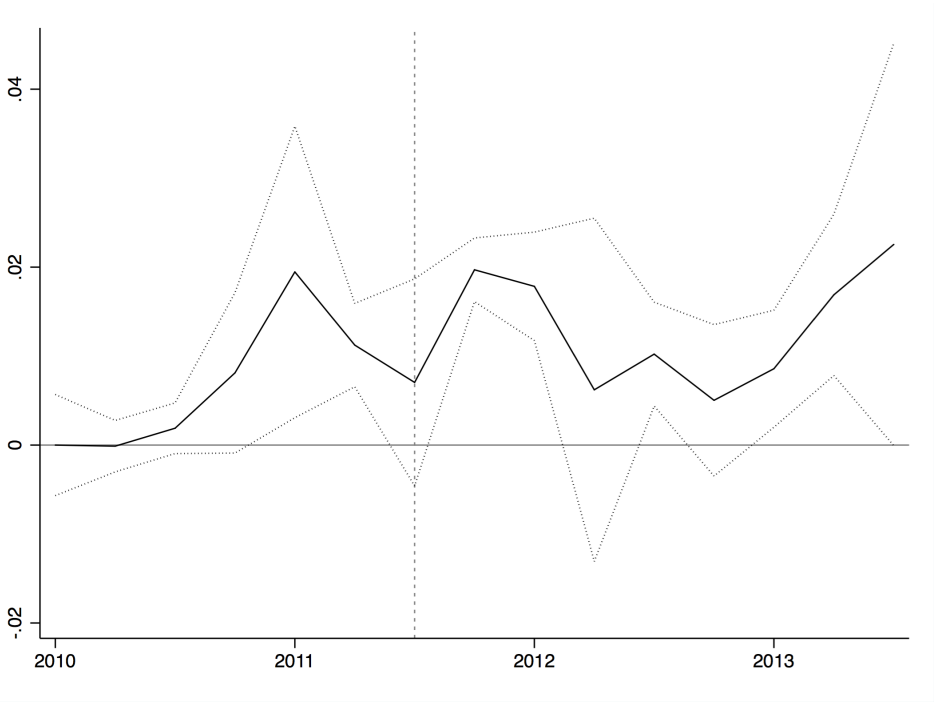
Appendix IA.X. Effect on mortgages unlikely to be securitized

This table presents estimates of the impact of the change in European Central Bank collateral eligibility policy on the interest rate and repayment performance of new mortgage originations that are ex ante unlikely to be securitized. Mortgages with a nonstandard payment type include those with "bullet plus life insurance" and "bullet plus investment portfolio" repayment schedules. Mortgages with a non-standard purpose include all mortgage loans except those for purchase, remortgage, and renovation. The unit of observation in each regression is either a loan or a bank/postal code/month. *Class 2/3 Issuer* banks have an above-median share of RMBS rated Class 2 or 3 out of total issuance in the before period. The before period is from January 2010 to December 2011 and the after period is from January 2012 to December 2013. Columns (1) and (2) define the dependent variable as the *Interest Rate*, (3) and (4) as *Loan Volume*, and (5) and (6) as *Payment Arrears*. Where indicated, regressions control for loan characteristics at origination and various fixed effects. Regressions containing loan characteristics also include corresponding indicator variables equal to one whenever the characteristic is missing. Volume regressions control for loan characteristics at origination averaged across loans within each bank/postal code/month–level cell. All variables are defined in Appendix A. Heteroscedasticity-robust standard errors are clustered at the origination month level and shown in parentheses. ***, **, and * denote 1%, 5%, and 10% statistical significance, respectively.

Dependent variable:	*Interest Rate*		*Loan Volume*		*Payment Arrears*	
Nonstandard:	Payment	Purpose	Payment	Purpose	Payment	Purpose
	(1)	(2)	(3)	(4)	(5)	(6)
After × Class 2/3 Issuer	–0.184	0.538***	0.077	–0.006	–0.001	–0.033*
	(0.118)	(0.112)	(0.076)	(0.453)	(0.029)	(0.018)
Loan controls	Y	Y	Avg.	Avg.	Y	Y
Employment status fixed effects	Y	Y	N/A	N/A	Y	Y
Payment type fixed effects	Y	Y	N/A	N/A	Y	Y
Mortgage purpose fixed effects	Y	Y	N/A	N/A	Y	Y
Bank fixed effects	Y	Y	Y	Y	Y	Y
Postal code × origination month fixed effects	Y	Y	Y	Y	Y	Y
N	5,286	22,674	2,777	5,730	5,286	22,674
R^2	0.625	0.449	0.780	0.744	0.496	0.197



Appendix IA.XI. Dynamics of loan repayment performance (annual frequency). This figure plots the estimated difference in loan repayment performance among Class 2/3 issuer and other banks over the event window at the annual frequency. The series is normalized so that the first observation is equal to zero. The vertical line corresponds to the December 2011 change in ECB collateral eligibility. The point estimates correspond to the year-by-year interaction terms based on the regression shown in Column (5) of Panel B of Table 9 with 95% confidence intervals around them.



Appendix IA.XII. Dynamics of loan repayment performance (quarterly frequency). This figure plots the estimated difference in loan repayment performance among Class 2/3 issuer and other banks over the event window at the quarterly frequency. The series is normalized so that the first observation is equal to zero. The vertical line corresponds to the December 2011 change in ECB collateral eligibility. The point estimates correspond to the quarter-by-quarter interaction terms based on the analogy of the regression shown in Column (5) of Panel B of Table 9 with 95% confidence intervals around them.