

Online Appendix:

Additional Tables and Figures

Table A1: Robustness check for placebo effects

Dependent variable: mortgage investment (million €)	Estimates
After 2014(Q3)	26.78*** (8.70)
Fund with FR below 90 in 2008	
Fund with FR below 90 in 2008 × After 2014 Q3 (β_1)	33.11 (35.08)
Negative difference in funding ratio in 2008	
Positive difference in funding ratio in 2008	
Negative difference in funding ratio _{t-4}	32.10
Positive difference in funding ratio _{t-4}	12.13
Interest rate change _{t-1}	2.18
Equity change _{t-1}	-4.30
Log of Total assets	-154.36
Log of Total assets (squared)	3.36
Log of Total number of participants × 10 ⁴	-210.95
Log of Total number of participants × 10 ⁴ (squared)	8.76
Share of active participants	75.37
Share of low-LTV loans (below 100)	-11.96
Share of loans with NHG	0.73
Share of age of borrowers below 40	-5.78
Share of long maturity	8.41
Share of amortizing loans	-60.02**
Share of negative changes in collateral	15.32
Constant	3,036.50
Pension funds fixed effects	Yes
Number of Observations	1,048
Number of Funds	15

Explanatory Note: Full regression results for robustness check in Table 7 Panel A, first coefficient. We test placebo effects assigning treatment when the funding ratio is below 90 in 2008, and we show no significant results. Source: Mercurius data (2019q2) of DNB, sample period from 2000q1 to 2019q2, own computations. Clustered standard errors at pension fund level in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

Table A2: Robustness check for placebo effects

Dependent variable: mortgage investment (million €)	Estimates
After 2014(Q3)	18.22** (8.00)
Fund with FR below 110 in 2008	
Fund with FR below 110 in 2008 × After 2014 Q3 (β_1)	23.84 (13.96)
Negative difference in funding ratio in 2008	
Positive difference in funding ratio in 2008	
Negative difference in funding ratio _{t-4}	12.52
Positive difference in funding ratio _{t-4}	13.16
Interest rate change _{t-1}	2.17
Equity change _{t-1}	-4.06
Log of Total assets	-259.06
Log of Total assets (squared)	5.59
Log of Total number of participants × 10 ⁴	-98.72
Log of Total number of participants × 10 ⁴ (squared)	3.95
Share of active participants	44.47
Share of low-LTV loans (below 100)	-12.22*
Share of loans with NHG	-0.33
Share of age of borrowers below 40	-4.49
Share of long maturity	6.40
Share of amortizing loans	-53.80**
Share of negative changes in collateral	14.81
Constant	3,633.50
Pension funds fixed effects	Yes
Number of Observations	1,048
Number of Funds	15

Explanatory Note: Full regression results for robustness check in Table 7 Panel A, second coefficient. We test placebo effects assigning treatment when the funding ratio is below 110 in 2008, and we show no significant results. Source: Mercurius data (2019q2) of DNB, sample period from 2000q1 to 2019q2, own computations. Clustered standard errors at pension fund level in parentheses. *** p<0.01, ** p<0.05, * p<0.10

Table A3: Robustness check for anticipation effects

Dependent variable: mortgage investment (million €)	Estimates
After 2014(Q3)	-1.87 (1.90)
Fund with recovery plan	
Fund with recovery plan × After 2013 Q3	4.59* (2.34)
Negative difference in funding ratio in 2008	
Positive difference in funding ratio in 2008	
Negative difference in funding ratio _{t-4}	-48.42
Positive difference in funding ratio _{t-4}	3.92
Interest rate change _{t-1}	5.74
Equity change _{t-1}	-3.42
Log of Total assets	194.02
Log of Total assets (squared)	-4.16
Log of Total number of participants × 10 ⁴	-58.03
Log of Total number of participants × 10 ⁴ (squared)	2.36
Share of active participants	53.36
Share of low-LTV loans (below 100)	-3.03
Share of loans with NHG	0.40
Share of age of borrowers below 40	3.50
Share of long maturity	3.42
Share of amortizing loans	2.33
Share of negative changes in collateral	-9.72
Constant	-1925.94
Pension funds fixed effects	Yes
Number of Observations	755
Number of Funds	15

Explanatory Note: Full regression results for robustness check in Table 7 Panel B, first coefficient. We test anticipation effects assigning the treated period one year earlier than the true FTK introduction; we find a borderline significant result, but the magnitude is negligible. Source: Mercurius data (2019q2) of DNB, sample period from 2000q1 to 2014q2, own computations. Clustered standard errors at pension fund level in parentheses. *** p<0.01, ** p<0.05, * p<0.10

Table A4: Robustness check for anticipation effects

Dependent variable: mortgage investment (million €)	Estimates
After 2014(Q3)	-0.77 (1.52)
Fund with recovery plan	
Fund with recovery plan × After 2012 Q3	4.01* (2.17)
Negative difference in funding ratio in 2008	
Positive difference in funding ratio in 2008	
Negative difference in funding ratio _{t-4}	-50.55
Positive difference in funding ratio _{t-4}	4.04
Interest rate change _{t-1}	5.88
Equity change _{t-1}	-3.57
Log of Total assets	200.48
Log of Total assets (squared)	-4.31
Log of Total number of participants × 10 ⁴	-60.45
Log of Total number of participants × 10 ⁴ (squared)	2.47
Share of active participants	54.46
Share of low-LTV loans (below 100)	-3.19
Share of loans with NHG	0.33
Share of age of borrowers below 40	3.52
Share of long maturity	3.32
Share of amortizing loans	1.95
Share of negative changes in collateral	-9.40
Constant	-1980.92
Pension funds fixed effects	Yes
Number of Observations	755
Number of Funds	15

Explanatory Note: Full regression results for robustness check in Table 7 Panel B, second coefficient. We test anticipation effects assigning the treated period two years earlier than the true FTK introduction, we find borderline significant results, but the magnitude is negligible. Source: Mercurius data (2019q2) of DNB, sample period from 2000q1 to 2014q2, own computations. Clustered standard errors at pension fund level in parentheses. *** p<0.01, ** p<0.05, * p<0.10

Table A5: Robustness checks, a pre-trend test

Dependent variable: mortgage investment (million €)	Estimates
Fund with recovery plan	
2000 Q2 × Fund with recovery plan	0.37
2000 Q3 × Fund with recovery plan	1.55
2000 Q4 × Fund with recovery plan	3.56
2001 Q1 × Fund with recovery plan	0.51
2001 Q2 × Fund with recovery plan	1.31
2001 Q3 × Fund with recovery plan	2.01
2001 Q4 × Fund with recovery plan	8.67
2002 Q1 × Fund with recovery plan	10.82
2002 Q2 × Fund with recovery plan	4.71
2002 Q3 × Fund with recovery plan	-2.08
2002 Q4 × Fund with recovery plan	-0.76
2003 Q1 × Fund with recovery plan	-3.05
2003 Q2 × Fund with recovery plan	-6.45
2003 Q3 × Fund with recovery plan	-4.96
2003 Q4 × Fund with recovery plan	-3.18
2004 Q1 × Fund with recovery plan	-3.06
2004 Q2 × Fund with recovery plan	-2.59
2004 Q3 × Fund with recovery plan	-3.62
2004 Q4 × Fund with recovery plan	-5.37
2005 Q1 × Fund with recovery plan	-4.73
2005 Q2 × Fund with recovery plan	-4.83
2005 Q3 × Fund with recovery plan	-5.36
2005 Q4 × Fund with recovery plan	-1.88
2006 Q1 × Fund with recovery plan	-2.36
2006 Q2 × Fund with recovery plan	5.00
2006 Q3 × Fund with recovery plan	4.44
2006 Q4 × Fund with recovery plan	-2.12
2007 Q1 × Fund with recovery plan	-3.69
2007 Q2 × Fund with recovery plan	1.97
2007 Q3 × Fund with recovery plan	-4.66
2007 Q4 × Fund with recovery plan	-8.86
2008 Q1 × Fund with recovery plan	-8.71
2008 Q2 × Fund with recovery plan	-9.39*
2008 Q3 × Fund with recovery plan	-8.23
2008 Q4 × Fund with recovery plan	-7.30*
2009 Q1 × Fund with recovery plan	7.16
2009 Q2 × Fund with recovery plan	6.07
2009 Q3 × Fund with recovery plan	4.58
2009 Q4 × Fund with recovery plan	3.83
2010 Q1 × Fund with recovery plan	-2.57
2010 Q2 × Fund with recovery plan	-5.02
2010 Q3 × Fund with recovery plan	-3.37
2010 Q4 × Fund with recovery plan	-2.81
2011 Q1 × Fund with recovery plan	-4.21
2011 Q2 × Fund with recovery plan	-3.01
2011 Q3 × Fund with recovery plan	-2.57
2011 Q4 × Fund with recovery plan	-1.01
2012 Q1 × Fund with recovery plan	-0.51
2012 Q2 × Fund with recovery plan	1.66
2012 Q3 × Fund with recovery plan	-0.76
2012 Q4 × Fund with recovery plan	-1.62
2013 Q1 × Fund with recovery plan	1.94
2013 Q2 × Fund with recovery plan	3.06
2013 Q3 × Fund with recovery plan	2.00
2013 Q4 × Fund with recovery plan	2.88

2014 Q1 × Fund with recovery plan	2.24
2014 Q2 × Fund with recovery plan	2.48
Quarter dummies	Yes
Negative difference in funding ratio in 2008	
Positive difference in funding ratio in 2008	
Negative difference in funding ratio _{t-4}	-72.76
Positive difference in funding ratio _{t-4}	-2.24
Interest rate change _{t-1}	
Equity change _{t-1}	
Log of Total assets	166.07
Log of Total assets (squared)	-3.56
Log of Total number of participants × 10 ⁴	-62.25
Log of Total number of participants × 10 ⁴ (squared)	2.51
Share of active participants	45.51
Share of low-LTV loans (below 100)	-2.78
Share of loans with NHG	0.19
Share of age of borrowers below 40	3.04
Share of long maturity	8.94
Share of amortizing loans	2.82
Share of negative changes in collateral	-9.68
Constant	-1,572.59
Pension funds fixed effects	Yes
Number of Observations	755
Number of Funds	15

Explanatory Note: A pre-trend test is performed by running the baseline regression again but adding to it the interaction terms (between the quarterly dummies and the recovery mode dummy). None of the coefficients of this interaction term is statistically significant at the 5% level, and only two are at 10%. Jointly they are not significant either. Source: Mercurius data (2019q2) of DNB, sample period from 2000q1 to 2014q2, own computations. Clustered standard errors at pension fund level in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

Table A6: Robustness check to effect of changes in interest rate

Dependent variable: mortgage investment (million €)	Estimates
After 2014(Q3)	14.72** (5.008)
Fund with recovery plan	
Fund with recovery plan × After 2014 Q3 (β_1)	41.12** (14.978)
Negative difference in funding ratio in 2008	
Positive difference in funding ratio in 2008	
Negative difference in funding ratio _{t-4}	34.83
Positive difference in funding ratio _{t-4}	12.64
Interest rate change _{t-1}	0.62
Fund with recovery plan × Interest rate change _{t-1}	2.89
Equity change _{t-1}	-0.61
Log of Total assets	-139.67
Log of Total assets (squared)	2.95
Log of Total number of participants × 10 ⁴	-141.83
Log of Total number of participants × 10 ⁴ (squared)	5.30
Share of active participants	38.37
Share of low-LTV loans (below 100)	-12.72*
Share of loans with NHG	0.99
Share of age of borrowers below 40	-6.61
Share of long maturity	7.58
Share of amortizing loans	-54.71**
Share of negative changes in collateral	13.32
Constant	2,612.98
Pension funds fixed effects	Yes
Number of Observations	1,048
Number of Funds	15

Explanatory Note: Full regression results for robustness check in Table 7 Panel C, first coefficient. Tested by running the baseline regression augmented by the changes in interest rates and their interactions with the recovery mode dummy; no significant results for both terms. Source: Mercurius data (2019q2) of DNB, sample period from 2000q1 to 2019q2, own computations. Clustered standard errors at pension fund level in parentheses. *** p<0.01, ** p<0.05, * p<0.10

Table A7: Robustness check for interest rate level

Dependent variable: mortgage investment (million €)	Estimates
After 2014(Q3)	10.88* (5.744)
Fund with recovery plan	
Fund with recovery plan × After 2014 Q3 (β_1)	49.87*** (14.863)
Negative difference in funding ratio in 2008	
Positive difference in funding ratio in 2008	
Negative difference in funding ratio _{t-4}	40.43
Positive difference in funding ratio _{t-4}	10.81
Interest rate level _{t-1}	-0.94
Fund with recovery plan × Interest rate level _{t-1}	3.07
Equity change _{t-1}	1.36
Log of Total assets	-159.78
Log of Total assets (squared)	3.42
Log of Total number of participants × 10 ⁴	-144.31
Log of Total number of participants × 10 ⁴ (squared)	5.45
Share of active participants	40.20
Share of low-LTV loans (below 100)	-12.58*
Share of loans with NHG	0.63
Share of age of borrowers below 40	-6.65
Share of long maturity	7.90
Share of amortizing loans	-55.02**
Share of negative changes in collateral	12.57
Constant	2,832.16
Pension funds fixed effects	Yes
Number of Observations	1,048
Number of Funds	15

Explanatory Note: Full regression results for robustness check in Table 7 Panel C, second coefficient. Tested by running the baseline regression augmented by the level of interest rates and the interactions with the recovery mode dummy; no significant results for both terms. Source: Mercurius data (2019q2) of DNB, sample period from 2000q1 to 2019q2, own computations. Clustered standard errors at pension fund level in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

Table A8: Robustness check using pension funds dummies

Dependent variable: mortgage investment (million €)	Estimates
After 2014(Q3)	14.42*** (4.990)
Fund with recovery plan	81.20** (35.590)
Fund with recovery plan × After 2014 Q3 (β_1)	41.69*** (14.781)
Pension funds dummies	Yes
Negative difference in funding ratio in 2008	
Positive difference in funding ratio in 2008	
Negative difference in funding ratio _{t-4}	35.33
Positive difference in funding ratio _{t-4}	12.79
Interest rate change _{t-1}	2.17
Equity change _{t-1}	-0.55
Log of Total assets	-139.62
Log of Total assets (squared)	2.95
Log of Total number of participants × 10 ⁴	-142.59
Log of Total number of participants × 10 ⁴ (squared)	5.33
Share of active participants	38.45
Share of low-LTV loans (below 100)	-12.74**
Share of loans with NHG	0.85
Share of age of borrowers below 40	-6.55
Share of long maturity	7.62
Share of amortizing loans	-54.73***
Share of negative changes in collateral	12.81
Constant	2,581.92
Pension funds fixed effects	Yes
Number of Observations	1,048
Number of Funds	15

Explanatory Note: Full regression results for robustness check in Table 7 Panel C, third coefficient. Tested by running the baseline regression again augmented by the pension funds dummies; no change in the main parameter (β_1). Source: Mercurius data (2019q2) of DNB, sample period from 2000q1 to 2019q2, own computations. Clustered standard errors at pension fund level in parentheses. *** p<0.01, ** p<0.05, * p<0.10

Table A9: Robustness check: falsification test

Dependent variable: mortgage investment (million €)	Estimates
After 2014(Q3)	21.77*** (5.17)
Large funds dummy	
Large funds dummy × After 2014 Q3 (β_1)	20.15 (15.979)
Negative difference in funding ratio in 2008	
Positive difference in funding ratio in 2008	
Negative difference in funding ratio _{t-4}	-18.64
Positive difference in funding ratio _{t-4}	4.13
Interest rate change _{t-1}	1.53
Equity change _{t-1}	-3.61
Log of Total assets	-855.63***
Log of Total assets (squared)	18.52***
Log of Total number of participants × 10 ⁴	-167.67
Log of Total number of participants × 10 ⁴ (squared)	7.84
Share of active participants	19.86
Share of low-LTV loans (below 100)	-8.20**
Share of loans with NHG	0.85
Share of age of borrowers below 40	-11.33**
Share of long maturity	6.08
Share of amortizing loans	-39.31**
Share of negative changes in collateral	7.67
Constant	10,777.47***
Pension funds fixed effects	Yes
Number of Observations	892
Number of Funds	13

Explanatory Note: Full regression results for robustness check in Table 7 Panel D, first coefficient. A falsification test is performed where treatment is assigned on the base of fund size (total assets), to (relatively) large funds, after excluding the two largest. No significant results. Source: Mercurius data (2019q2) of DNB, sample period from 2000q1 to 2019q2, own computations. Clustered standard errors at pension fund level in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

Table A10: Robustness check for fund size (total assets), excluding two largest funds

Dependent variable: mortgage investment (million €)	Estimates
After 2014(Q3)	14.87*** (3.124)
Fund with recovery plan	
Fund with recovery plan × After 2014 Q3 (β_1)	39.35*** (11.194)
Negative difference in funding ratio in 2008	
Positive difference in funding ratio in 2008	
Negative difference in funding ratio _{t-4}	18.91
Positive difference in funding ratio _{t-4}	-0.46
Interest rate change _{t-1}	1.59
Equity change _{t-1}	-1.25
Log of Total assets	-911.20***
Log of Total assets (squared)	19.62***
Log of Total number of participants × 10 ⁴	-43.35
Log of Total number of participants × 10 ⁴ (squared)	1.83
Share of active participants	-56.60
Share of low-LTV loans (below 100)	-7.00**
Share of loans with NHG	2.25
Share of age of borrowers below 40	-10.57**
Share of long maturity	3.19
Share of amortizing loans	-33.82**
Share of negative changes in collateral	2.69
Constant	10,873.54***
Pension funds fixed effects	Yes
Number of Observations	892
Number of Funds	13

Explanatory Note: Full regression results for robustness check in Table 7 Panel D, second coefficient. The effect of fund size on mortgage investment is tested by running the baseline regression again but after dropping the two largest funds in our data. The regression delivers similar results (both the direction and the significance) as in our baseline though the magnitude gets smaller. Source: Mercurius data (2019q2) of DNB, sample period from 2000q1 to 2019q2, own computations. Clustered standard errors at pension fund level in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

Table A11: Robustness checks for the share of mortgages in total assets, excluding two largest funds

Dependent variable: mortgage investment /total assets	Estimates
After 2014(Q3)	0.0016*** (0.0004)
Fund with recovery plan	
Fund with recovery plan × After 2014 Q3 (β_1)	0.0009** (0.0004)
Negative difference in funding ratio in 2008	
Positive difference in funding ratio in 2008	
Negative difference in funding ratio _{t-4}	0.0029**
Positive difference in funding ratio _{t-4}	0.0002
Interest rate change _{t-1}	0.0002
Equity change _{t-1}	0.0005
Log of Total assets	0.017**
Log of Total assets (squared)	-0.0004**
Log of Total number of participants × 10 ⁴	0.002
Log of Total number of participants × 10 ⁴ (squared)	-0.0001
Share of active participants	-0.0006
Share of low-LTV loans (below 100)	-0.0005**
Share of loans with NHG	0.0003*
Share of age of borrowers below 40	-0.0004**
Share of long maturity	0.0001
Share of amortizing loans	-0.0018***
Share of negative changes in collateral	-0.0002
Constant	-0.204**
Pension funds fixed effects	Yes
Number of Observations	892
Number of Funds	13

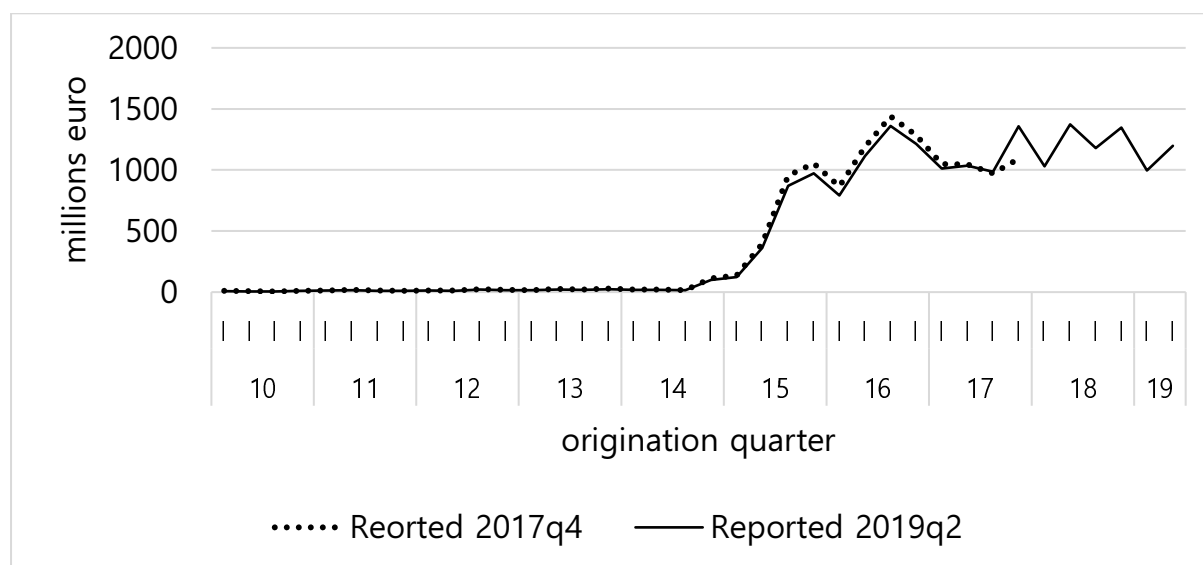
Explanatory Note: Full regression results for robustness check in Table 7 Panel D, third coefficient. Tested by replacing the dependent variable in the baseline model with the mortgage investment share (mortgage investments/total assets). We exclude here the two largest funds, main parameter (β_1) still significant. Source: Mercurius data (2019q2) of DNB, sample period from 2000q1 to 2019q2, own computations. Clustered standard errors at pension fund level in parentheses. *** p<0.01, ** p<0.05, * p<0.10

Table A12: Robustness checks for share of mortgages in total assets, entire sample

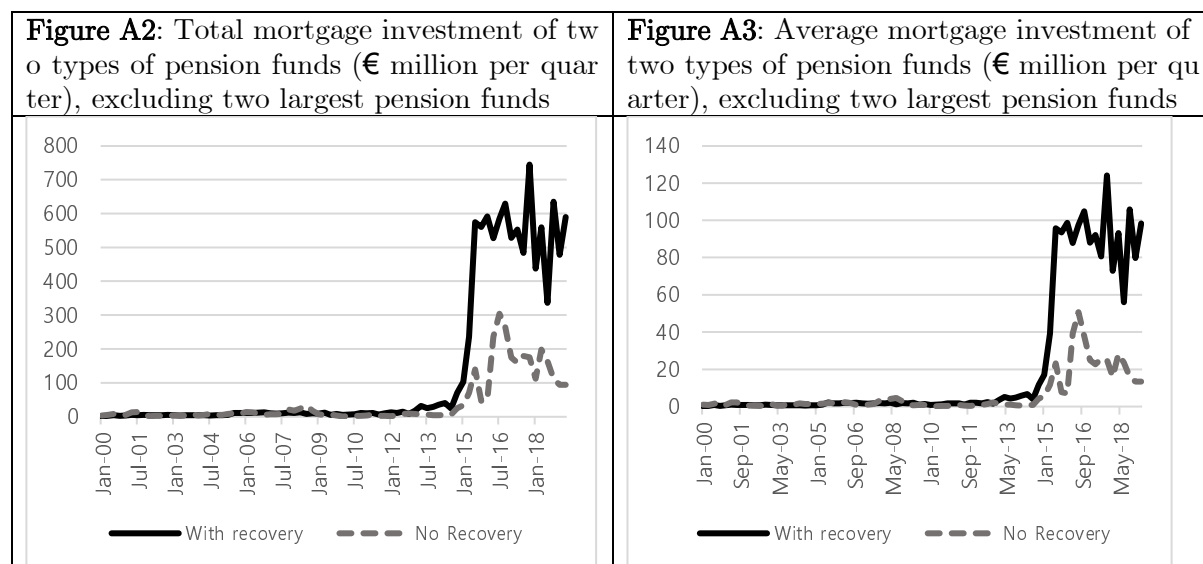
Dependent variable: mortgage investment /total assets	Estimates
After 2014(Q3)	0.0015*** (0.0004)
Fund with recovery plan	
Fund with recovery plan \times After 2014 Q3 (β_1)	0.0006 (0.0004)
Negative difference in funding ratio in 2008	
Positive difference in funding ratio in 2008	
Negative difference in funding ratio _{t-4}	0.0006
Positive difference in funding ratio _{t-4}	0.0002
Interest rate change _{t-1}	0.0002
Equity change _{t-1}	0.0004
Log of Total assets	0.0141***
Log of Total assets (squared)	-0.0003***
Log of Total number of participants $\times 10^4$	0.0015
Log of Total number of participants $\times 10^4$ (squared)	-0.0001
Share of active participants	-0.0003
Share of low-LTV loans (below 100)	-0.0005***
Share of loans with NHG	0.0002*
Share of age of borrowers below 40	-0.0004**
Share of long maturity	0.0002
Share of amortizing loans	-0.0017***
Share of negative changes in collateral	-0.0002
Constant	-0.1671***
Pension funds fixed effects	Yes
Number of Observations	1,048
Number of Funds	15

Explanatory Note: In Table 7 (robustness checks), we tackle the skewness of mortgage investments due to the presence of two particularly large pension funds in the Netherlands (that we excluded in several checks). Here, we revert this check by including again the two funds that skew the distribution of total assets. We divide the dependent variable by total assets as in Panel D3, but including back the two largest funds. The results show that β_1 is no longer significant (not even if we drop total asset as an explanatory variable) indirectly confirming that skewness needed to be checked for. Source: Mercurius data (2019q2) of DNB, sample period from 2000q1 to 2019q2, own computations. Clustered standard errors at pension fund level in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

Figure A1: mortgage underwriting by pension funds by origination quarter as observed in 2017q4 and 2019q2.



Explanatory note: We report a comparison of the time path of underwriting as it appeared in 2019q2 and 2017q4. The figure shows almost overlapping patterns indicating little dynamic selection. Thus, most loans added in the period elapsing between 2017q4 and 2019q2 are entirely new, nor relabeled from previous quarters. Source: Mercurius data (2017q4 and 2019q2) of DNB, sample period from 2010q1 to 2019q2, own computations.



Explanatory note: Here we replicate Figures 9 and 10 in the paper dropping the two largest pension funds in the data, in order to correct for fund size. We still observe the key pattern described in our study. Source: Mercurius data (2019q2) of DNB, sample period from 2000q1 to 2019q2, own computations.