Comparing Securitized and Balance Sheet Loans: Size Matters*

Online Appendix

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We assemble a unique dataset of commercial mortgages with information on loan characteristics at origination and subsequent performance. The most significant difference between securitized and balance sheet loans is the size of the loan. The loans in the highest loan size decile have a 43% percent chance of securitization whereas the ones in the lowest decile have only a 1% chance. This result is consistent with diversification being a key motivation for securitization. We also find that loans that require substantial monitoring are less likely to be securitized. Finally, securitized loans get resolved less quickly after defaulting.

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A Appendix

A.1 Additional Empirical Results

Table 1: Probit Estimation of Loan Securitization, Robustness

	(1)	(2)	(3)	(4)	(5)	(6)
		2005-2007 Originations Only				Ex. NYC
Constant	-1.30***	-1.43***	-3.44***	-3.64***	0.26	-3.27***
	(0.22)	(0.23)	(0.48)	(0.45)	(0.57)	(0.40)
Log Loan Amount	0.48***	0.49***	0.59***		0.40***	0.51***
	(0.04)	(0.04)	(0.06)		(0.07)	(0.06)
	12.2%	12.4%	12.6%		9.9%	8.6%
Log Lender Assets			0.14***	0.22***		
			0.03	0.03		
			3.0%	5.6%		
Loan Amt./ Lender Assets				21.10**		
				8.78		
				544%		
Development (LTV ≥1)	-1.20***	-1.20***	-1.87***	-1.79***	-1.83***	-1.31***
	(0.22)	(0.22)	(0.40)	(0.41)	(0.41)	(0.40)
	-30%	-30%	-35%	-48%	-45%	-22%
LTV	-0.20	-0.20	0.13	0.76***	0.07	-0.86**
	(0.15)	(0.15)	(0.28)	(0.27)	(0.32)	(0.34)
	-5%	-5%	3%	19%	2%	-15%
Price per Square Foot	-0.34*	-0.34*	-0.04	0.19	0.03	0.24
	(0.19)	(0.19)	(0.25)	(0.22)	(0.36)	(0.42)
	-0.0085%	-0.0086%	-0.0008%	0.0050%	0.0007%	0.0004%
CBD	-0.68***	-0.69***	-0.75***	-0.00	-0.55**	-0.37
	(0.16)	(0.16)	(0.25)	(0.21)	(0.25)	(0.23)
	-17%	-17%	-16%	-0%	-13%	-6%
Multi-building	0.26	0.25	0.60*	1.03***	0.22	0.25
	(0.17)	(0.17)	(0.32)	(0.28)	(0.29)	(0.21)
	6.5%	6.4%	12.9%	26.5%	5.5%	4.3%
Depository US Inst.		0.19**				
		0.09				
		4.7%				
Orig. Yr. FEs	Yes	Yes	Yes	Yes	Yes	Yes
MSA FEs	Yes	Yes	Yes	Yes	Yes	Yes
Prop. Age FEs (<1960, 60-80, 80-00)	Yes	Yes	Yes	Yes	Yes	Yes
Borrower Type FEs	Yes	Yes	Yes	Yes	Yes	Yes
Originator FEs	No	No	No	No	Yes	No
Number of Obs.	1306	1306	615	615	403	1120
Pseudo-R^2	23%	23%	35%	22%	37%	34%

Notes: The table contains estimates of a probit where the dependent variable takes a value of 1 if the loan is securitized and 0 otherwise (equation (2) in the text). In all six specifications, the first entry for each variable is the coefficient, the second entry (in parentheses) is the robust standard error, and the third entry is the effect of a 1 unit change in the independent variable (the other characteristics are held fixed at their actual values). In all specifications, we include year and MSA fixed effects. The specifications in columns 3 and 4 include only loans originated by depository US institutions and for which we have asset information on the lender in the quarter the loan is originated. The specification in column 5 includes only loans originated by the largest 10 originators that originate both balance sheet and CMBS loans in our sample. *** and ** denote significance at the 1% and 5% levels. Coefficients and standard errors shown on Price per Square Foot are $\times 10^3$. The specifications in columns 1-5 include all loans originated 2005-2007. The specification in column 6 includes all loans originated 2005-2012 but excludes loans on NYC property.

Table 2: Alternative Definitions of Development Loan

	(1)	(2)	(3)	(4)	(5)
Constant	-2.78***	-2.72***	-2.66***	-2.56***	-2.50***
	(0.23)	(0.23)	(0.24)	(0.24)	(0.24)
Log Loan Amount	0.48***	0.48***	0.48***	0.48***	0.52***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Development (LTV>=1, benchmark)	-1.19***				
	(0.21)				
Development (LTV>=1.05)		-1.06***			
		(0.25)			
Development (LTV>=1.1)			-1.01***		
			(0.28)		
Development (LTV>=1.15)				-0.75***	
				(0.29)	
Development (Stated Borrower Objective)					-0.90***
					(0.16)
LTV	-0.21	-0.36**	-0.45***	-0.61***	-0.82***
	(0.15)	(0.17)	(0.18)	(0.18)	(0.15)
Price per Square Foot	-0.39**	-0.41**	-0.43**	-0.44**	-0.48**
	(0.18)	(0.18)	(0.18)	(0.18)	(0.20)
CBD	-0.65***	-0.66***	-0.65***	-0.66***	-0.67***
	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)
Multi-building	0.26	0.23	0.23	0.23	0.21
	(0.16)	(0.16)	(0.15)	(0.15)	(0.16)
Orig. Yr. FEs	Yes	Yes	Yes	Yes	Yes
MSA FEs	Yes	Yes	Yes	Yes	Yes
Prop. Age FEs	Yes	Yes	Yes	Yes	Yes
Borrower Type FEs	Yes	Yes	Yes	Yes	Yes
Number of Obs.	1,962	1,962	1,962	1,962	1,962
Pseudo-R^2	0.32	0.32	0.31	0.31	0.33

Notes: The table contains estimates of a probit where the dependent variable takes a value of 1 if the loan is securitized and 0 otherwise (equation (2) in the text). In all specifications, the first entry for each variable is the coefficient and the second entry (in parentheses) is the robust standard error. In all specifications, we include year and MSA fixed effects. The specification in column 5 defines a development loan as one for which the borrower states its intention as "Redevelopment" or "Renovation" rather than one of the other options ("Investment", "Occupancy", or "Condo Conversion"). *** and ** denote significance at the 1% and 5% levels. Coefficients and standard errors shown on Price per Square Foot are $\times 10^3$.

Table 3: Probit Estimation of Loan Securitization from Structural Model, Loans Originated by Non-Depository Institutions

	(1)	(2)	(3)	(4)	(5)	(6)
		Full Sample			Non-Depository	
	$\alpha = 1$	$\alpha = 0.9$	$\alpha = 0.8$	$\alpha = 1$	$\alpha = 0.9$	$\alpha = 0.8$
Constant	-3.00***	-3.01***	-3.01***	-4.23**	-4.23**	-4.23**
	(0.25)	(0.25)	(0.25)	(1.81)	(1.81)	(1.81)
Log Loan Amount	0.50***	0.50***	0.50***	0.34***	0.34***	0.34***
	(0.04)	(0.04)	(0.04)	(0.07)	(0.07)	(0.07)
Development (LTV $\geq$ 1)	-1.22***	-1.23***	-1.23***	-0.92**	-0.92**	-0.93**
	(0.25)	(0.25)	(0.25)	(0.38)	(0.38)	(0.39)
LTV	-0.23	-0.23	-0.22	-0.47	-0.47	-0.46
	(0.15)	(0.15)	(0.15)	(0.32)	(0.32)	(0.32)
Price per Square Foot	-0.42**	-0.43**	-0.43**	-0.39	-0.40	-0.41
	(0.19)	(0.19)	(0.19)	(0.37)	(0.38)	(0.38)
CBD	-0.67***	-0.67***	-0.67***	-0.37	-0.37	-0.36
	(0.16)	(0.16)	(0.16)	(0.30)	(0.31)	(0.31)
Multi-building	0.25	0.25	0.25	0.12	0.12	0.12
	(0.16)	(0.16)	(0.16)	(0.36)	(0.36)	(0.36)
Depository US Inst.	0.22***	0.22***	0.22***			
	(0.08)	(0.08)	(0.08)			
$\hat{\varepsilon}_{i,t}^{DISTRESS}$	0.0368	-0.0017	-0.0483	-0.0598	-0.1150	-0.1905
	(0.0706)	(0.0735)	(0.0768)	(0.1590)	(0.2936)	(0.6382)
Orig. Yr. FEs (2005, 2006, and 2007)	Yes	Yes	Yes	Yes	Yes	Yes
MSA FEs	Yes	Yes	Yes	Yes	Yes	Yes
Prop. Age FEs (<1960, 60-80, 80-00)	Yes	Yes	Yes	Yes	Yes	Yes
Borrower Type FEs	Yes	Yes	Yes	Yes	Yes	Yes
Number of Obs.	1962	1962	1962	652	652	652
Pseudo-R^2	34%	34%	34%	32%	32%	33%

Notes: The table contains estimates of a probit where the dependent variable takes a value of 1 if the loan is securitized and 0 otherwise (equation (3) in the text). The independent variables $x_{i,t-1}$ are the same as in Table 3. We identify the distress variable $\varepsilon_{i,t}^{DISTRESS}$ using default rates of the loans (see section 4) under the assumptions about the value of α stated. The assumption that $\alpha = 1$ corresponds to no difference in the likelihood of distressed CMBS loans entering into default relative to balance sheet loans. Values of $\alpha < 1$ imply that distressed CMBS loans are more likely to default than distressed balance sheet loans. The estimates are obtained from a pooled dataset of all loans in our January 2005 to April 2012 sample. In all specifications, the first entry for each variable is the coefficient and the second entry (in parentheses) is the robust standard error. Standard errors are estimated using nonparametric bootstrap with 500 replications to take into account the fact that $\varepsilon_{i,t}^{DISTRESS}$ was estimated rather than observed. *** and ** denote significance at the 1% and 5% levels. Coefficients and standard errors shown on Price per Square Foot are $\times 10^3$.

A.2 Estimation Details

We have the index model:

$$\begin{aligned}
\Pr\left(D_{i,t+1}=1\right) &= \left(CMBS_{i,t}+\alpha\left(1-CMBS_{i,t}\right)\right)\Pr\left(\tilde{x}_{i,t-1}\eta+\varepsilon_{i,t+1}^{DISTRESS}>0\right) \\
&= \left(CMBS_{i,t-1}+\alpha\left(1-CMBS_{i,t-1}\right)\right)F\left(\tilde{x}_{i,t-1}\eta\right).
\end{aligned}$$

assuming that $\varepsilon_{i,t+1}^{DISTRESS}$ has a symmetric cumulative distribution function $F(\cdot)$.

The density of $D_{i,t+1}$ given $\tilde{x}_{i,t-1}$, η, α, and $CMBS_{i,t}$ is thus

$$f\left(D_{i,t+1}|\tilde{x}_{i,t-1},\eta,\alpha\right)=\left\{\begin{array}{c}
\left[F\left(\tilde{x}_{i,t-1}\eta\right)\right]^{D_{i,t+1}}\left[1-F\left(\tilde{x}_{i,t-1}\eta\right)\right]^{1-D_{i,t+1}}CMBS_{i,t} \\
\left[\alpha F\left(\tilde{x}_{i,t-1}\eta\right)\right]^{D_{i,t+1}}\left[1-\alpha F\left(\tilde{x}_{i,t-1}\eta\right)\right]^{1-D_{i,t+1}}\left(1-CMBS_{i,t}\right)
\end{array}\right\}$$

so the log likelihood of observation i is

$$\begin{aligned}
\ell_i\left(\eta\right) &= D_{i,t+1}\ln\left\{\left[CMBS_{i,t}+\alpha\left(1-CMBS_{i,t}\right)\right]F\left(\tilde{x}_{i,t-1}\eta\right)\right\} \\
&\quad +\left(1-D_{i,t+1}\right)\ln\left\{1-\left[CMBS_{i,t}+\alpha\left(1-CMBS_{i,t}\right)\right]F\left(\tilde{x}_{i,t-1}\eta\right)\right\}
\end{aligned}$$

and grouping observations by their securitization status we can write the log likelihood for the sample as

$$\begin{aligned}
\mathcal{L}\left(\eta\right) &= \sum_{i=1}^{N_{CMBS}}\left\{D_{i,t+1}\ln F\left(\tilde{x}_{i,t-1}\eta\right)+\left(1-D_{i,t+1}\right)\ln\left(1-F\left(\tilde{x}_{i,t-1}\eta\right)\right)\right\} \\
&\quad +\sum_{i=1}^{N_{BAL.SHEET}}\left\{D_{i,t+1}\ln\left[\alpha F\left(\tilde{x}_{i,t-1}\eta\right)\right]+\left(1-D_{i,t+1}\right)\ln\left(1-\alpha F\left(\tilde{x}_{i,t-1}\eta\right)\right)\right\}
\end{aligned}$$

which can be estimated using maximum likelihood.

We can thus take $\hat{\varepsilon}_{i,t+1}^{DISTRESS}$ as an estimate of $\varepsilon_{i,t}^{DISTRESS}$ to estimate (**??**). We follow Chesher and Irish (1987) in computing the generalized residuals as the derivative of the log-likelihood of each observation with respect to the constant term, i.e.,

$$
\begin{aligned}
\hat{\varepsilon}_{i,t+1} &= E\left(\varepsilon_{i,t+1}^{DISTRESS} | D_{i,t+1}, \tilde{x}_{i,t-1}, \eta, \alpha, CMBS_{i,t}\right) \\
&= \frac{\partial \ell_i(\eta)}{\partial \eta} \\
&= \left\{ \begin{array}{c} \frac{D_{i,t+1} f(\tilde{x}_{i,t-1}\eta)}{F(\tilde{x}_{i,t-1}\eta)} + \frac{-(1-D_{i,t+1}) f(\tilde{x}_{i,t-1}\eta)}{1-F(\tilde{x}_{i,t-1}\eta)} CMBS_{i,t} \\ \frac{D_{i,t+1} f(\tilde{x}_{i,t-1}\eta)}{F(\tilde{x}_{i,t-1}\eta)} + \frac{-(1-D_{i,t+1}) \alpha f(\tilde{x}_{i,t-1}\eta)}{1-\alpha F(\tilde{x}_{i,t-1}\eta)} (1 - CMBS_{i,t}) \end{array} \right\} \\
&= \left\{ \begin{array}{c} \frac{(D_{i,t+1} - F(\tilde{x}_{i,t-1}\eta)) f(\tilde{x}_{i,t-1}\eta)}{F(\tilde{x}_{i,t-1}\eta)[1-F(\tilde{x}_{i,t-1}\eta)]} CMBS_{i,t} \\ \frac{(D_{i,t+1} - \alpha F(\tilde{x}_{i,t-1}\eta)) f(\tilde{x}_{i,t-1}\eta)}{F(\tilde{x}_{i,t-1}\eta)[1-\alpha F(\tilde{x}_{i,t-1}\eta)]} (1 - CMBS_{i,t}) \end{array} \right\} \qquad (1)
\end{aligned}
$$

See also Cox and Snell (1968), Pagan and Vella (1989), and Greene (2000, pp. 916-917) for discussions of generalized residuals. Intuitively, the effect of α in (1) is to increase the residual for balance sheet loans that do not default. If $\alpha < 1$, the balance sheet loans had on average higher risk than what we observe purely from the default and the factor α corrects accordingly.