Accounting, Capital Requirements, and Financial Stability

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Agenda

- <u>Background</u>: Ryan (2017) and Dou, Ryan (2017) essays and also Acharya, Ryan (2016)
  - Financial stability, banks, bank regulation, bank accounting
  - Hurdles to empirical identification of the effects of bank accounting on stability
  - Securitization structures and accounting
  - Financial crisis and changes in accounting rules effective in 2010
- <u>Main paper</u>: Dou, Ryan, Xie (2016)
  - Research design issues and approach
  - Hypotheses
  - Empirics
  - Revisions for second round
  - Conclusions

BACKGROUND: FINANCIAL STABILITY, BANKS, AND BANK REGULATION

Financial Stability and Banks

- <u>Financial stability</u>: the consistent ability of firms to finance their positive npv projects across the economic cycle

- Banks help ensure stability as the primary backstop providers of liquidity and issuers of federally insured deposits

Financial Stability and Banks 2

- These roles are compromised when banks accumulate
  - Debt overhangs (Jensen and Meckling 1976; Myers 1977)
  - Risk overhangs (Gron and Winton 2001)
- These overhangs cause banks to exhibit various stability-deteriorating behaviors
  - Debt overhangs yield "gambling for resurrection" and underinvestment in projects that primarily benefit debtholders
  - Risk overhangs yield unwillingness to assume more of the affected exposures
- Limiting banks' overhangs is critical to ensuring stability

How Can Bank Accounting Reduce Banks' Overhangs and Enhance Stability?

- Affect calculation of regulatory capital ratios
  - Dou, Ryan, Xie (2016) examine in securitization accounting setting
- Provide accurate/timely information to market participants and regulators
- Require banks to understand their exposures better

Regulatory Capital Ratios

- A measure of owners' equity divided by a measure of (possibly risk-weighted) assets.
  - Levels of the ratios are reduced by
    - More conservative accounting
    - On- rather than off-balance sheet accounting
  - Volatility of ratios may be increased or decreased by fuller recognition of unrealized gains and losses
    - Capture banks' asset-liability management and other forms of economic hedging?

Regulatory Capital Ratios 2

- Lower capital ratios may cause banks to
    - Reduce loan origination
    - Sell assets
    - Issue capital
- Empirical evidence that on average banks tend to reduce assets, not issue capital (Adrian and Shin 201X)

HURDLES TO THE EMPIRICAL IDENTIFICATION OF THE EFFECTS OF BANK ACCOUNTING ON STABILITY

Correlated Omitted Variables

- Need to distinguish the effects of changes over time or variation across banks in accounting from other changes around the same time and correlated bank characteristics, respectively
  - Financial crisis both motivated the 2010 changes in securitization accounting and directly affected securitization banks
  - Stronger, better-managed banks tend to make better accounting choices and better risk management decisions

Time Inconsistency

- Incorporating economic volatility into accounting numbers should improve banks' ex ante incentives but may ex post deteriorate their reported solvency and liquidity

Need Proxy for Loan Supply

- Bank accounting affects stability through banks' supply of loans, not borrowers' demand for loans

  - Dou, Ryan, Xie (2016) use loan-level HMDA mortgage application, acceptance, and sale data to disentangle loan supply from loan demand
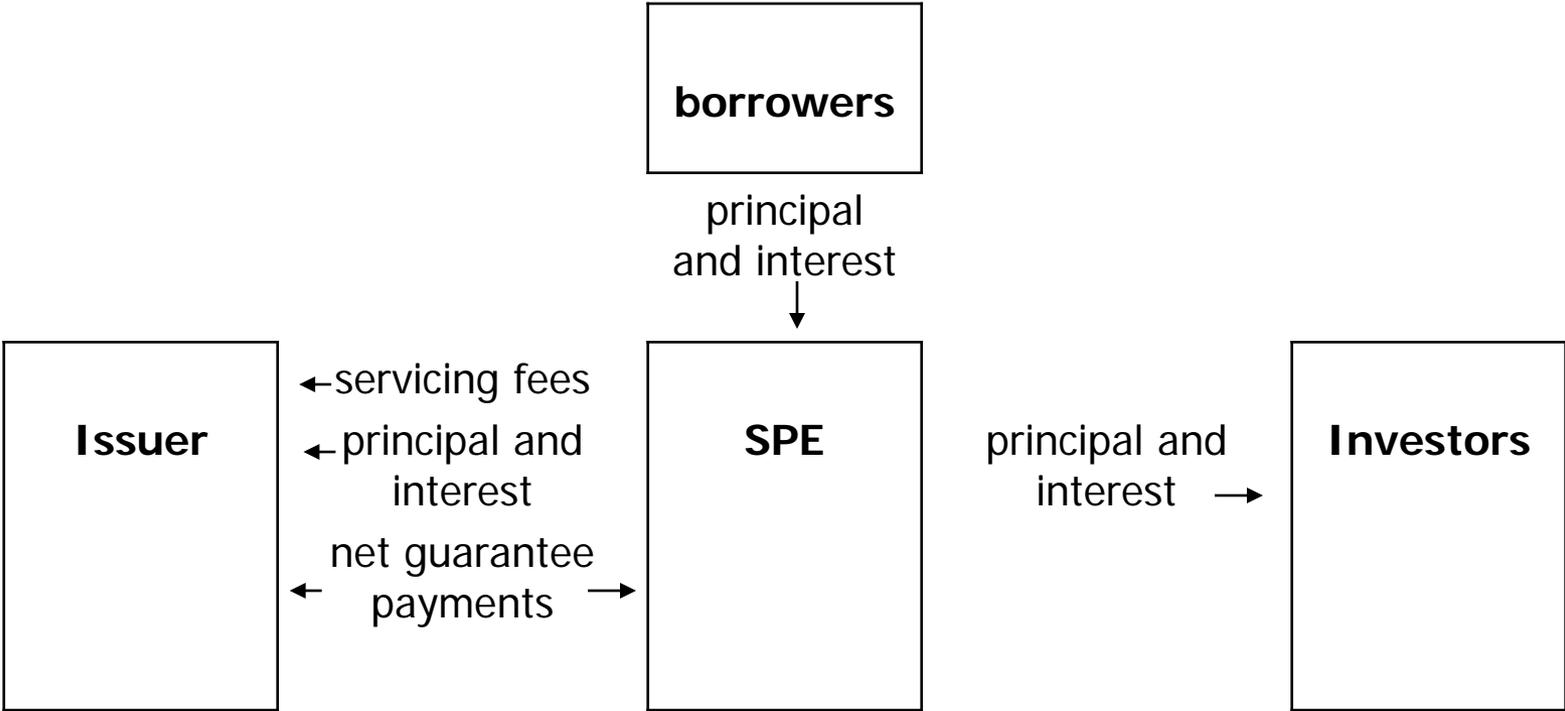
BACKGROUND: SECURITIZATION STRUCTURES AND ACCOUNTING

Picture of Simple Securitization at Initiation

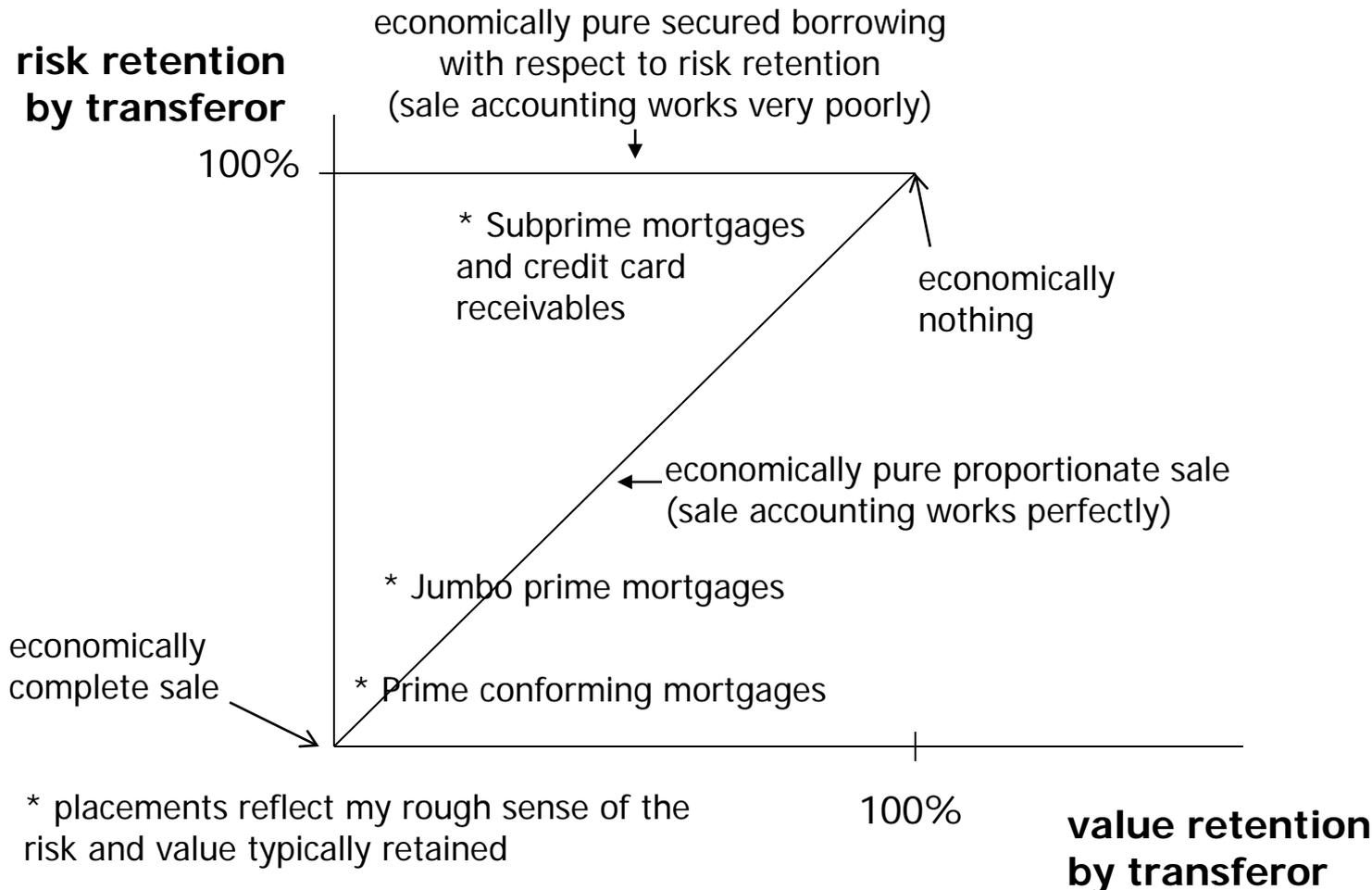| Issuer | ← cash
← servicing rights
← retained securities
guarantee →
financial assets → | SPE | ←cash
sold securities → | Investors |

Accounting question 1: Does the issuer account for the transfer of financial assets as a sale of the assets to the SPE or as a borrowing secured by the assets?

Accounting question 2: Does the issuer (or the sponsor in ABCP securitizations) consolidate the SPE?

Picture of Simple Securitization after Initiation

How to Think About the Economics of and Accounting for Securitizations

risk retention by transferor

economically pure secured borrowing with respect to risk retention (sale accounting works very poorly)

100%

* Subprime mortgages and credit card receivables

economically nothing

economically pure proportionate sale (sale accounting works perfectly)

* Jumbo prime mortgages

economically complete sale

* Prime conforming mortgages

* placements reflect my rough sense of the risk and value typically retained

100%

value retention by transferor

FAS 140 and FIN 46(R)

- Prior to their amendment by FAS 166/167 effective in 2010, these standards allowed transferors

  – To account for the vast majority of securitizations as sales (FAS 140)

  – Not to consolidate the securitization SPEs, even when they retained most of the SPEs' risks (FIN 46(R))

- Yielded off-balance sheet accounting

FAS 140 and FIN 46(R) 2

- Two main problems with these standards, both related to SPE consolidation:
  - Notion of qualifying special purpose entities (QSPEs) immune from consolidation by the transferor (FAS 140) or most other parties (FIN 46(R))
    - Truly passive? Limited activities? Distinct from transferor or sponsor?
  - FIN 46 (R)'s quantitative approach (>50% of risk and rewards) to variable interest entity (VIE) consolidation
    - Led to bright-line structuring, such as sale of "expected loss notes"

The Financial Crisis

- Revealed the (known) fiction of QSPEs
  - Transferors and ABCP sponsors provided voluntary credit or liquidity support to ABCP conduits, structured investment vehicles, credit card master trusts…
  - Transferors repurchased transferred assets due to (credibly alleged) representation and warranty violations
- Losses borne by transferors and ABCP sponsors far exceeded the magnitude of the expected loss notes purchased by third parties

FAS 166 and FAS 167

- Most important FASB standards directly motivated by the financial crisis
- FAS 166/167 eliminated QSPEs
- FAS 167 requires a party to consolidate a VIE if that party has the
  - "Power to direct the activities...that most significantly impact the entity's economic performance"
  - "Obligation to absorb losses of the entity that could potentially be significant"
    - Qualitative
- Effective January 1, 2010 for December FYE firms

Magnitude of Effects of FAS 166/167

- 27 of the U.S. bank holding companies ("banks") in our sample consolidated VIEs holding an estimated $765 billion of assets at end of 2010, 5.3% of banking industry assets
  - Mostly ABCP conduits and credit card master trusts Big enough to significantly reduce the capital adequacy of and thus constrain the loan origination and sale activities by the affected banks
  - At least until they take actions to mitigate these effects

DOU, RYAN, XIE (2016)

Ways that Dou, Ryan, Xie (2016) Distinguish the Crisis from FAS 166/167

- Difference-in-differences research design
  - Compare changes in the associations of banks' mortgage origination or mortgage sale rates with their on-balance sheet securitized assets (treatment) and off-balance sheet securitized assets (control) around 2010
- Falsification tests
  - Assign 2010 or 2011 amount of SPE consolidation to 2008-2009 hypothetical post-FAS 166/167 period
- Cross-sectional partition based on banks' regulatory capital adequacy

Mortgage Origination Hypothesis Development

- New VIE consolidation under FAS 166/167 may
  - Lead banks to reduce lending because
    - It reduces regulatory capital ratios through increased assets and allowances for loan losses
    - Banks increase regulatory ratios back to target levels by reducing assets, not increasing equity
  - Have no effect on banks' lending because
    - It has no effect on banks' economic risks
    - Market participants treat securitizations in which banks bear sufficient credit risks as on-balance sheet
    - Banks maintain capital adequacy buffers

Mortgage Origination Hypothesis Development 2

- We expect the former reasons to have some effect, but banks to take actions over time to mitigate that effect

- **H1:** FAS 166/167 are associated with reduced mortgage origination by banks that newly consolidate VIEs under the standards, and this effect attenuates over time.

Mortgage Sale
Hypothesis Development

- New VIE consolidation under FAS 166/167 may

  - Lead banks to increase mortgage sales by decreasing the amount of loans that banks' regulatory capital can support

  - Have no effect on banks' securitization activity because

    - Banks maintain adequate capital adequacy buffers
    - Governmental and conforming (but not nonagency) mortgage securitization remained robust through crisis

Mortgage Sale
Hypothesis Development 2

- We expect the former reason to have some effect, but banks to take actions over time to mitigate this effect

- **H2:** FAS 166/167 are associated with increased loan sales by banks that newly consolidate VIEs under the standards, and this effect attenuates over time

Data and Samples

- ## Loan-level mortgage origination sample to test H1

  - ### HMDA loan-level data from 2005-2014

    - Applications, approval decisions, location, borrower financial and demographic characteristics
    - 2005-2009 pre-FAS 166/167, 2010-2015 post-FAS 166/167
    - Stratified random sample of 4.9 mm mortgage applications for 6027 bank-years and 1029 banks

  - ### Matched to bank-level financial data on FR Y-9C filings

    - 38 "treatment" banks consolidate VIEs under FAS 166/167 in 2011
    - 991 control banks that do not securitize or securitize but do not consolidate securitization entities

Data and Samples 2

- Similarly constructed loan-level mortgage sale sample to test H2
  - Stratified random sample of 4.0 mm originated mortgages for 4475 bank-years and 862 banks
    - 33 "treatment" banks and 829 control banks

Key Variables

Main variables of interest

- **Approval**: Equals 1 (0) if a mortgage application is approved (denied).
- **Sold**: Equals 1 (0) if a mortgage is sold (not sold) in the calendar year of origination.
- **Consolidated_VIE_Share**: Assets held by consolidated VIEs under FAS 166/167, scaled by the difference between total assets (bhck2170) and assets held by consolidated VIEs under FAS 166/167. Assets held by consolidated VIEs under FAS 166/167 is measured as the sum of bhckj981 through bhckj998, and bhckk003 through bhckk014.

Bank-level control variables in the lending analysis

- **OffBS_Securitization**: Principal balance of off-balance-sheet assets sold and securitized with servicing retained or with recourse or other seller-provided credit enhancements (the sum of bhckb705 through bhckb711), scaled by the difference between total assets and assets held by consolidated VIEs under FAS 166/167.
- **Post**: Equals 1 (0) for the post-FAS 166/167 period 2010-2014 (pre-FAS 166/167 period 2005-2009).

Assets in Banks' Consolidated VIEs

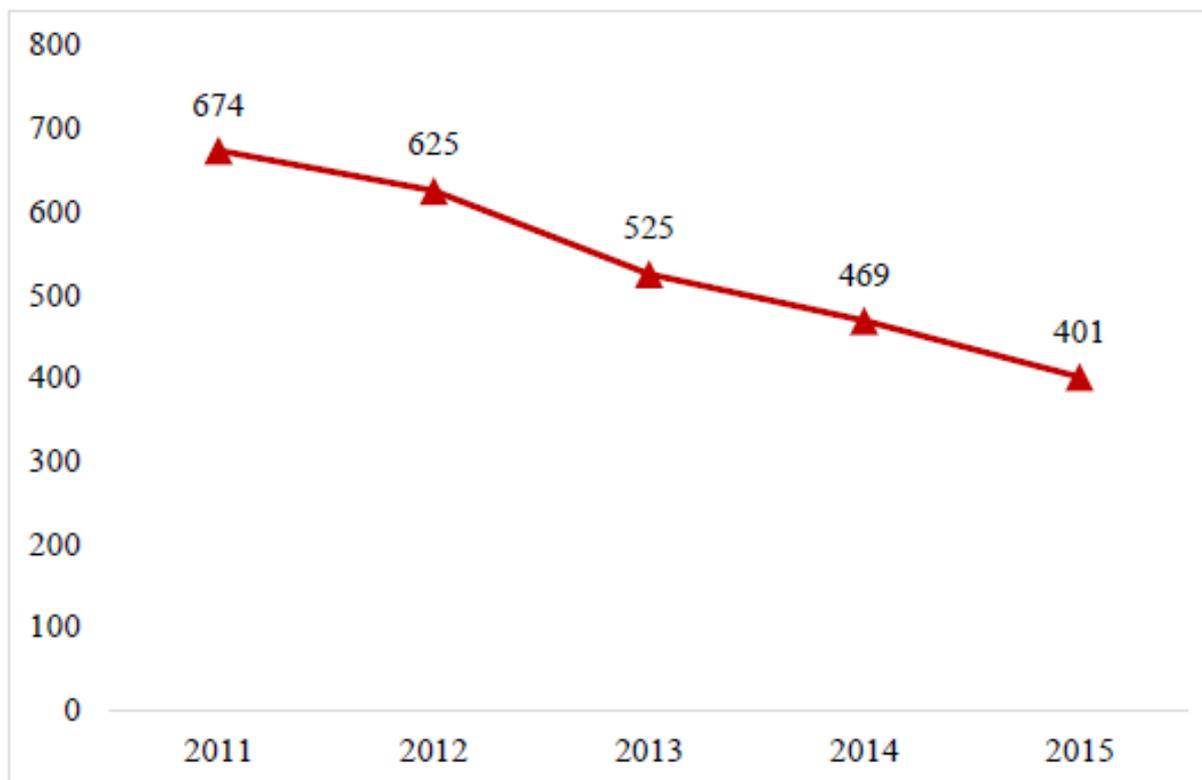Figure 1: Total Assets Held by the U.S. Banking Industry's Consolidated VIEs in 2011-2015

Figure 1 depicts the total assets (in $ billion) held by the VIEs consolidated by all U.S. bank holding companies with FR Y-9C filings in 2011 in each year from 2011 to 2015. The effective year of 2010 for FAS 166/167 is excluded because data on assets held by consolidated VIEs are not available in FR Y-9C filings and available only for public banks that disclose the data in 2010 Form 10-K filings.

Model to Test H1

$$Approval_{i,j,t} = \alpha_0 + \alpha_1 Consolidated\_VIE\_Share_{i,t} + \alpha_2 OffBS\_Securitization_{i,t}$$
$$+ \alpha_3 OffBS\_Securitization_{i,t} \times Post \qquad (1)$$
$$+ \sum \alpha_k \, Bank\text{-}level \; Control \; Variable^n{}_{i,t-1} + \sum \alpha_l \, Loan\text{-}level \; Control \; Variable^m{}_{j,t-1}$$
$$+ Bank \; Fixed \; Effects + Year \times MSA \; Fixed \; Effects$$
$$+ Year \times Loan\text{-}characteristics \; Fixed \; Effects + \varepsilon_{i,j,t}$$

Test both the effect of consolidated VIEs relative to no securitization:

$\qquad \alpha_1$

and relative to unconsolidated VIEs (i.e., difference-in-differences):

$\qquad \alpha_1 - (\alpha_2 + \alpha_3)$

Fixed effects are a key part of difference-in-differences research design

Model to Test H2

$$Sold_{i,j,t} = \alpha_0 + \alpha_1 Consolidated\_VIE\_Share_{i,t} + \alpha_2 OffBS\_Securitization_{i,t}$$
$$+ \alpha_3 OffBS\_Securitization_{i,t} \times Post \qquad (2)$$
$$+ \sum \alpha_k \text{ Bank-level Control Variable}^n_{i,t-1} + \sum \alpha_l \text{ Loan-level Control Variable}^m_{j,t-1}$$
$$+ \text{ Bank Fixed Effects} + \text{Year} \times \text{MSA Fixed Effects}$$
$$+ \text{Year} \times \text{Loan-characteristics Fixed Effects} + \varepsilon_{i,j,t}$$

Test both the effect of consolidated VIEs relative to no securitization:

α_1

and relative to unconsolidated VIEs (i.e., difference-in-differences):

$\alpha_1 - (\alpha_2 + \alpha_3)$

Fixed effects are a key part of difference-in-differences research design

Test of H1: Results

Table 2. The Effect of FAS 166/167 on Bank Lending

	Dependent Variable = Approval				
	2005-2010	2005-2011	2005-2012	2005-2013	2005-2014
VARIABLES	(1)	(2)	(3)	(4)	(5)
Consolidated_VIE_Share	-0.335***	-0.446***	-0.369***	-0.336**	-0.298*
	(<0.001)	(<0.001)	(0.005)	(0.023)	(0.059)
OffBS_Securitization	0.006	-0.071	-0.055	-0.043	-0.032
	(0.919)	(0.203)	(0.304)	(0.446)	(0.536)
OffBS_Securitization × Post	0.018	0.007	0.010	0.007	0.007
	(0.472)	(0.815)	(0.733)	(0.831)	(0.851)
OffBS_Securitization +					
OffBS_Securitization × Post	0.023	-0.065	-0.045	-0.036	-0.025
	(0.687)	(0.270)	(0.297)	(0.374)	(0.376)
Difference: *Consolidated_VIE_Share − (OffBS_Securitization + OffBS_Securitization × Post)*	-0.358***	-0.382***	-0.324**	-0.300*	-0.272
	(<0.001)	(<0.001)	(0.019)	(0.052)	(0.100)

10% greater consolidation yields 3.82% lower mortgage approval rate than non-consolidation in 2011 ; effects attenuate by about one third through 2014.

Test of H2: Results

Table 3. The Effect of FAS 166/167 on Loan Sales

	Dependent Variable = *Sold*				
	2005-2010	2005-2011	2005-2012	2005-2013	2005-2014
VARIABLES	(1)	(2)	(3)	(4)	(5)
Consolidated_VIE_Share	0.828***	0.779***	0.683***	0.654***	0.556***
	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(0.006)
OffBS_Securitization	0.187*	0.197**	0.220***	0.205**	0.155**
	(0.061)	(0.019)	(0.006)	(0.015)	(0.035)
OffBS_Securitization × Post	-0.051	-0.085	-0.104	-0.077	-0.069
	(0.345)	(0.124)	(0.114)	(0.291)	(0.273)
OffBS_Securitization +					
OffBS_Securitization × Post	0.136	0.112	0.116	0.129	0.086
	(0.316)	(0.319)	(0.232)	(0.203)	(0.103)
Difference:					
Consolidated_VIE_Share −					
(OffBS_Securitization +					
OffBS_Securitization × Post)	0.692***	0.667***	0.567***	0.525***	0.470***
	(<0.001)	(<0.001)	(<0.001)	(0.001)	(0.010)

10% greater consolidation yields 6.92% higher mortgage sale rate than non-consolidation in 2010; effects attenuate by about one third through 2014.

Falsification Tests

Table 4. Falsification Tests of the Effects of FAS 166/167 on Lending and Loan Sales

	Falsification Test of Lending Effects: Dependent Variable = *Approval*		Falsification Test of Loan Sale Effects: Dependent Variable = *Sold*	
	2008–2009 as post period; value of *Consolidated_VIE_Share* in 2010 is assigned to this variable in 2008-2009	2008–2009 as post period; value of *Consolidated_VIE_Share* in 2011 is assigned to this variable in 2008-2009	2008–2009 as post period; value of *Consolidated_VIE_Share* in 2010 is assigned to this variable in 2008-2009	2008–2009 as post period; value of *Consolidated_VIE_Share* in 2011 is assigned to this variable in 2008-2009
VARIABLES	(1)	(2)	(3)	(4)
Consolidated_VIE_Share	**0.031**	**0.055**	**0.208**	**0.317**
	(0.625)	(0.547)	(0.272)	(0.227)
OffBS_Securitization	0.018	0.011	0.165	0.177
	(0.777)	(0.847)	(0.274)	(0.205)
OffBS_Securitization × Post	-0.069	-0.066	0.046	0.017
	(0.156)	(0.146)	(0.701)	(0.876)
OffBS_Securitization +				
OffBS_Securitization × Post	**-0.051**	**-0.055**	**0.211**	**0.194**
	(0.302)	(0.271)	(0.153)	(0.187)
Difference:				
Consolidated_VIE_Share −				
(OffBS_Securitization +				
OffBS_Securitization × Post)	**0.082**	**0.110**	**-0.003**	**0.124**
	(0.320)	(0.334)	(0.991)	(0.720)

Partitioning on Lagged Tier 1 Risk-Based Capital Ratio

Table 5. Partitioning on Regulatory Capital

VARIABLES	Paritioning Analysis for Lending: Dependent Variable = *Approval*		Paritioning Analysis for Loan Sales: Dependent Variable = *Sold*	
	Low capital	High capital	Low capital	High capital
	(1)	(2)	(3)	(4)
Consolidated_VIE_Share	-0.680***	-0.186	1.170***	0.488***
	(<0.001)	(0.322)	(0.004)	(0.005)
OffBS_Securitization	0.004	-0.067	0.136*	0.186***
	(0.912)	(0.265)	(0.069)	(0.008)
OffBS_Securitization × Post	0.033	0.014	-0.025	-0.180***
	(0.386)	(0.754)	(0.682)	(0.007)
OffBS_Securitization +				
OffBS_Securitization × Post	0.037	-0.053	0.112*	0.006
	(0.228)	(0.114)	(0.082)	(0.913)
Difference:				
Consolidated_VIE_Share −				
(OffBS_Securitization +				
OffBS_Securitization × Post)	-0.717***	-0.133	1.059***	0.482***
	(<0.001)	(0.509)	(0.006)	(0.003)

New Analyses for 2nd Round

- Completed analyses, results robust or strengthen
  - Partition based on the impact of VIE consolidation on capital rather than on the level of capital
  - Exclude observations with non-zero ABCP conduits
  - Include linear and interactive year dummy variables in models
  - Decompose off-balance sheet securitized loans into type of loans
    - unfortunately, data does not exist on Y-9C filings to do this for on-balance sheet loans
  - Limit mortgage origination and sale samples to
    - crisis/post crisis period 2007-2014
    - banks that consolidate some VIEs
  - Conduct bank-level mortgage origination and sale analyses incorporating dollar amount of sold loans
  - Partition based on proxies for risk of loans
  - Examine cases where market discipline is likely to be weaker vs. stronger

Conclusions

- Securitizing banks' new consolidation of securitization entities under FAS 166/167 leads to
  - Persistently reduced lending
  - Persistently increased loan sales
  - Effects
    - Economically significant
    - Robust to falsification test
    - Stronger for low regulatory capital banks