Adverse or maybe not-so-adverse Selection in the CMBS Market

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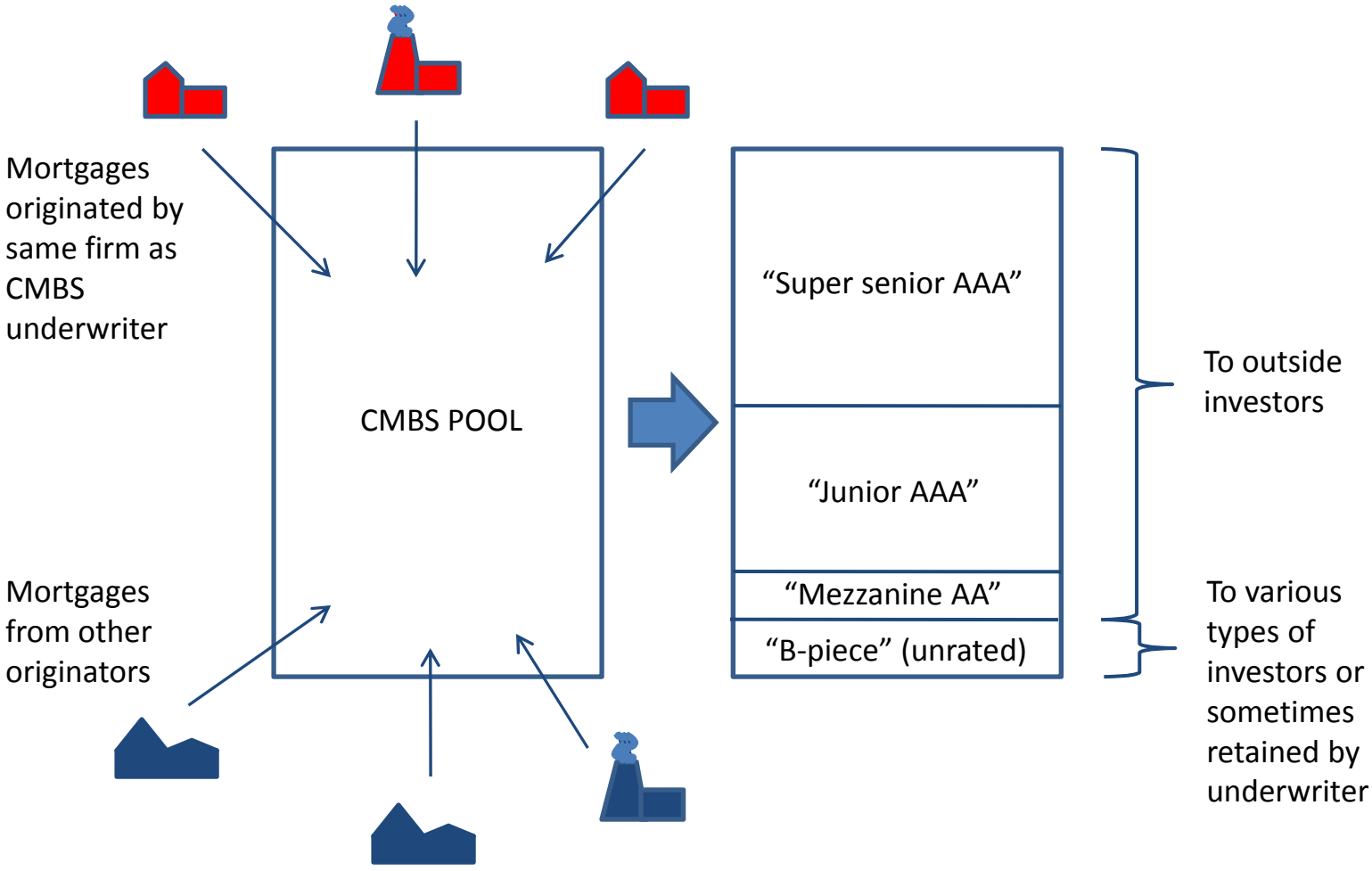
* Views expressed here do not necessarily reflect the views of the Federal Reserve System or its staff.

Introduction

- Commercial mortgages: “2nd wave” of financial crisis
  - Many loans are securitized as CMBS
  - Unprecedented delinquency levels (9.5% for securitized)
- Observers blame distorted incentives associated with securitization:
  - Loan origination
  - When CMBS deals put together (*underwriting*)
- CMBS underwriters also originate loans: choose whether to securitize *in-house* or sell to competitors.
- Opportunities for adverse selection.

CMBS Securitization



Market Participants and Data

- 500+ CMBS deals (2000-07) containing on average 125 loans
- Deal data:

  Loans in pool, tranche structure, date of deal, lead underwriter(s)
- Loan data:

  Characteristics at origination, originator,
  payment history through 07/2010
- 82% of loans originated by lead underwriters securitized in-house (i.e., in deals that they themselves underwrite).
- Also many standalone originators that don't do CMBS deals.
- Not observed: unsecuritized loans

Stylized Fact

- Loans in CMBS deals that are originated by the underwriter (in-house loans) are less likely to default:
  - 9% lower hazard, controlling for observable loan characteristics.
  - Better performance of in-house loans mainly arises in deals containing a large share of in-house loans.

Potential Drivers of In-House Effect

- Nonrandom selection:
  A. In-house vs non-in-house, conditional on securitization
     1. Underwriter has private info about loan quality: adverse selection
     2. Compensation for correlation in returns on in-house loans
  B. What's securitized

     Demand for loans by competing deals correlated with overall quality of loans that originator securitizes vs. keeps on balance sheet.

     E.g., shift in demand → proportion securitized → degree of adv. selection
- Causal effect

  More effort by underwriters/originators to maintain ex post performance.
- Disentangling drivers requires model of how deals put together.
- Possible policy ramifications: e.g., effect of requiring originators to retain a larger slice of the CMBS securities.

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Reduced Form Analysis

- Empirical distribution of default times for loans, accounting for controls.
  - Censored hazard model
  - Unobserved heterogeneity, with distribution (nonparametric) that depends on whether loan is in-house.
- Ultimately want to model portfolio returns, so also estimate the joint distribution using a copula

Reduced form estimates

- Distribution of unobserved heterogeneity shifted downward for in-house loans.

  Mean hazard ratio for in-house: 0.95

- Hazard ratio for select control variables:

  Loan-to-value: 12.0

  Rental income / monthly payments: 0.76

  Occupancy rate: 0.22

- Joint distribution: high degree of correlation within geographic regions and property types.

Structural Model

- Matching of loans $j = 1, \ldots, J$ to deals $i = 1, \ldots, I$
- J_i : portfolio for deal i
- Underwriters maximize profits statically for each deal
- Determination of gross profits from J_i :
  1. Return distribution, implied by default time distribution:
     $\{w_j\}$: exogenous loan characteristics
     → effects from reduced-form model
     $\{v_{ij}\}$: in-house status of loans endogenously determined
     → non-selection effect parameter α_0
  2. Tranching rule (exogenous function of return distribution)
  3. Demand function for tranches (exogenous).
  4. $\{z_{ij}\}$: private signals about quality of each loan
- Dependence of J_i on $\{z_{ij}\}$ captures the adverse selection.

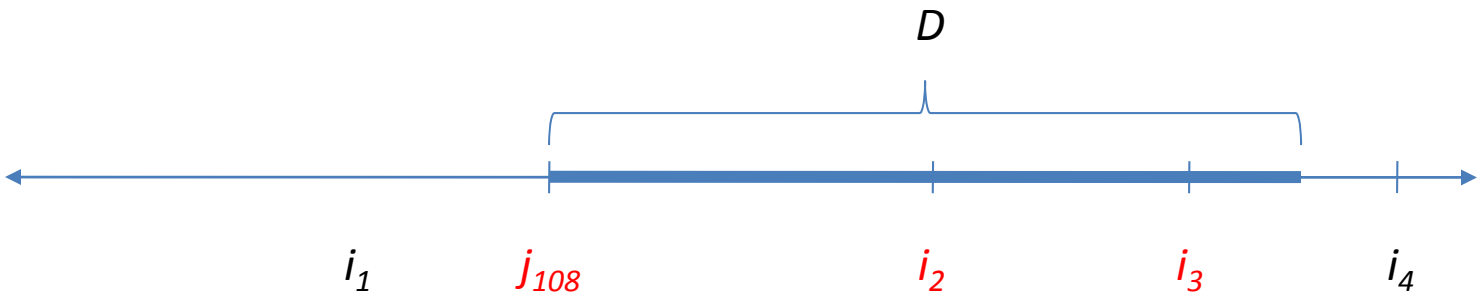
Structural Model

- Each *i* chooses J_i from *feasible set* based on potential trades with competing deals *i′*.
- *Net* profits = gross profits +/- transfer payment for each loan sold/bought.

  Transfer payment between *i* and *i′* for loan *j:*

  $$c^{ii'}{}_j = f(w_j) + \zeta^{ii'}{}_j$$

Model: *feasible* trades



Shaded segment = time interval containing other firms with which firm 3 may transact for loan 108.

Identification

- Key parameter of interest: non-selection effect of in-house, α_0.
- Selection effect = (reduced-form effect) – α_0
- Identifying α_0: exogenous variation in propensity of loans originated by *i* to go outside J_i.

  Propensity stronger if:
  - More feasible trading partners
  - Negative correlation of w_j with characteristics of loans originated by trading partners.

Inequality moments

- Necessary conditions: perturb observed portfolios by having firm i buy/sell a single loan from/to *i′*.

$$\pi(J_i) - \pi(J_i \setminus j) = r(J_i) - r(J_i \setminus j) \quad + \quad z_{ij} \quad - \quad \zeta^{ii'}{}_j \quad \geq 0$$

$$\pi(J_i) - \pi(J_i \cup j) = r(J_i) - r(J_i \cup j) \quad - \quad z_{ij} \quad + \quad \zeta^{ii'}{}_j \quad \geq 0$$

Observed Unobserved

- Pakes, Porter, Ho, Ishii (2011): find weighted linear combinations of necessary condition across firms and choice alternatives s.t. either no selection on unobservables or unobservables cancel out.

- Basic assumption: *i* has homogeneous beliefs about all loans by a given originator.

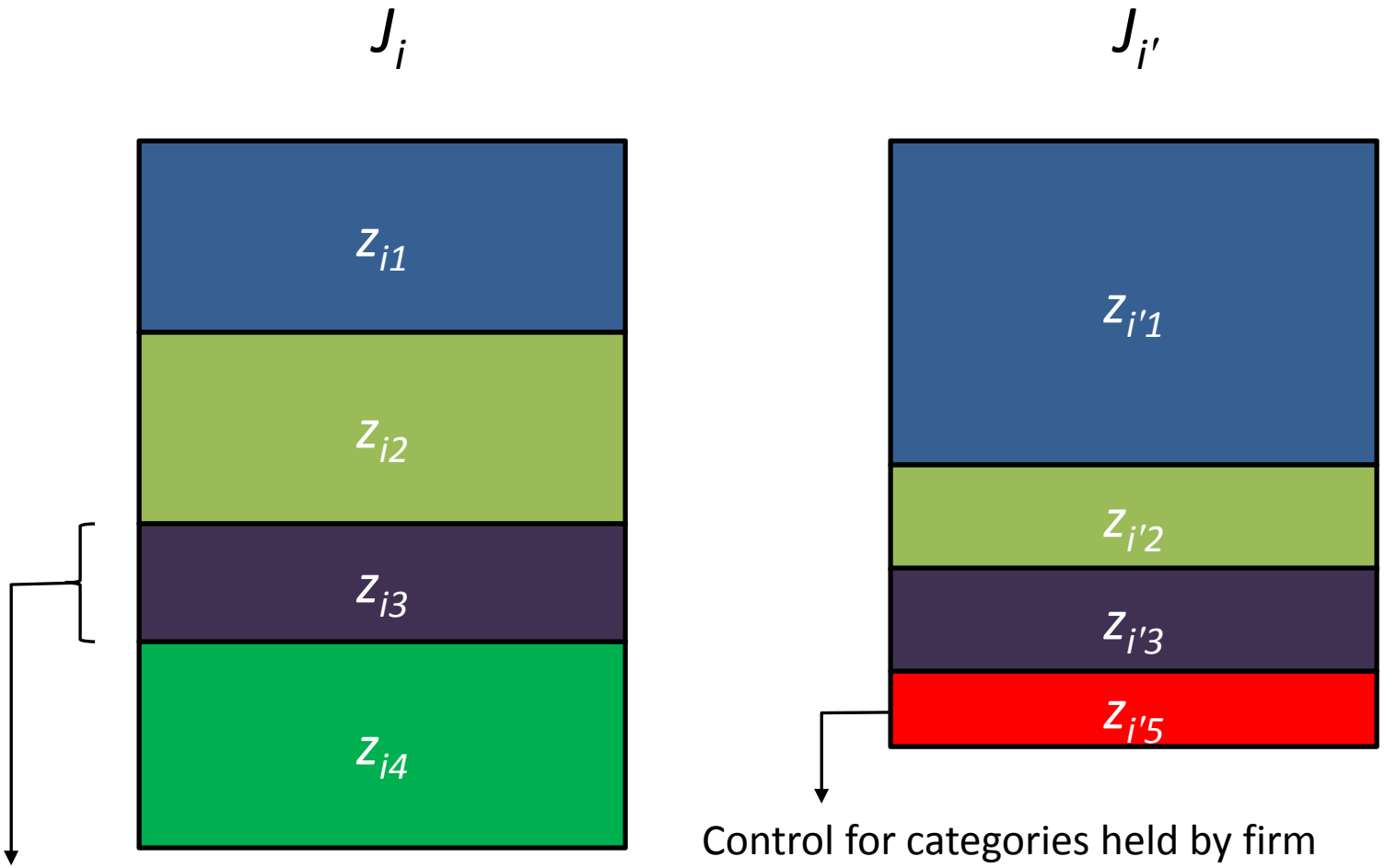
  If originator of loan $j = k(j)$,

$$z_{ij} = z_{ik(j)}, \quad \zeta^{ii'}{}_j = \zeta^{ii'}{}_{k(j)}$$

- Alternative assumption: No private information

$$z_{ij} = z_{i'j}$$

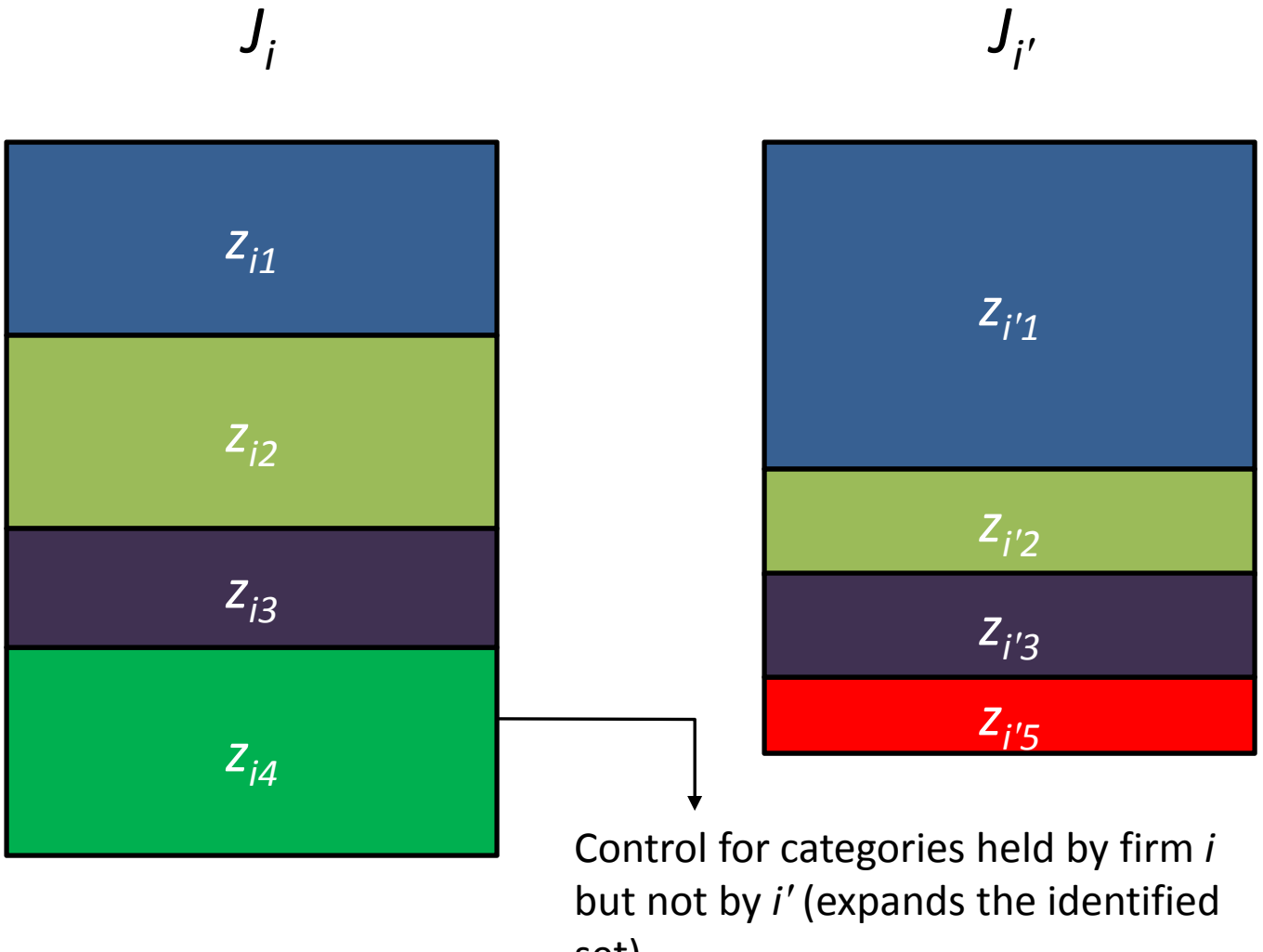
(1) Moments based on *i dropping* a loan



Weight observations by $1/n_{ik}$, where n_{ik} = #(loans by originator k).

Control for categories held by firm i' but not by i (expands the identified set).

(2) Moments based on *i adding* a loan



(3) Moments based on total gains to trade

- Exploit symmetry of transfer payments:

  What *i* pays = what *i′* receives.

  Unobserved component of transfer payments

  $(\zeta^{ii'}_{j})$ drop out.

Structural Estimates

α_0 (in-house effect on hazard)	[-0.76515	-0.76515]	[-0.76515	-0.76515]
Transfer price parameters (γ				
Transfer pmnt Constant	[1.41351	1.43801]	[1.41350	1.43808]
Cutoff seasoning	[-0.00150	0.00051]	[-0.00150	0.00051]
DSCR at issuance	[0.16020	0.16063]	[0.16020	0.16064]
No DSCR data	[0.41328	0.49205]	[0.41328	0.49211]
Occupancy at issuance	[-0.73135	-0.70820]	[-0.73135	-0.70819]
No occupancy data	[-0.68167	-0.68071]	[-0.68167	-0.68062]
Original LTV	[-0.36974	-0.36920]	[-0.36974	-0.36902]
No LTV data	[-0.27813	-0.26391]	[-0.27813	-0.26382]
Coupon Spread	[0.02435	0.02444]	[0.02435	0.02444]
Discount factor for "B-piece" cashflows				
β_{2000}	[-0.18219	0.05334]	[-0.18219	0.05947]
β_{2001}	[-0.09829	0.35459]	[-0.09829	0.36074]
β_{2002}	[-0.21023	0.35425]	[-0.21023	0.36053]
β_{2003}	[-1.17997	-0.08341]	[-1.17998	-0.07723]
β_{2004}	[-1.07939	0.99750]	[-1.07940	1.01011]
β_{2005}	[0.38461	2.25475]	[0.38460	2.26164]
β_{2006}	[2.86174	4.75258]	[2.86174	4.75936]
β_{2007}	[-1.08626	44.08948]	[-1.08632	44.09618]

> 0 means increase in hazard of default.

Implies hazard ratio of 0.46, more than accounting for the reduced-form effect.

Conclusion

- Incentive distortions in securitization markets a major concern.
- Hard to quantify selection effects w/o some structure.
- Estimate most parameters directly from data in first stage.
- Estimation using moment inequalities: don’t have to solve for full equilibrium.
- Evidence does not support better performance of in-house loans being due to selection at margin in-house versus non-in-house.