How Do Regulators Influence Mortgage Risk? Evidence from an Emerging Market

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EM Mortgage Regulation

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- Mortgage markets vary considerably across countries.
 - What are the causes of this variation?
 - What are the consequences?
 - Part of a broader research agenda on international comparative household finance.

 An important, topical question given the recent housing crisis in the developed world.

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 - Evidence from the U.S. indicates significant impacts of regulatory norms on mortgage screening (see, for example, Keys et al., 2011 *QJE*).

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- We have excellent data from an Indian mortgage provider.
 - An opportunity to learn from the time-series of innovations.

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- 2. We also find that regulation priority sector lending norms distorted the relationship between loan defaults and rate-setting.
- 3. We find evidence consistent with learning over time by the mortgage provider in the face of a rapidly changing regulatory environment.

- Beginning with a majority of fixed-rate mortgage initiations (~65%) in 1995, virtually all issuance by 2010 is variable-rate.
- Variable and fixed interest rates generally track benchmark rates.

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- Important deviations from general trends:
 - Increase in both fixed and variable rate defaults during 2001-2003, especially pronounced in fixed-rate mortgages.
 - Levelling off of defaults by 2005.
 - Pronounced spike in fixed-rate issuance by the mortgage provider in 2004, accompanied by a reduction in average fixed rate relative to variable rate.

Default Rate, 90 days past due

Seasonally adjusted using monthly dummies



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A Hazard Model for Defaults

- We estimate a hazard model to better understand the determinants of defaults.
 - Decompose time-series variation in default rates into cohort-time variation and demographic/loan characteristic variation.
- Default Indicator on Loan

 $\delta_{i,c,b,t} = FE(Branch, Cohort \times Time) + j(Dem., LoanChars) + \gamma r_{i,c,b} + e_{i,c,b}^{\delta}$

 To control for house-price movements, we include (in *LoanChars*) branch-level house-price appreciation up to time *t* from the beginning of the sample period.

Decomposing Default-Rate Variation Variable-Rate Loans



Decomposing 90 Day Delinquency Rates

 Default spike in 2002, 2003, not explained by loan or borrower characteristics, house prices, or GDP growth.

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- Change in classification of NPAs in 2004 and 2005 90-day delinquencies.

Cohort-Time Fixed Effects, Which Loans? Variable-Rate Loans



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More Regulatory Norms: Priority Sector Lending

- Low-cost housing is one component of "priority sector lending" (PSL) norms mandated by the RBI.
 - Quantity targets and price subsidies for "qualified" lending.
- Quantity:
 - ▶ 40% of net bank credit for domestic banks (32% for foreign banks)

- ▶ 3% of net new deposits of public sector banks into housing.
 - HFCs indirectly subject to PSL quantity norms.
- Price subsidies: Interest-rate "subventions."
- Compulsory low-interest lending to rural agriculture if you violate targets...!

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 - Distorting effect of subsidies should move bubbles north-west (low initial interest rate, high lifetime default rate).

Fixed-Rate Loans, 1995-1999



Initial Interest Rate Above Initial Interest Rate on Smallest Non-Subsidized Loans

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Variable-Rate Loans, 1995-1999



1995-1999 Variable Rate Mortgages

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Learning by the Mortgage Provider

- We measure:
- 1. Cross-sectional correlation in each cohort of initial interest rates and lifetime default indicator.

1.1 To what extent are rates set in line with rational forecasts of default?

- 2. *Rolling* cross-sectional correlation between fitted initial interest rates and fitted lifetime default indicator
 - 2.1 Is mortgage provider using measurable loan and borrower characteristics "correctly"?
- Idea: correlations rise if the mortage provider is learning, since interest rates increasingly set to account for subsequent defaults.

Cross-Sectional Variation in Initial Rates

Variable Rate Mortgages



Correlations, Variable Rate Mortgages



- • Corr(Fitted Initial Rates, Fitted 90d Defaults)
- -- Corr(Fitted Initial Rates, Fitted 90d Defaults), Pooled Model

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The Early 2000s

- Significant increase in correlations of initial interest rates and lifetime default rates over the early 2000s.
- Substantial increase in the cross-sectional standard deviation of initial (mostly variable) rates.
 - Mostly from higher coefficients on demographic variables (no great change in variation of demographics).
- Which demographics/loan attributes are they learning about?
 - Variable rate loans: Loan size (some evidence for loan-to-cost and loan-to-income ratios).

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• Fixed rate loans: Loan term (size also important).

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Priority-sector lending norms.

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 Mortgage provider seemingly learning fast in a difficult environment.

Share of Variable Rate Loans in Total Issuance



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Initial Fixed and Variable Rates for Mortgages

Average across all Loans issued in each Cohort



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