

# Specialisation in mortgage risk under Basel II

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# Motivation

- ▶ Residential **mortgage market**
  - ▶ Epicentre of financial crisis (Mian and Sufi, 2015)
  - ▶ Large share of total bank lending (Jordà et al, 2016)

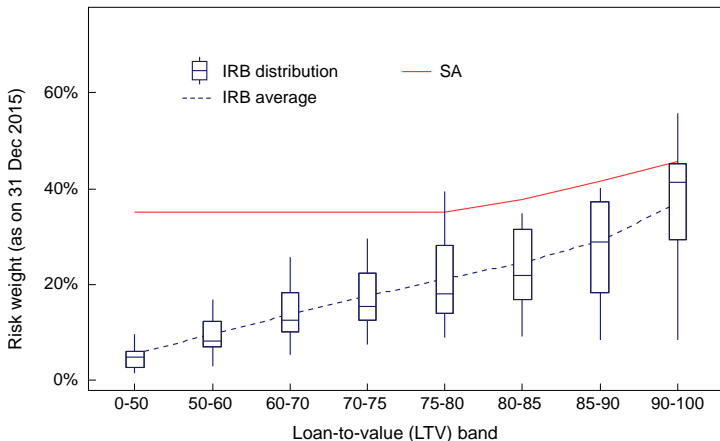
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- ▶ Methodology-driven heterogeneity in **capital requirements**
  - ▶ BCBS (2016)

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- ▶ Methodology-driven heterogeneity in **capital requirements**
  - ▶ BCBS (2016)
- ▶ **Specialization** → distribution of **risk**
  - ▶ Current debate on reforms of Basel II-III

## Heterogeneity in risk weights - UK mortgages



- ▶  $K_{min} = RWA \cdot KReq$
- ▶ Two approaches: models (IRB) and standardised (SA)

# Do regulatory risk models affect market outcomes?

- ▶ **Mechanism:** Similar risk, different methodologies → capital requirements → specialisation
- ▶ **Theory:** Repullo & Suarez (2004)
- ▶ **Empirics:** Behn et al (2016a & 2016b) for corporate lending in Germany

# This paper

- ▶ **Identification challenge:** isolating effect of methodology
  - ▶ one borrower, many lenders (Khwaja Mian, 2008)
  - ▶ mortgages: one borrower, one lender → ?

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- ▶ **Micro-data** on 7 million UK mortgages (2005-2015)

⇒ Two **identification strategies** based on:

1. Quasi-experimental variation from switch to Basel II
2. New LTV-level risk weight data for post-Basel II



# Outline

Identification

Results

Policy

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Identification

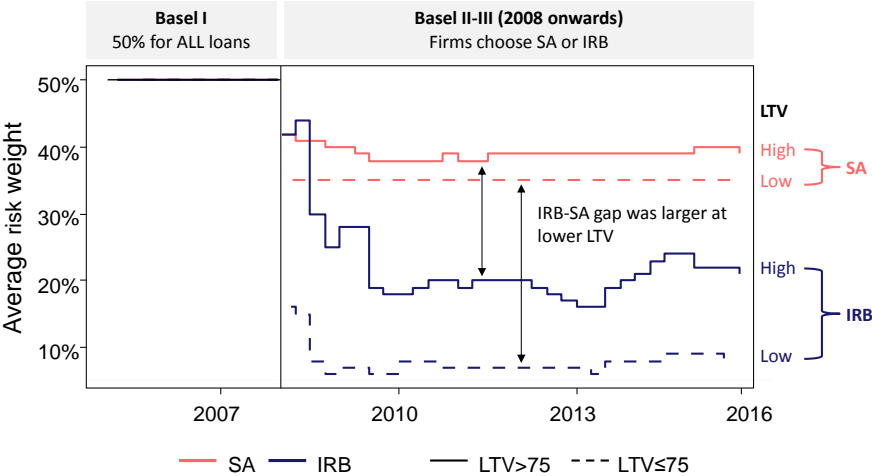
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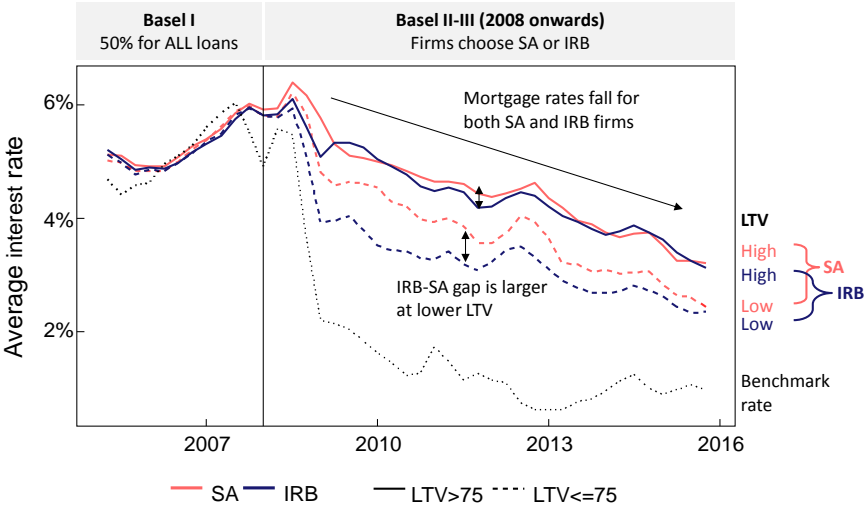
# Switch to Basel II as a quasi-experiment

- ▶ Switch to Basel II as an exogenous supply-side shock
- ▶ Selection into IRB group approx. exogenous w.r.t. risk
  - ▶ High costs of IRB adoption (CMA, 2015)
  - ▶ Mainly driven by firm size (economies of scale)

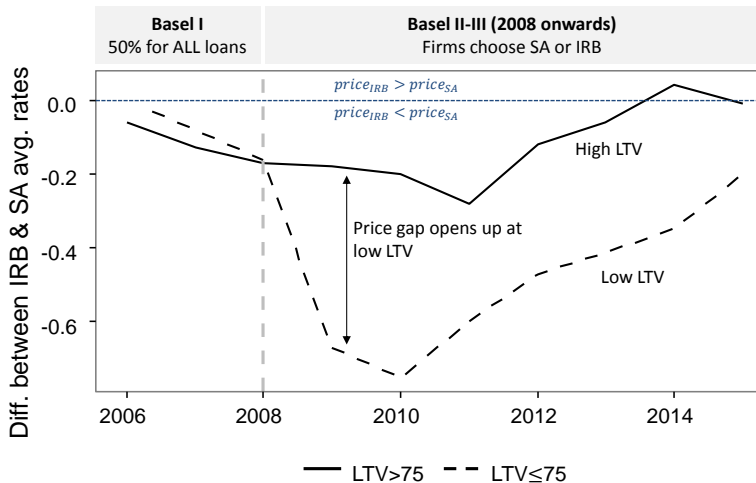
# Risk weights variation



# Mortgage price variation



# Mortgage price variation (IRB-SA price difference)



## Triple difference model (2005-15)

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for IRB firms                      low LTV

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DDD: Differential impact for IRB firms at low LTV

$$\delta_{123} \text{BaselIII}_t \times \text{IRB}_b \times \text{LowLTV}_s$$

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► Hypotheses:

1. Interest rates:  $\delta_{123} < 0$
2. Portfolio shares:  $\delta_{123} > 0$

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- ▶ Hypothesis:  $\beta > 0$

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- ▶ Hypothesis:  $\beta > 0$
- ▶ Also with  $RW_{bst} \times CapReq_{bt}$

# Outline

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## Triple difference model – Results (2005-15)

	Benchmark	LTV threshold	
	75	70	80
Panel A: interest <sub>ibst</sub>			
<i>DDD</i> <sub>bst</sub>	-0.319*** (0.088)	-0.463*** (0.083)	-0.272*** (0.090)
Adjust R2	0.401	0.384	0.410
Observations	6931773	6931773	6931773
Panel B: portfolio share <sub>bst</sub>			
<i>DDD</i> <sub>bst</sub>	0.121*** (0.008)	0.110*** (0.008)	0.101*** (0.009)
Adjust R2	0.077	0.092	0.065
Observations	19571	19571	19571

- ▶ IRB → prices fall by an additional 32bp at low LTV (vs. high)
- ▶ IRB → portfolio share of low LTV increases by 12pp

## Risk weights model – Results (2009-15)

	Dependent variable: interest <sub>ibst</sub>	
	(1)	(2)
$RW_{bst}$	0.010*** (0.003)	
$RW_{bst} \times \text{Cap req}_{bt}$		0.060*** (0.018)
Fixed effects:		
Lender-quarter	Yes	Yes
Lender-segment	Yes	Yes
Segment-quarter	Yes	Yes
Individual controls	Yes	Yes
Adjusted R2	0.636	0.633
Observations	3748593	3696374

- ▶ 1pp  $\Delta RW \rightarrow$  1bp  $\Delta$ Rates
- ▶  $LTV \leq 50$ : 30pp  $\Delta RW \rightarrow$  30bp  $\Delta$ Rates

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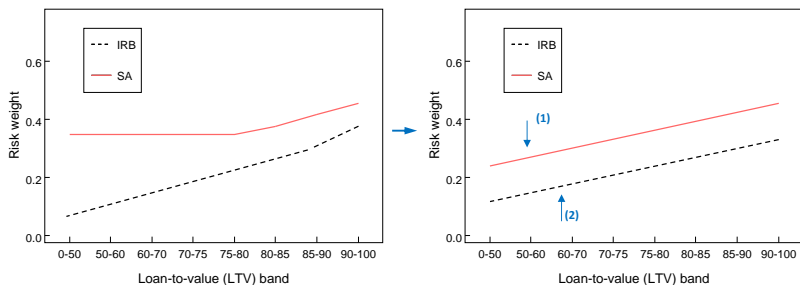
Policy

## Main results: impact of Basel II internal models

- ▶ Basel II: specialisation of smaller firms (SA) in high LTV
  - ⇒ Lower systemic importance
  - ⇒ But less sophisticated risk management
- ▶ Within Basel II: 1pp  $\Delta$ RW  $\rightarrow$  1bp  $\Delta$ Rates
  - ⇒ Below 75% LTV, implies 20-30bp price advantage
  - ⇒ Jump from 10th to 1st in best buy tables (at 75% LTV)



# Basel: reduction in variability of models and in IRB-SA gap



- Options: (1) more risk sensitive SA, (2) floors on IRB

# Appendix

## Alternative channels – Triple difference model

	Dependent variable: $\text{interest}_{ibt}$			
	(1)	(2)	(3)	(4)
Basel II <sub>t</sub> × Low LTV <sub>b</sub> ×				
IRB <sub>t</sub>	-0.319*** (0.088)		-0.450*** (0.086)	
Low buffer <sub>t</sub>		0.086 (0.090)	0.079 (0.092)	
Funding shock <sub>t</sub>				-0.027 (0.118)
Adjusted R2	0.401	0.397	0.405	0.401
Observations	6,931,773	6,931,773	6,931,773	5,032,264

- ▶ Exposure to the crisis (low capital buffer)
- ▶ Effect of the crisis (high funding cost)

## Heterogeneous effects – Risk weights model

	Dependent variable: interest <sub>ibst</sub>			
	Capital buffer		LTV	
	High (1)	Low (2)	High (3)	Low (4)
<i>RW<sub>bst</sub></i>	0.001 (0.003)	0.017*** (0.004)	0.019*** (0.005)	0.014*** (0.003)
Fixed effects:				
Lender-quarter	Yes	Yes	Yes	Yes
Lender-segment	Yes	Yes	Yes	Yes
Segment-quarter	Yes	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes	Yes
Adjusted R2	0.710	0.563	0.671	0.533
Observations	2244041	1490925	1177934	2570659

- ▶ Pass-through driven by lenders with low buffers
- ▶ Similar at high and low LTV

# Data

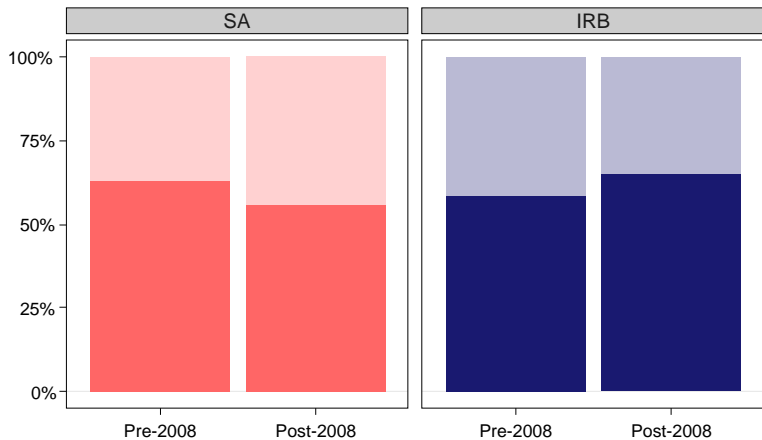
- ▶ Product Sales Database: UK residential mortgages
  - ▶ Rates, product characteristics, property and loan values, borrower characteristics
  - ▶ **At origination**
  - ▶ c. 14 million loans 2005-2015
- ▶ CMA/PRA survey
  - ▶ Risk weights by loan-to-value band
  - ▶ 17 'solo' entities on IRB 2008-2015

## Two complementary identification strategies

	<b>Triple difference</b>	<b>RW pass-through</b>
<b>Period</b>	2005-15	2009-15
<b>Risk weight data</b>	No	Yes
<b>Variation</b>	only IRB v SA	also IRB v IRB
<b>Focus</b>	Regime change	IRB models

# Portfolio shares

**Portfolio share at low LTV ( $\leq 75\%$ )**



# Market shares

### Market shares in each segment

