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# Bank Competition and Stability in the United Kingdom

**Michael Straughan, Sebastian de-Ramon and Bill Francis**  
Bank of England

11 July, 2018

## Agenda

- Why do we care about competition and stability?
- What does the literature say?
- How does competition affect stability on average
- Heterogeneous effects
- Policy implications



## Why do we care about bank competition & stability?

- Relevant to the Bank of England's financial stability remit
  - Both macro and firm-level elements
- Also relevant to the PRA's secondary competition objective
  - PRA needs to better understand how competition may affect stability
- Hotly debated topic in academic, policymaking and regulatory communities



## Literature is divided theoretically...

- **Competition-fragility hypothesis**
  - Competition reduces bank profitability and banks respond by increasing risk, either increasing leverage or reducing underwriting standards/screening activities (Marcus, 1984; Keeley, 1990)
- **Competition-stability hypothesis**
  - Competition reduces margins / lending rates which lowers risk of borrower default and asset portfolio risk (Boyd and De Nicoló, 2005)
  - Banks respond to competition in loan markets by increasing monitoring and reducing funding costs which banks signal to the markets by holding additional capital (Allen et al., 2011)
- **Ambiguous relationship**
  - Competition effect depends on balance of: (i) positive credit risk-shifting effect (competition-stability) offset by (ii) negative interest margin effect (competition-fragility) (Martinez-Miera and Repullo, 2010). Dominance of (i) expected in highly concentrated markets & vice versa



# ... and empirical evidence is mixed

Effect of competition on stability	Effect of more competition	Data	Study
Favourable	Overall banking sector stability	International 1980-2003, 28 systemic crisis	Schaek, Čihák and Wolfe, 2006
	Overall banking sector stability and individual bank soundness	1872 Banks from 63 countries 1997-2009	Anginer, Demirgüç-Kunt and Zhu, 2012
	Individual bank resilience	2500 US Banks in 2003 and 2600 banks in 134 poor countries 1993-2004	Boyd, De Nicolò and Jalal, 2009
	Individual bank soundness	2500 US Banks in 2003 and 2600 banks in 134 poor countries 1993-2004	Boyd, De Nicolò and Jalal, 2006
	Individual bank soundness	EU banks 1997-2005	Uhde and Heimeshoff, 2009
	Individual bank soundness	EU banks in 46 countries 1992-2006	De Nicolò and Turk-Ariss, 2010
	Individual bank soundness	EU banks 1995-2005	Schaek and Čihák, 2010
	Higher capital ratios	2600 Banks from 10 EU countries 1999-2005	Schaek and Čihák, 2012
Ambiguous	Smaller banks hold more capital but are riskier	286 US banks 1989 and 1990	Hughes and Mester (1998)
Ambiguous	Increases z-score but less concentration and market power reduce non-performing loans	8000 banks in 23 countries (mostly US)	Berger, Klapper and Turk-Ariss, 2009
Unfavourable	Overall banking sector instability	69 countries 1980-1997, 47 financial crisis	Beck, Demirgüç-Kunt and Levine, 2006
	Overall banking sector instability (evidence from developing countries is unclear)	Country level international	Evrensel, 2008
	Higher probability of bank distress	308 EU banks 1996-2009	Cipollini and Fiordelisi, 2012
	Higher deposit rates increase wholesale funding and risk	581 US banks 1997-2006	Craig and Dinger, 2013
	Exacerbated distortions from deposit insurance	US banks 1980s	Keeley, 1990
	Less profits reduce incentive to survive	Spanish banks 1988-2003	Jimenez, Lopez and Saurina, 2007
	Lower mortgage lending standards	UK mortgage loans 2000-2006	Dell'Ariccia, Igan and Laeven, 2008



## Data and assumptions

- Unbalanced panel data set from Bank of England's Historical Banking Regulatory Database (HBRD)
  - detailed balance sheet and income statement data for 250+ firms
  - quarterly, from 1989 to 2013
- Competition is between firms with a particular business model
  - financial intermediation role transforming deposits to loans
  - ties together a number of products: deposits, loans, payment services etc.
  - avoids need for arbitrary allocation of costs across markets
- Use data on solo entities, not groups



## Empirical approach

- Estimate models of the form:

$$stability_{i,t} = \alpha + \beta competition_{t-j} + \Phi X_{i,t} + \Theta Y_t + \mu_i + \varepsilon_{i,t}$$

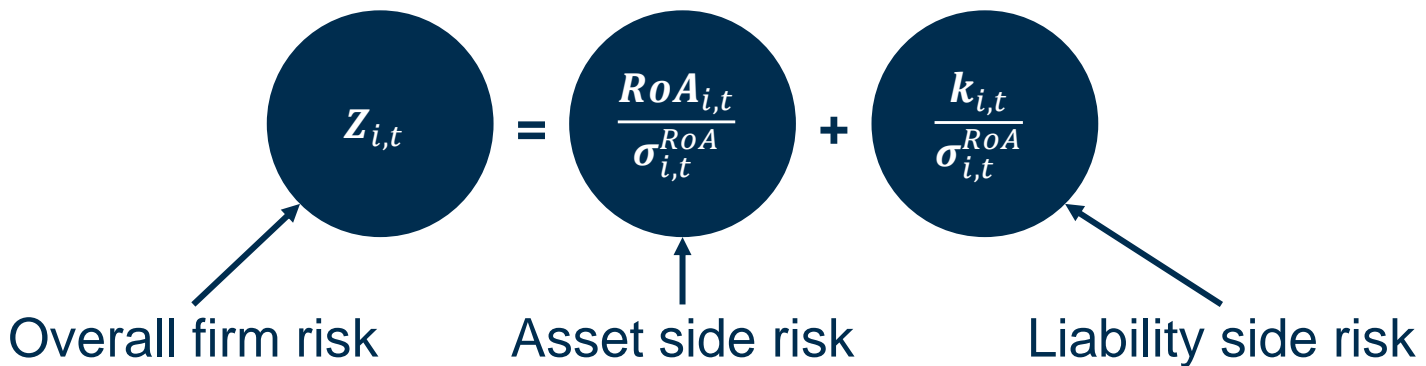
where  $X_{i,t}$  and  $Y_t$  are bank-level and macroeconomic controls, respectively

- Higher levels of (bank level)  $stability_{i,t}$  variable indicate higher stability
- Higher values of (industry level)  $competition_t$  variable indicate *less intense* competition / greater market power
- The main parameter of interest is  $\beta$ , the coefficient on  $competition_t$ 
  - **negative values** of  $\beta$  indicate **competition-stability**
  - **positive values** of  $\beta$  indicate **competition-fragility**



## Measures of stability / fragility

- We use the (log of) **Z-score** as a measure of overall firm risk
- Decompose the Z-score into three components: (i) **return on assets** ( $RoA$ ), **capital (leverage) ratio** ( $k$ ) and the **volatility of asset returns** ( $\sigma_{i,t}^{RoA}$ )
- Also look at two additive components, **risk adjusted return** on assets and **risk adjusted capital ratio**
- The additive components approximate asset-side and liability-side risks





## Measures of competition

We use three measures of “competition” in separate regressions

### 1. The **Boone indicator**

- measures competition from an efficiency perspective: output of efficient firms benefits more than inefficient firms from more intense competition
- adjusted for ‘competition for deposits’ phenomena

### 2. The **Lerner index**

- measure of firms’ market power: firms with greater market power have higher price-cost margins
- Calculated for each firm, use the median value as a proxy for industry margins (results using average not different)

### 3. The **Herfindahl-Hirschman index (HHI)**

- direct measure of concentration used as a proxy for competition
  - Use HHI for assets as a proxy for competition across all bank activities
- We lag the competition measures to avoid any endogeneity issues



## Key results

	Boone indicator	Lerner index (median)	HHI (assets)
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Capital Ratio ( $k_{i,t}$ )	0.6639***	15.4240***	3.0963***
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Risk adjusted asset returns ( $RoA_{i,t}/\sigma_{i,t}^A$ )	-0.2885***	-7.4497***	-1.2955***
Risk adjusted capital ratio ( $k_{i,t}/\sigma_{i,t}^A$ )	2.1889***	178.7400***	9.4712***



## Average impact of competition on stability

- Positive coefficients for all competition measures when regressed against Z-score supports **competition/fragility**
  - higher market power improves stability (Lerner index, HHI)
  - less efficient firms survive as competition diminishes (Boone)
- Outcome masks different effects on different aspects of banks' business
  - negative coefficient for (risk-adjusted) return on assets shows **competition is positive for profitability**: Boyd & De Nicolò competition-stability
  - positive coefficient for (risk-adjusted) capital ratio **suggests market power encourages higher bank capitalisation**: Marcus / Keeley competition-fragility
- Both competition-stability and competition-fragility hold
- But the economic effect is relatively small
  - A return to late 1990s competition levels (e.g. Boone indicator from -2.3 to -6.3) would change the Z-score by only around 6-8%



## Heterogeneous effects of competition

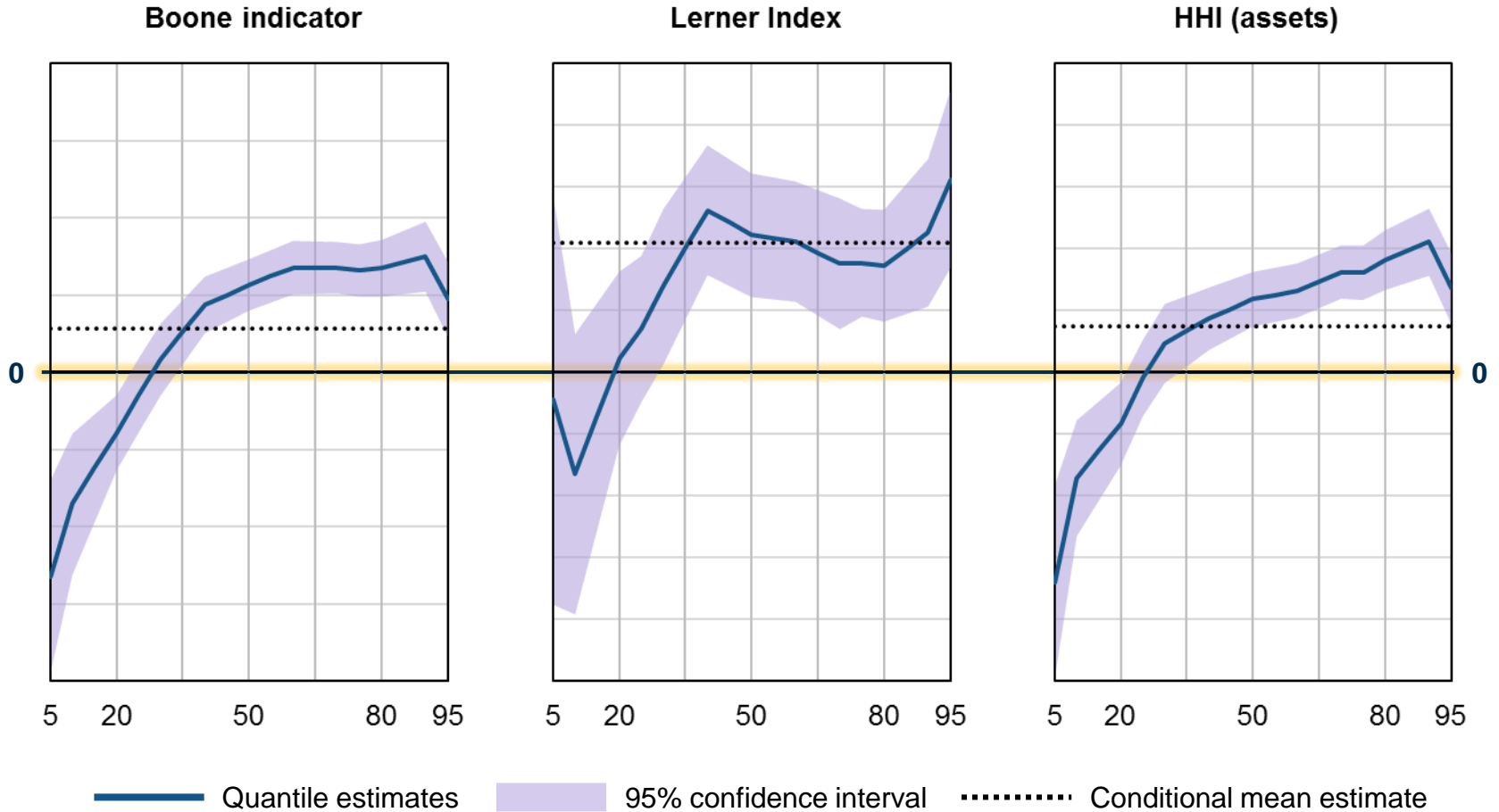
- Use quantile regression techniques to investigate if effects are different for firms with different characteristics
- Results show that the impact of competition on stability changes:
  - from **favourable effect** for the **riskiest firms**
  - to an **unfavourable effect** for the **healthiest firms**
- The change is driven by liability side risks
  - less competition reduces incentives for banks with relatively weak capitalisation (banks in lowest 20<sup>th</sup> percentile by Z-score) to hold higher capital ratios (competition-stability)
  - effect is reversed for firms with Z-score above the 40<sup>th</sup> percentile (competition-fragility)
  - effect on risk-adjusted asset returns is positive for all competition measures



# Key results

Quantiles:	5	10	20	25	30	40	50	60-95	F-Stat
	<b>ln(Z-score)</b>								
<b>Boone indicator</b>	-0.080***	-0.051***	-0.024***	-0.009	0.005	0.026***	0.034***	All positive and ***	9.42***
<b>Lerner Index</b>	-0.44	-1.65	0.222	0.701	1.386**	2.626***	2.222***		2.63***
<b>HHI (assets)</b>	-0.340***	-0.171***	-0.084**	-0.009	0.047	0.087***	0.119***		7.54***

# Quantiles: overall firm stability (log of z-score)



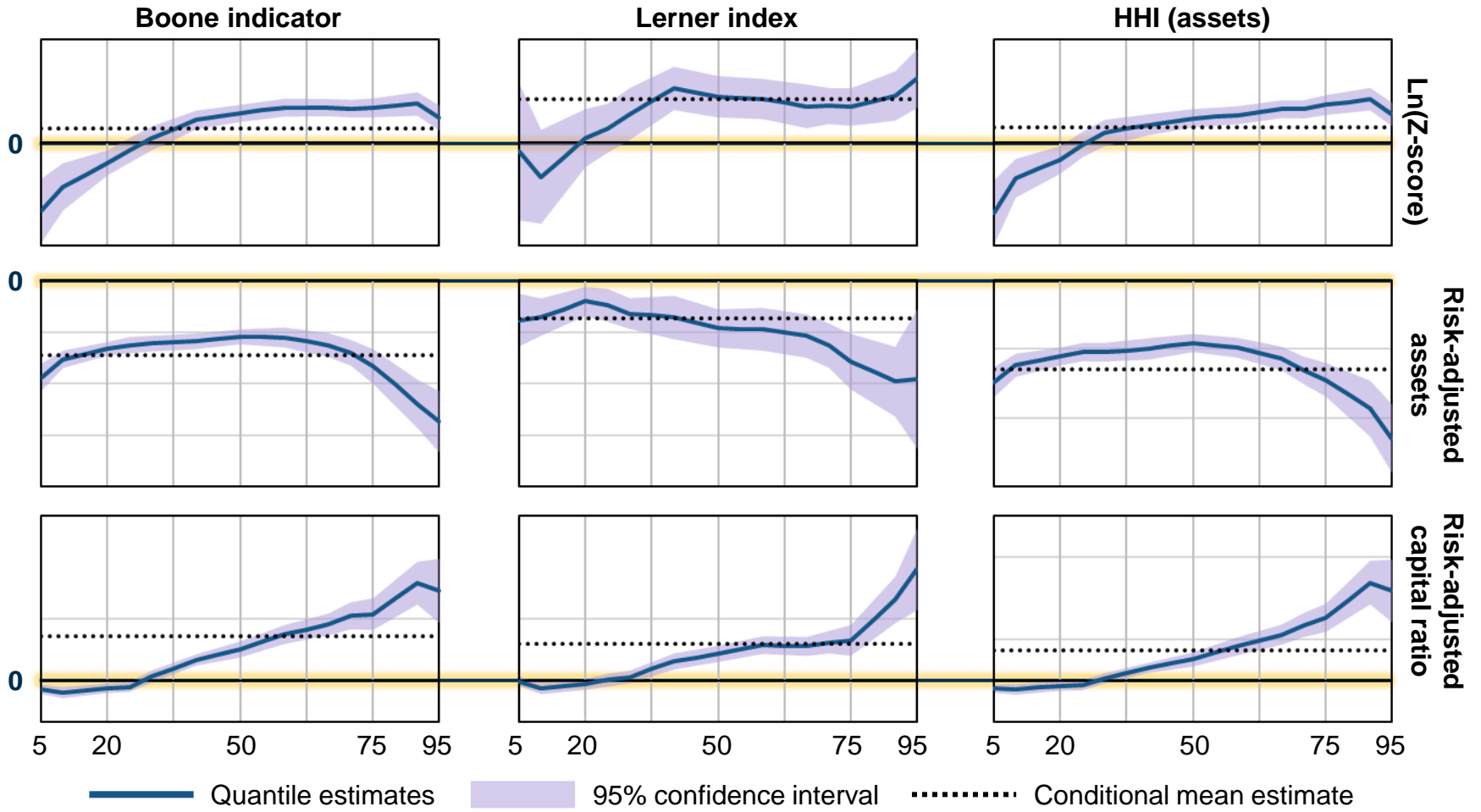


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<b>RoA/σ</b>									
<b>Boone indicator</b>	-0.377***	-0.306***	-0.265***	-0.251***	-0.245***	-0.237***	-0.219***	All negative and ***	8.13***
<b>Lerner Index</b>	-7.720***	-7.121***	-4.100***	-4.844***	-6.439***	-7.223***	-9.322***		2.65***
<b>HHI (assets)</b>	-1.482***	-1.234***	-1.109***	-1.043***	-1.047***	-0.996***	-0.911***		5.38***
<b>Capital ratio/σ</b>									
<b>Boone indicator</b>	-0.409***	-0.555***	-0.357***	-0.279**	0.211	1.013***	1.528***	All positive and ***	23.58***
<b>Lerner Index</b>	-1.83	-36.14***	-16.26	3.817	19.55	94.45***	131.4***		11.02***
<b>HHI (assets)</b>	-1.824***	-2.046***	-1.208**	-1.013*	0.634	3.197***	5.216***		14.93***



# Overall Stability, and Asset and Equity risk



## Conclusions

- There is a **negative** effect of competition on stability *on average*
- The economic significance of the impact appears modest
- Different impact of competition on asset and liability components shows that both competition-stability and competition-fragility hypothesis can hold simultaneously
- The overall negative effect of competition on stability appears to be driven by incentives to hold lower capital ratios
- However, the effect of competition is heterogeneous across financially weak and financially healthy banks
  - financially weak banks benefit from greater competition intensity
- Policy implication is that there is a trade-off to consider when pursuing pro-competition measures



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