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Scenario Selection for Financial Stability Stress Tests

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Bank of England

IMF Expert Forum on Advances Stress Testing Techniques
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The presentation expresses the views and analysis of the author and should not be thought to represent those of the Bank of England or the Monetary Policy Committee members.
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Hosted by the International Monetary Fund
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A Future Framework for FS at the Bank of England

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- A clear objective function
  - Initially narrow focus on major UK banks (or large LCFI operating in the UK) at the core of the financial system
  - Open questions: infrastructure, core financial markets, risk preferences
- A clear analytical framework
  - Analytical framework to produce 'league table' of risks
  - Focus on major vulnerabilities
  - Use quantitative techniques to assess PD and impact of FS risks → Stress testing / measuring FS
- Systemic policy design and crisis management

Measuring FS and Stress Testing

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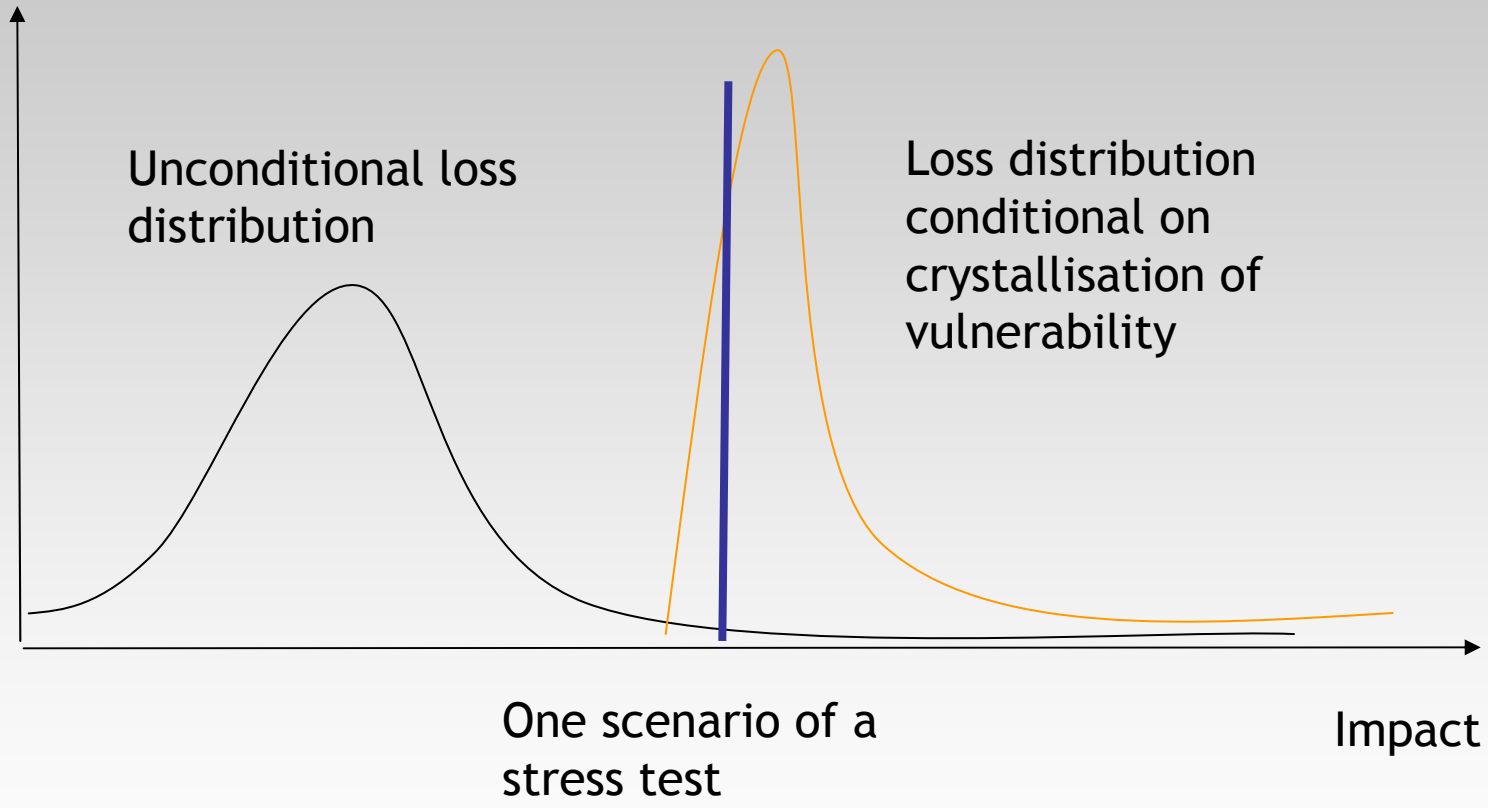
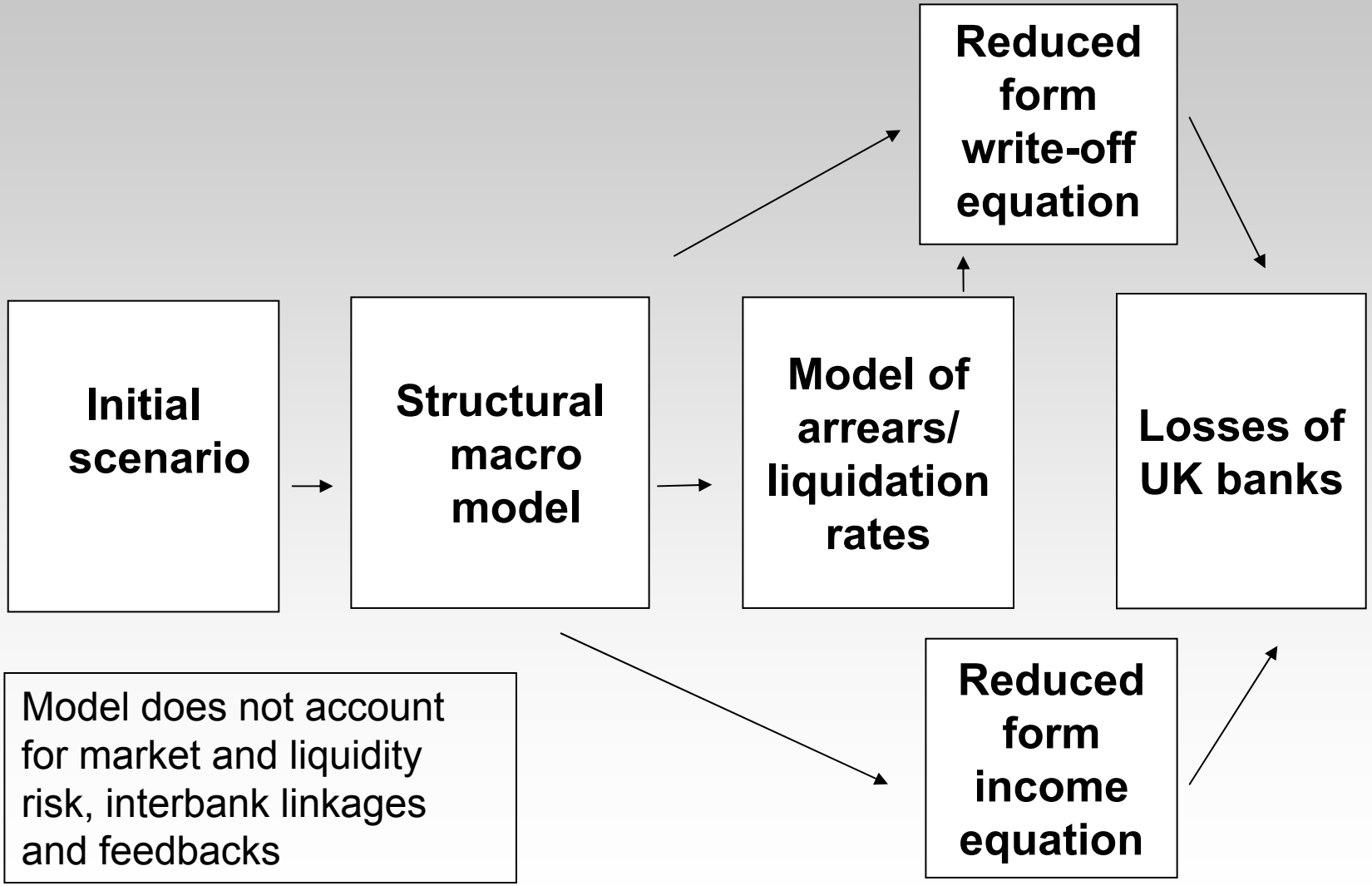


Use stress tests as a coherent framework to approximate and discuss impact of FS vulnerabilities

Current Macro Stress Testing Framework at the Bank of England



For a technical description of the model see Bunn, P, A. Cunningham and M. Drehmann (2005), ''Stress Testing as a Tool for Assessing Systemic Risk', Bank of England, *Financial Stability Review,* June

Standard Scenario Selection Methods

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- Historical Scenario
  → E.g. early 1990s recession in the UK
- Probabilistic Scenario
  → Calibration against distribution of past out turns
- Hypothetical Scenario
  → Extreme but plausible, e.g. Avian flu
- Reverse Engineering Scenario
  → E.g: Which shock would wipe out banks' profits

→ **Key question: which scenario triggers vulnerability**

Example: Scenario Selection to assess FS vulnerability 'Global Imbalances'

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- FS vulnerability: Level of US current account deficit
- Use economic literature as a guide to assess possible interest rate and FX change which triggers unwinding of deficit
- Develop 'moderate' and 'severe' scenario to explore loss distribution
- To capture disorderly unwinding combine interest rate and FX shocks with shocks to global equity markets, credit spreads, long term interest rates and house price falls.

The Scenarios

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	Variable	Moderate	Severe
Core	US effective exchange rate	-20% in 2 quarters	-40% in 1 quarter
	US 10 year yields	+2.5pp in 4 quarters	+2.5pp in 4 quarters
Accompanying	Global 10 year yields ex-US	+2pp in 4 quarters	+2pp in 4 quarters
	US house prices	-10% in 8 quarters	-15% in 8 quarters
	UK and selected Euro house prices	-10% in 8 quarters	-15% in 8 quarters
	Global equity prices	endogenous (-5%)	-20% in 1 quarters
	Global credit spreads	+85bp in 12 quarters	+225bp in 12 quarters

(a) All variables expressed in nominal terms, as a percentage change from starting values.

How to assess the probability of a scenario materialising?

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- Generally large degree of uncertainty
- Can be derived by looking at
  - Historic distribution of shocked variables as in probabilistic approach
  - Statistical inference using the volatility of the series and simple distributional assumptions or more advance modelling such as GARCH
  - Probability implied by financial instruments, eg option prices
  - Compare outcome of the scenario to historical events for example in terms of GDP growth or write-offs
- Assessment needs to be conditional on current environment

What is the appropriate horizon?

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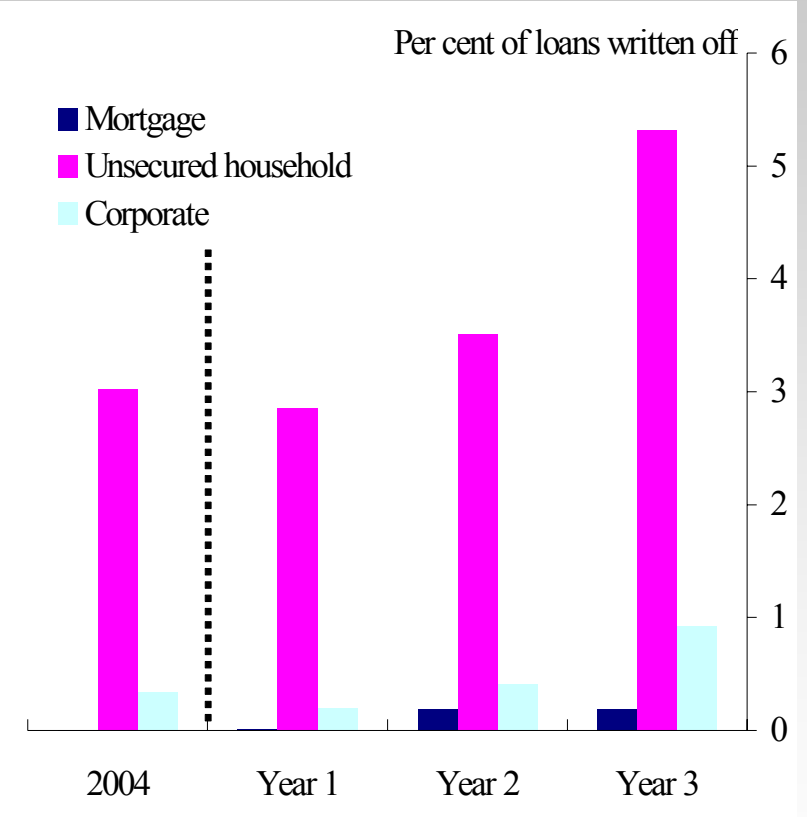
- Different risks have different horizons.
- Market/liquidity risk very short horizon but credit risk needs time to ripple through the system → we use 3 year horizon
- Recent research at the BoE shows that once net-interest income is modelled appropriately worst impact in terms of profits could be after 1-2 years



Stress test based on 35% drop in world equity prices, 12% decline in property prices, 1.5% increase in unanticipated earnings growth and 15% depreciation in exchange rate. See Bunn et al (2005).

Issues when running the scenario

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- Need to model base case scenario
- Adopt scenario to explore structural breaks
  - Example: Buy-to let mortgages might react differently to house price falls → what if buy-to let borrowers 2,3 or 4 times as sensitive to house prices
- Crystallisation of vulnerability may lead to non-linearities
  - Possible to capture within the model but also ask ‘what if questions’
  - Example: LGD might be higher if all banks try to realise collateral → what if fire-sales lead to extra 10% or 20% haircut
- Policy reaction
- Aggregation and comparison with other FS risks

Conclusion

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- Stress tests provide a coherent framework to discuss and assess impact of FS vulnerabilities
- Scenario should be designed to trigger vulnerability
- But stress testing cannot be a black box and scenario needs to take account of possible problems such as non-linearities or structural breaks.