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Stress Testing – Confluence of the Actuaries and Economists Viewpoints in the New Economic Environment

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INTRODUCTION



Introduction

Following the GFC, integrated stress testing gained acceptance as a key technique for assessing resilience

- It has been adopted by regulators globally to assess capital adequacy
- Financial institutions have made significant investments in developing their stress testing capabilities

Scenario setting is well established at an aggregate level

- Financial institutions have developed sophisticated quantitative models that translate the scenarios to financial impacts
- However, use of aggregate scenarios (e.g. national macroeconomic scenarios) can limit the insights that can be gained from the exercise

Bringing an economist's perspective can enrich scenarios and provide deeper insights:

- Using granular and detailed scenarios can provide information that may be masked using aggregate or national scenarios
- During previous downturns, different geographies and industries do not fare equally
- Understanding these nuances can provide information that enable better evaluation of risk.



STRESS TESTING AT LIFE INSURERS

Stress Testing Current Practice

Overview

- Stress testing capabilities for life insurers are, in the main, not well advanced
- More rigorous stress testing exercises, conducted at a whole of business level, are still evolving
- Heterogeneous nature of the life insurance industry compared to banking. Life insurance companies have very diverse business models and exposures – diversified, reinsurers, risk specialists
- First industry wide stress test carried out in 2015.
- APRA expects to undertake another industry stress test, likely to be 2018
- Stress testing should inform capital decisions, helping to set target surplus thresholds

1. Scenario Development and Enrichment

- Set out scenario including cause of shock and likely progression through the economy
- Enrich scenario provided by economist to provide inputs for other variables of interest

2. Assumptions and Modelling

- Formulate key assumptions on how business variables respond to macroeconomic conditions
- Model impacts on key variables such as claims, lapses, and capital position

3. Aggregation and Reporting

- Centralise all inputs across different areas such as product, statutory funds, and company level
- Disseminate results to key stakeholder and SMEs for review and challenge.



STRESS TESTING AT GENERAL INSURERS

Relevance of Economic Stresses to General Insurers

Overview

- Most general insurers are concerned far less about economic stresses than they are about natural peril stresses, large insurance losses or reinsurance failure.
 - Assets tend to be highly liquid and dominated by high quality short term fixed income so;
 - Vulnerability to economic stresses is focused on their liabilities.
- General insurers were not particularly impacted by the GFC.

Economic Stress for Specific Product Lines

- Economic stresses are key for some general insurers with classes of business **dominated by consumer credit, trade credit, lenders' mortgage, surety bonds, political risk**
- The nature of the economic stress to which general insurers are most exposed can be quite bespoke to nature of risks underwritten, for example:
 - Lenders' mortgage insurers are particularly sensitive to a dual trigger of residential property prices dropping and unemployment increasing, whereas;
 - Trade credit insurers are sensitive to bankruptcies.

Incorporating Economic Stresses for LMI Insurers

Overview

- Lenders' mortgage insurance responds to the dual trigger of the mortgagee defaulting and the stressed sale price for their house being insufficient to cover the outstanding loan.
- Considerations include:
 - regional variations
 - interdependency between economic variables and demographic variables

Modelling Credit Metrics

Probability of Default = f (unemployment rate, mortgage repayments, wage growth)

Loss Given Default = f (house prices, outstanding loan values, mortgage break fees)



STRESS TESTING AT BANKS

Current Practice In Banks

Overview

- Carried out internally by banks for a number of years, with strong focus on adverse economic conditions
- Stress scenarios can range from small specific events (e.g. operational risk scenarios, market risk stresses) to bank-side stress tests
- First industry wide stress test carried out in 2002-2003 on housing risk
- Major industry-wide stress test post GFC carried out in 2014
- APRA extends stress testing to smaller banks, large credit unions in 2016
- The typical process for scenario development is shown on the following page.

1. Scenario Development and Enrichment

- Set out scenario including cause of shock and likely progression through the economy
- Enrich scenario provided by economist to provide inputs for other variables e.g. yield curve, spreads

2. Assumptions and Modelling

- Formulate key assumptions on how business variables respond to macroeconomic conditions
- Model the impacts on key variables such as NIM, credit losses, and capital position

3. Aggregation and Reporting

- Centralise all inputs across different areas such as product, credit modelling, and treasury
- Disseminate results to key stakeholder and SMEs for review and challenge.

Scenario Development for Regulatory Stress Tests

Scenario

- Sharp down in downturn in China, results in a housing market double – dip

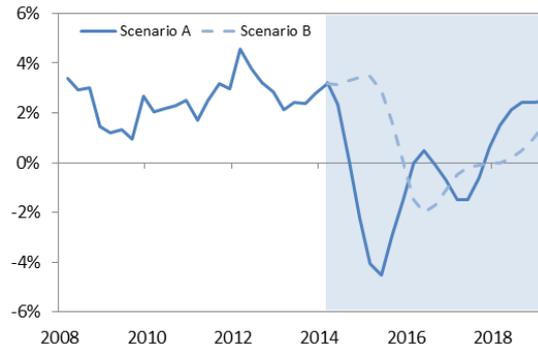
Economic Impacts

- GDP contracts by as much as 4% and growth is depressed for a few years
- Unemployment hits 13%
- House price index declines nearly 40%

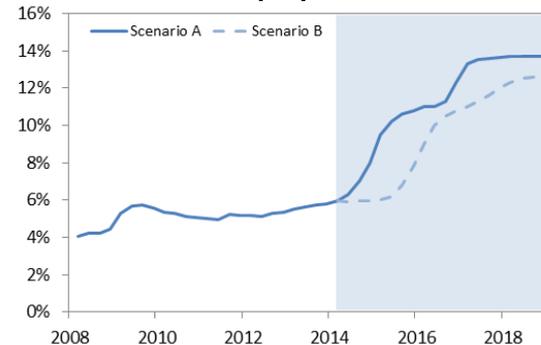
Enrich scenario

- Yield curve
- Market response
- Product volumes

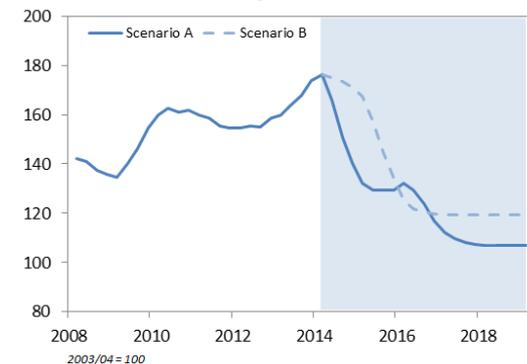
GDP



Unemployment rate



House price index



Source: Byres, 2014, Seeking strength in adversity: Lessons from APRA's 2014 stress test on Australia's largest banks

Bank Internal Stress Scenarios

Commonwealth Bank (FY16)

- CBA disclose the stress test used by the retail bank.
- Described as a “severe but plausible commodities-led recession”

Assumptions (%)	Base	Year 1	Year 2	Year 3
Cash Rate	2.0	1.0	0.5	0.5
Unemployment	5.8	7.5	9.5	11.0
Hours under-employed	10.2	12.4	15.3	17.4
Cumulative reduction in house prices	n/a	10.0	23.0	31.0
LMI claim payout ratio	n/a	70%	70%	70%

Source: Results presentation for the full year ended 30 June 2016, CBA

National Australia Bank (FY16)

- NAB also discloses its home lending stress scenario
- Scenario is a “severe recession”, that is “worse than in the early 1980s or 1990s, only exceeded by the 1930s recession”

STRESSED SCENARIO – MAIN ECONOMIC PARAMETERS¹

	Year 1	Year 2	Year 3	Year 4
Annual GDP growth (%)	(1.4)	(1.8)	0.5	3.8
Unemployment rate (%)	7.9	9.9	10.9	10.5
House prices (% p.a. change)	(13.6)	(13.0)	(3.9)	(0.1)
Cash rate (%)	2.3	1.0	0.6	0.3

Source: Full Year Results 2016 Investor Presentation, NAB

International Experience – US CCAR

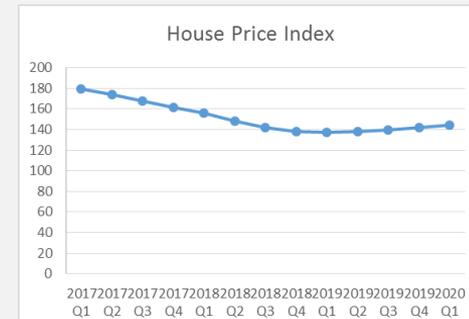
CCAR Overview

- Comprehensive Capital Analysis and Review (CCAR) uses stress tests for assessing capital adequacy
- Large US banks are required to submit their CCAR returns, and including capital actions in the coming year
- Banks are expected to show that they can continue to operate in adverse conditions
- CCAR requirements are onerous with significant qualitative and quantitative information requirements

CCAR Economic Scenarios

- Weakening global activity, with long term aversion to long term fixed income
- Moderate US recession initially followed by recovery
- CCAR scenarios provide a range of variables:
 1. GDP growth, disposable income growth, unemployment rate
 2. CPI rate
 3. Interest rates, mortgage rate, prime rate
 4. Dow Jones Index,
 5. House Price Index
 6. CRE Index

CCAR 2017 Scenarios



International Experience – Europe

EBA Stress Tests

- EBA runs industry wide stress tests for European Banks every two years
- EBA sets the methodology and common scenario which are then implemented by national supervisors
- Used to strengthen market discipline through publication of bank level results
- Transparency also aims to improve confidence in the EU banking sector
- In 2016, a sample of 51 banks were included

EBA Economic Scenarios

- EBA develops the scenario taking into consideration its views on systemic risk.
- Narrative is as follows:
 1. Increasing investor aversion to long term fixed interest,
 2. Causing rise in risk premia
 3. Leads to limited secondary market liquidity
 4.
- Scenario provides country by country variables – both baseline and adverse
- Variables include: interest rates, GDP growth exchange rates, stock prices, non EU region growth, inflation, etc.

EBA 2016 Scenarios

Table 6: GDP growth in EU countries

	Baseline growth rates (percentages)			Deviations (percentage points)		
	2016	2017	2018	2016	2017	2018
Belgium	1.3	1.7	1.6	-2.9	-4.0	-1.0
Bulgaria	1.5	2.0	2.1	-2.9	-5.0	-2.1
Czech Republic	2.4	2.7	1.8	-4.5	-5.1	-1.4
Denmark	2.0	1.8	1.8	-4.1	-3.9	0.1
Germany						
Estonia						
Ireland						
Greece						
Spain						
France						
Croatia						
Italy						
Cyprus						
Latvia						
Lithuania						
Luxembourg						

Chart 1: Contributions of individual adverse shocks to deviation of real EU GDP from baseline (percentage points)

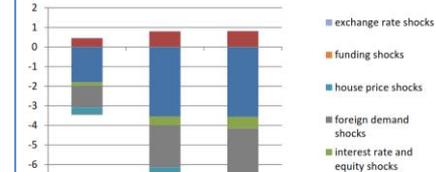
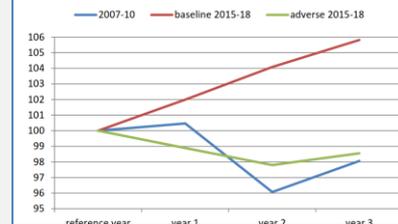


Chart 2: EU real GDP under the baseline and adverse scenarios in a historical perspective





CHALLENGES IN SCENARIO DEVELOPMENT

Scenario Development Challenges

1. Scenario reflects bank's exposure

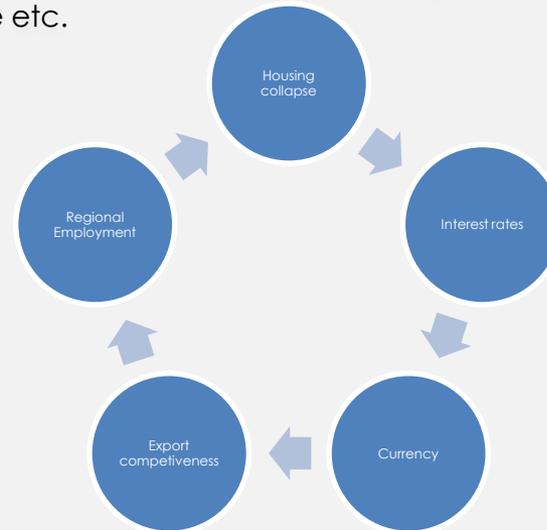
A broad scenario may not give enough information on a bank's specific exposures both in regional, type of lending and industry.



For lenders that have specific exposures such as agribusiness for example, the impact of a broad scenarios can hard to translate to specific impacts

2. Scenarios dependent on state of economy and interlinkages

Banks need to think through the scenario, how it plays out and the impact on connected parts such as GDP, interest rates, currency rates, terms of trade etc.



Scenario Development Challenges

3. Granularity

A global or national economic stress may not capture dynamics specific to regions and subsectors. For example in mortgage lending, APG 223 requires that:

“Good practice would be for an ADI to conduct stress testing at a sufficiently granular level to enable adequate sensitivity to the risk characteristics of different loan types. These characteristics would typically include product type, LVR, LMI coverage (including counterparty credit risk), serviceability, geography, vintage, origination channel and borrower characteristics.”

Source: APG223 – Residential Mortgage Lending

4. Inability to use in decision making

Where a scenario lacks consistency, is not granular or unrealistic it is difficult to use the results to manage the banks. For example, a scenario based on a few variables and expert judgement will not meet this:

“Some models still rely too heavily on a single economic driver or judgement alone, lacking a convincing link to the scenario or taking a high-level approach that misses the differences in risk across different types of asset.”

Wayne Bryes, 2014.



THE ECONOMIST'S PERSPECTIVE

Economics

Selected 'stress test' variables

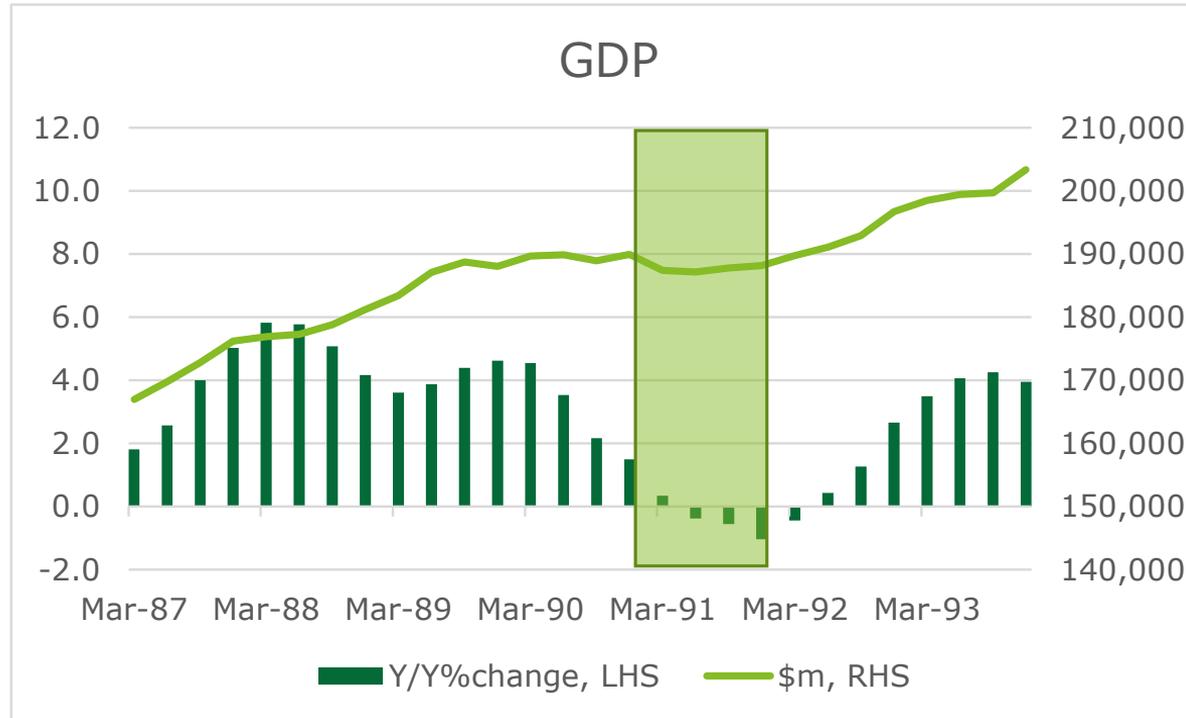
- GDP
- Unemployment rate
- House price index

Expanding the list

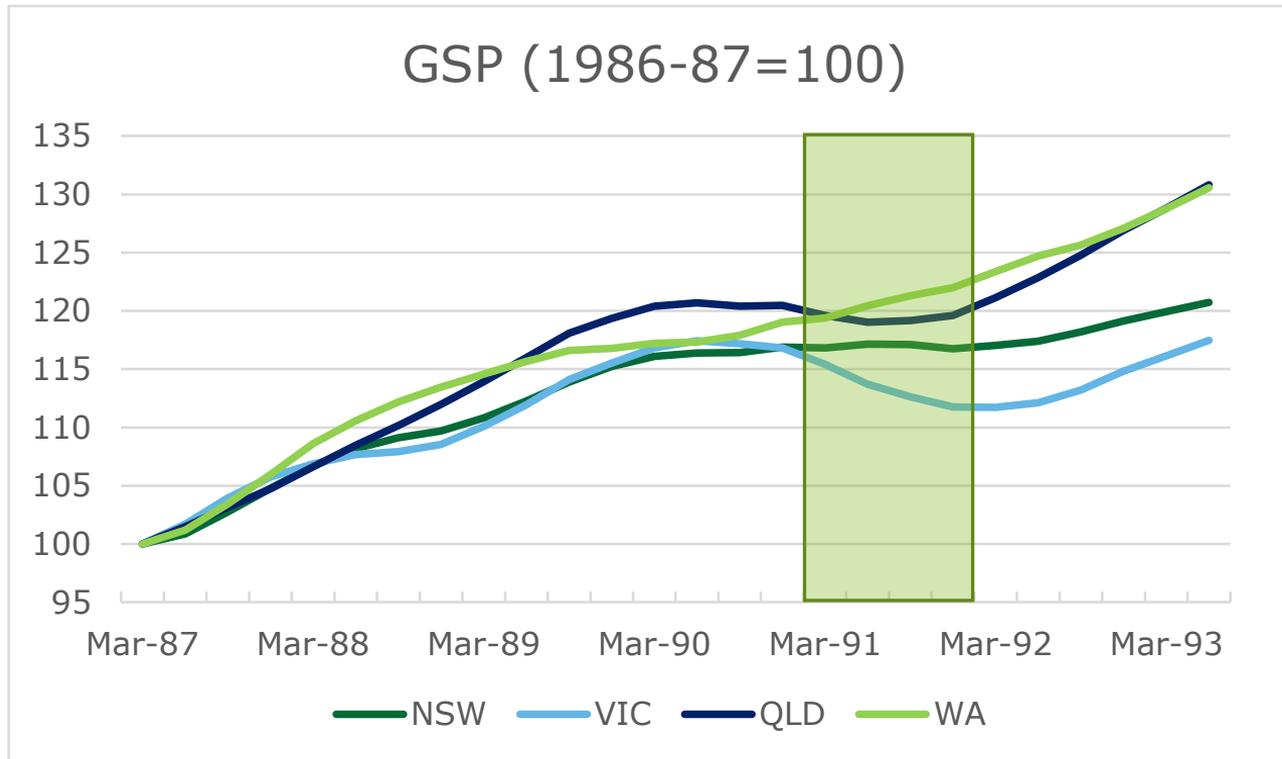
- Industry

Over the horizon

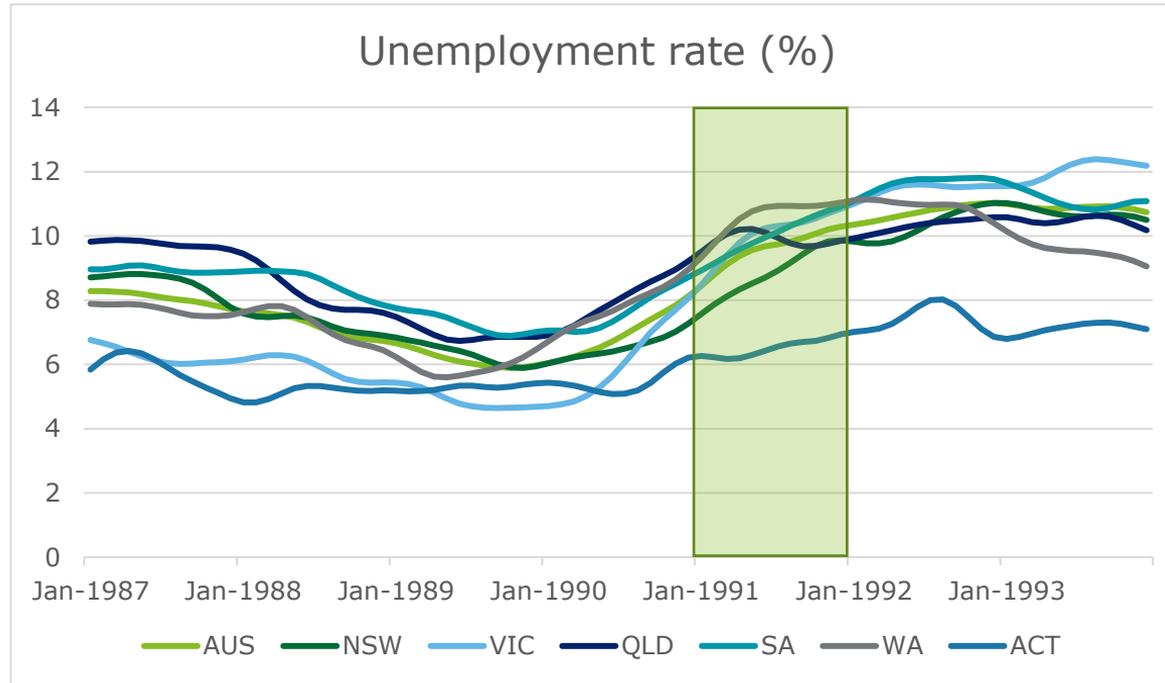
The last recession – national



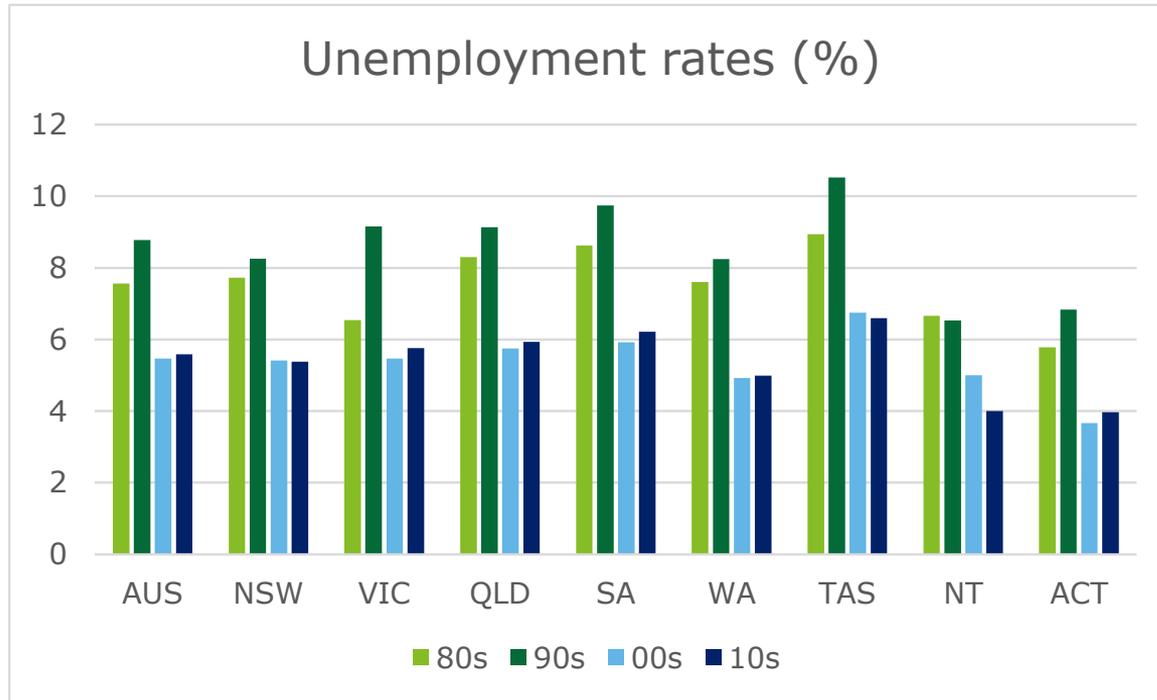
The last recession – states



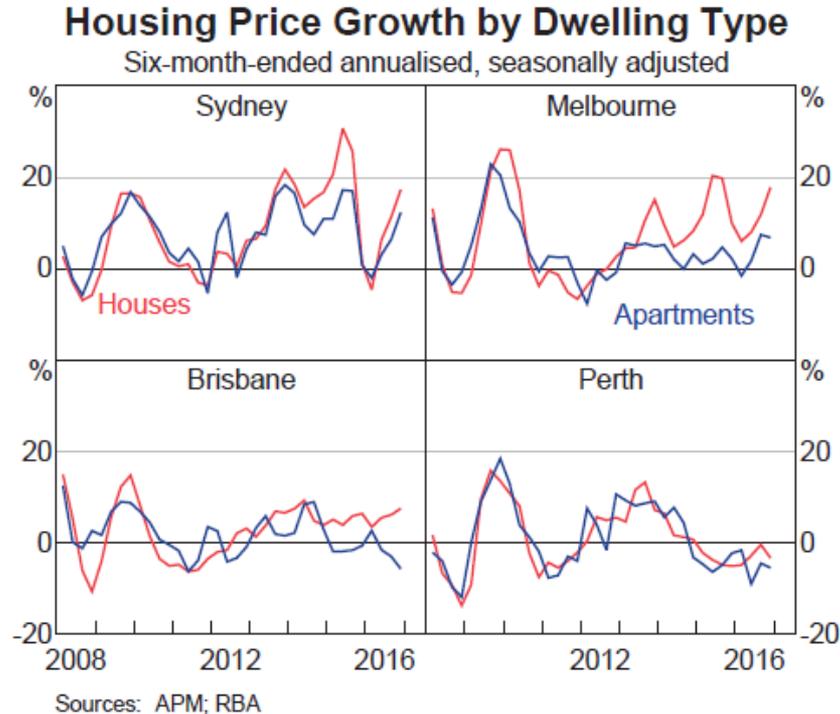
The last recession – unemployment



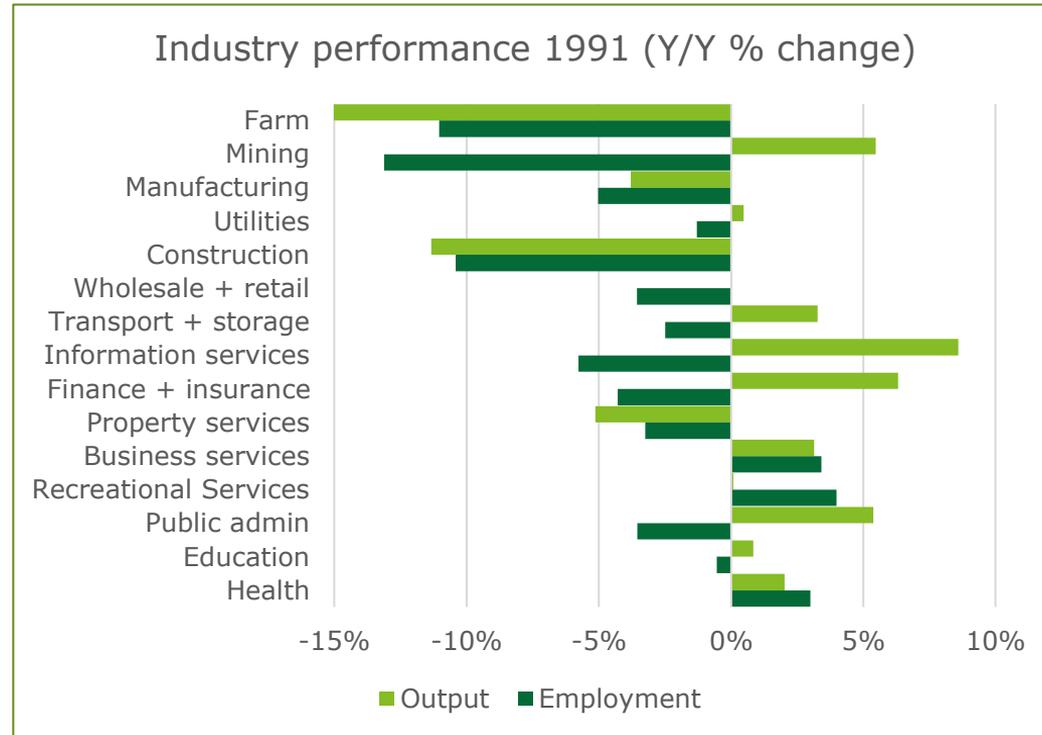
Unemployment, by state, by decade



A collection of housing sub-markets

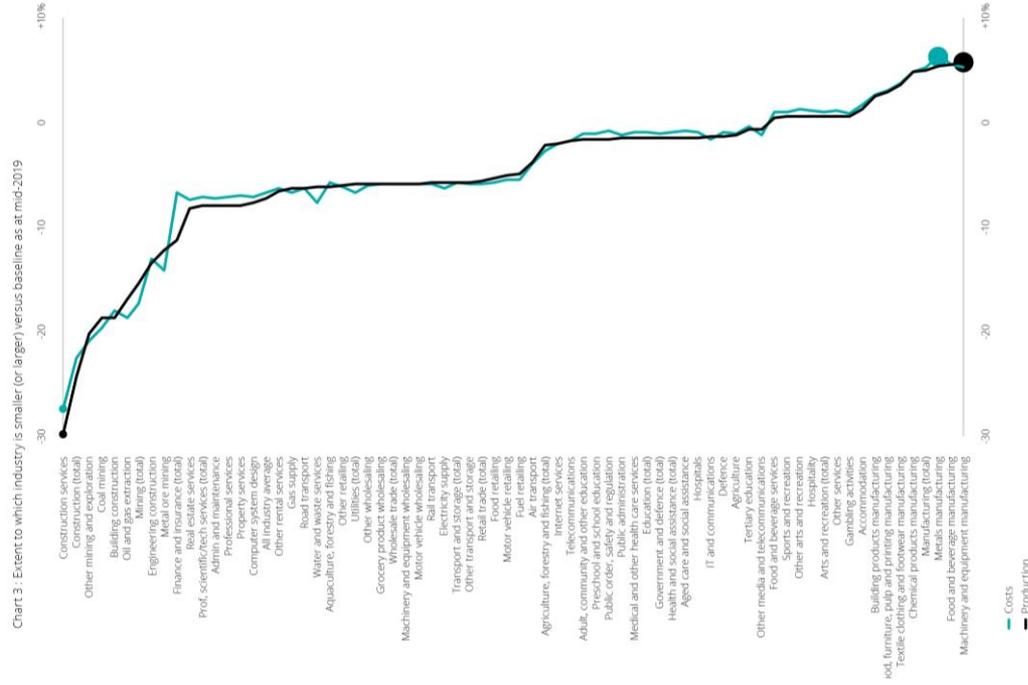


The last recession - industry mix matters





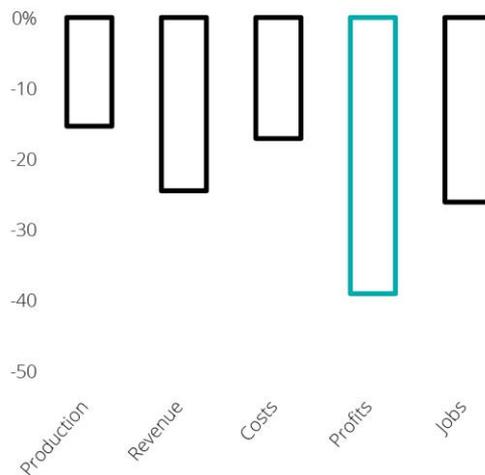
Scenario – China stumbles, by industry



Source: Deloitte Horizon, China stumbles scenario

Scenario – China stumbles, mining

Chart 5: Mining snapshot versus baseline as at mid-2019



Source: Deloitte Horizon model, China stumbles scenario



THE WAY FORWARD

The Way Forward

- Regulatory focus on stress testing has resulted in financial intuitions developing sophisticated models, infrastructure and processes for carrying out stress testing
- Introducing the economist view and using economic modelling can improve the level of insight provided
- Past recessions have shown that regions and industries tend to behave differently. While national level indicators are valuable, these can mask underlying clusters of risk. This is where developing and applying granular scenarios helps to enhance:

Risk Identification

Risk Limit Setting

Concentration Risk

“What was once viewed as a backroom activity performed by the actuarial team is now expected to reach further into the organisation if it is to be effective in making organisations resilient to adverse shocks.”

Geoff Summerhayes, APRA, Preparing for the unexpected - Insights from APRA's 2015 Life Insurance stress test



DISCUSSION AND QUESTIONS



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