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Development of Economic Resilience Indicators for Australia's Regions: An Application to Rural NSW

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Development of Economic Resilience Indicators for Australia's Regions: An Application to Rural NSW

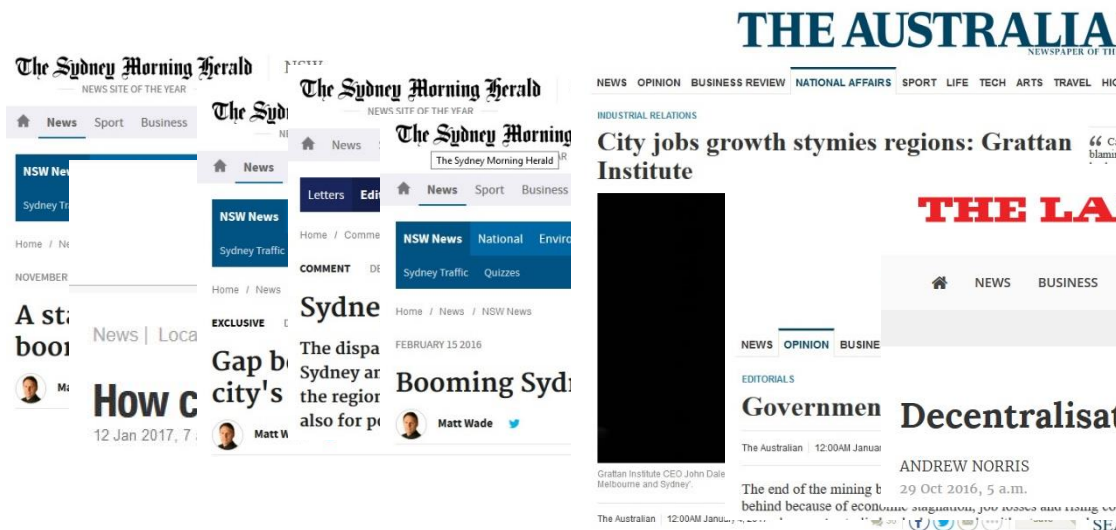
61st Annual AARES Conference, Brisbane, 8th February 2017
Ed Lefley, Dr. Shawn Leu and Prof. Derek Baker
UNE Centre for Agribusiness, University of New England,
Armidale

Outline

- Background and Motivation
- Research Questions
- Methodology
- Results:
 - What's driving 29 regions
 - 5 yearly average snapshot of how each region fairs on each of these component
 - How does the 5 year index work?
 - Two principal components that capture the salient information
 - Projects the resilience of the region over the 5 years.
 - There is a time component for each region
 - We take away the time variation across the region; we project the incremental change onto the principal component
- Concluding Comments

Background and Motivation

- Regional Economies are well known to perform at a different pace to the capital cities



GRATTAN
Institute



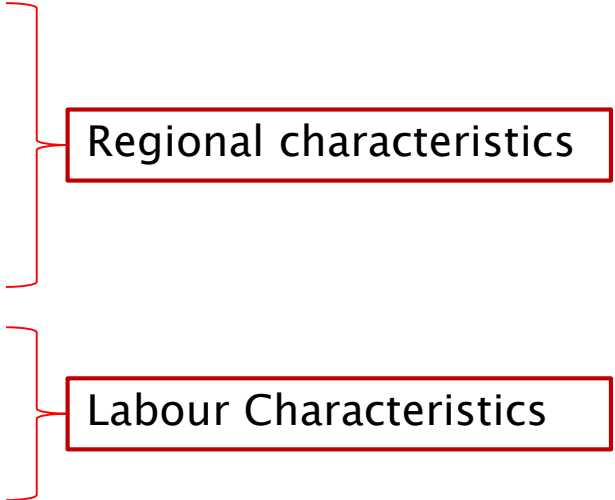
Research Question

- Can an indicator be developed?
 - Who has already developed one?
 - Ron Martin (2012, 2015) in the UK
 - Oregon Regional Economic Indicator
 - Why do we need one?

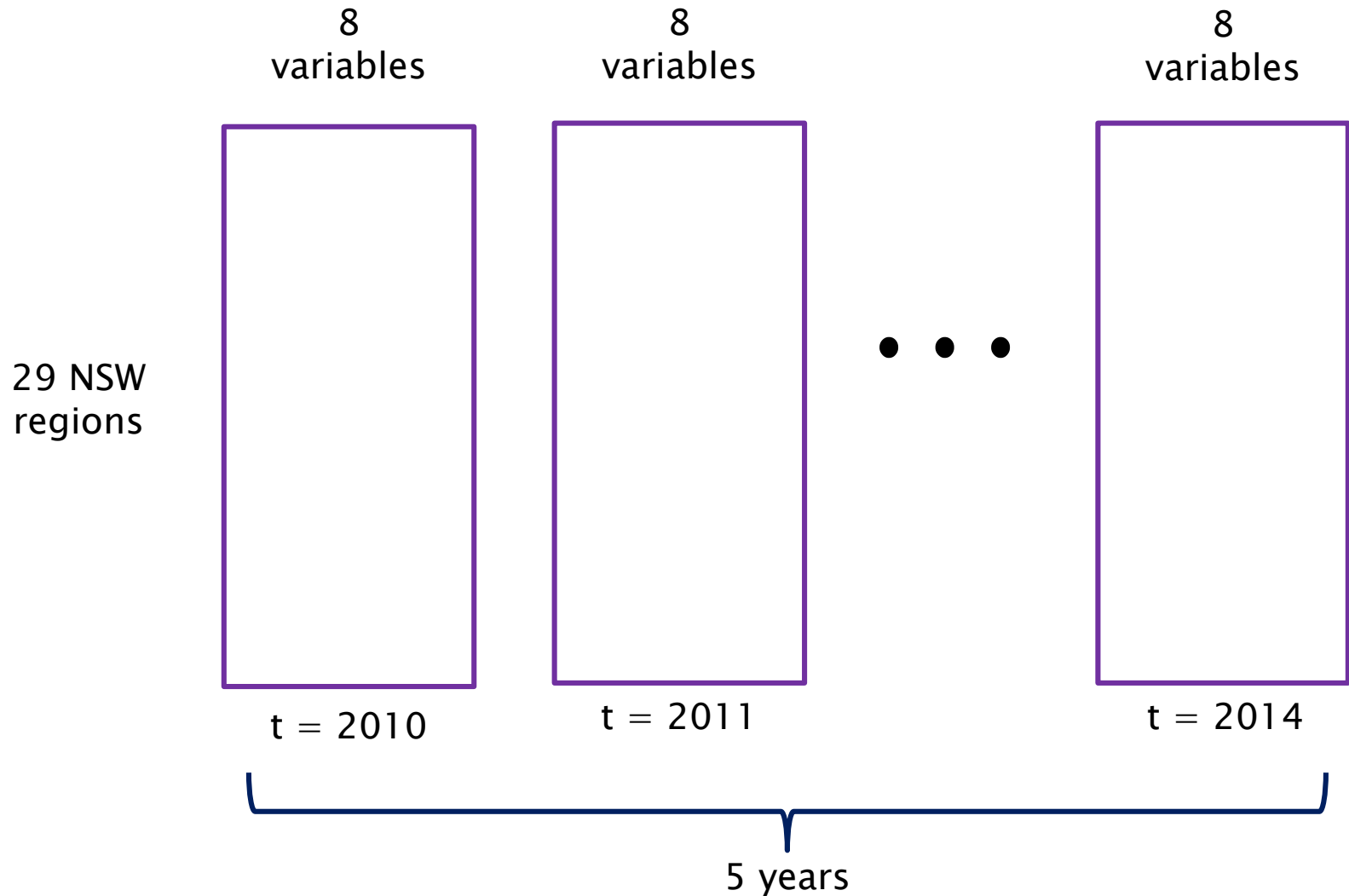
What is our definition of economic resilience?

- Economic Resilience
 - Martin (2012, 2015)
 - Developing countries (micro level panel data at household level)
 - Economic Geography
- Resilience through more dimensions

Data

- Annual data extracted from ABS for 29 regions in NSW
 - 8 variables over 5 years (2010–2014)
 - Building Approvals
 - Estimated Resident Population
 - Net Regional Migration
 - Patent Applications
 - Trademark Applications
 - Employment Rate
 - Unemployment Rate
 - Participation Rate
 - Data only available from 2010 onwards due to change to the ASGS areas
- 
- The diagram consists of two red rectangular boxes. The top box is labeled 'Regional characteristics' and is connected by a red bracket to the first five variables of the list: Building Approvals, Estimated Resident Population, Net Regional Migration, Patent Applications, and Trademark Applications. The bottom box is labeled 'Labour Characteristics' and is connected by a red bracket to the last three variables: Employment Rate, Unemployment Rate, and Participation Rate.

Panel Data



Three-way Anova

Effect	SS	%
Regions	63.304	5.56
Variables	366.333	32.20
Time	1.723	0.15
Regions × Variables	635.211	55.84
Regions × Time	8.081	0.71
Variables × Time	8.825	0.78
Regions × Variables × Time	54.094	4.76
Total SS	1137.571	100.00

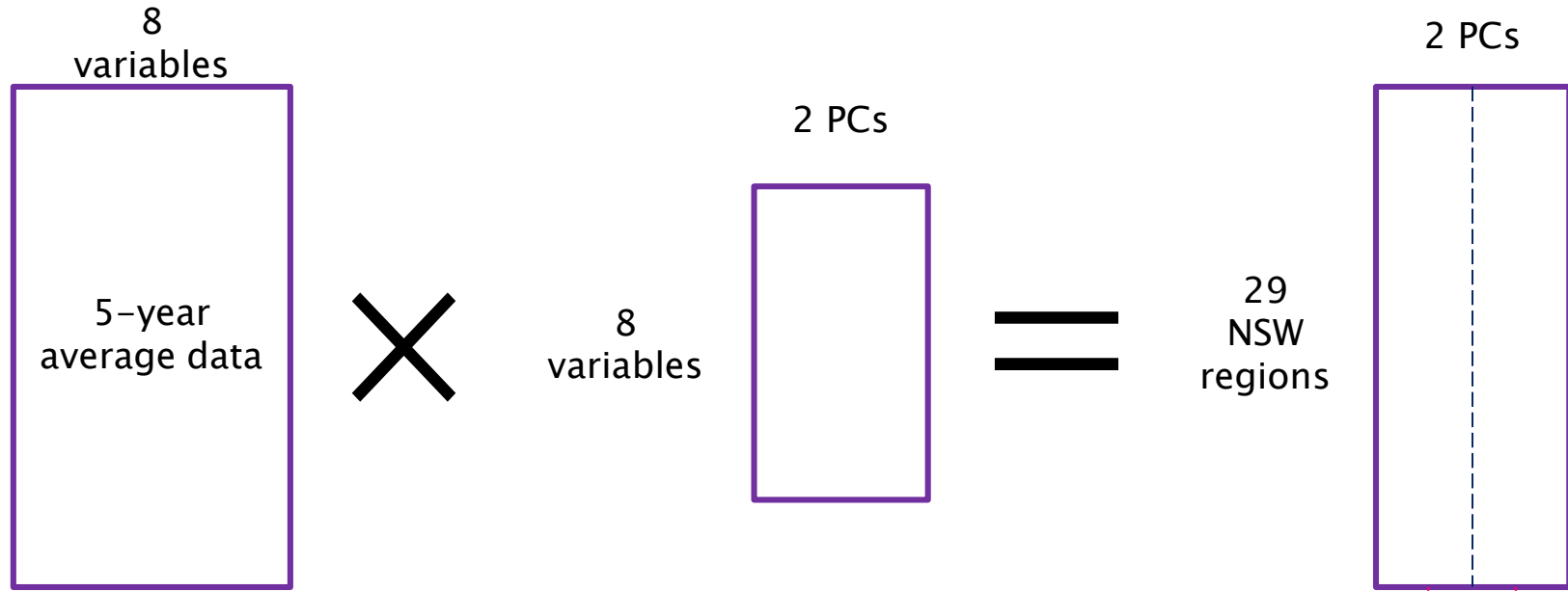
- Most of the interaction is in (Regions × Variables) that carries 55.84% of the variance in the data
 - lack of interaction with time is possibly due to the short span
- Hence we start by averaging the data across Time and extract the principal components

2 Principal Components

	Regional Characteristics	Labour Market
Building Approvals	0.471	-0.156
Estimated Resident Population	0.418	0.193
Net Regional Migration	-0.409	0.159
Patent Applications	0.447	0.099
Trademark Applications	0.477	0.045
Employment Rate	0.024	0.578
Unemployment Rate	0.085	-0.504
Participation Rate	0.038	0.560

- Eigenvalues indicate 2 principal components (using the Kaiser–Guttman rule)
 - explains 78.7% of the variance
- After varimax rotation, we focus on (absolute) values of loadings > 0.3
- This gives a clear split between Labour and Regional Characteristics components

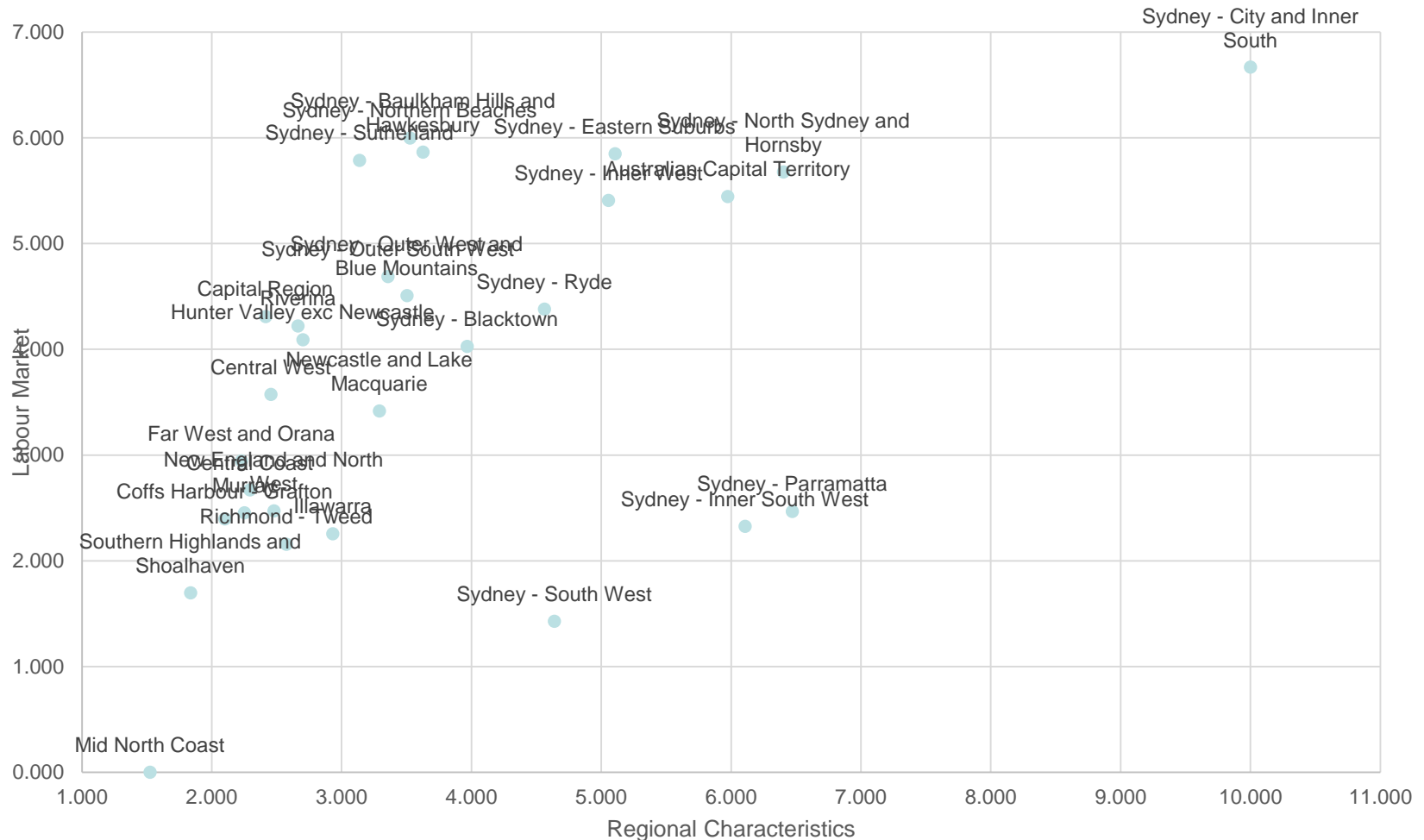
Cross-Sectional Regional Index



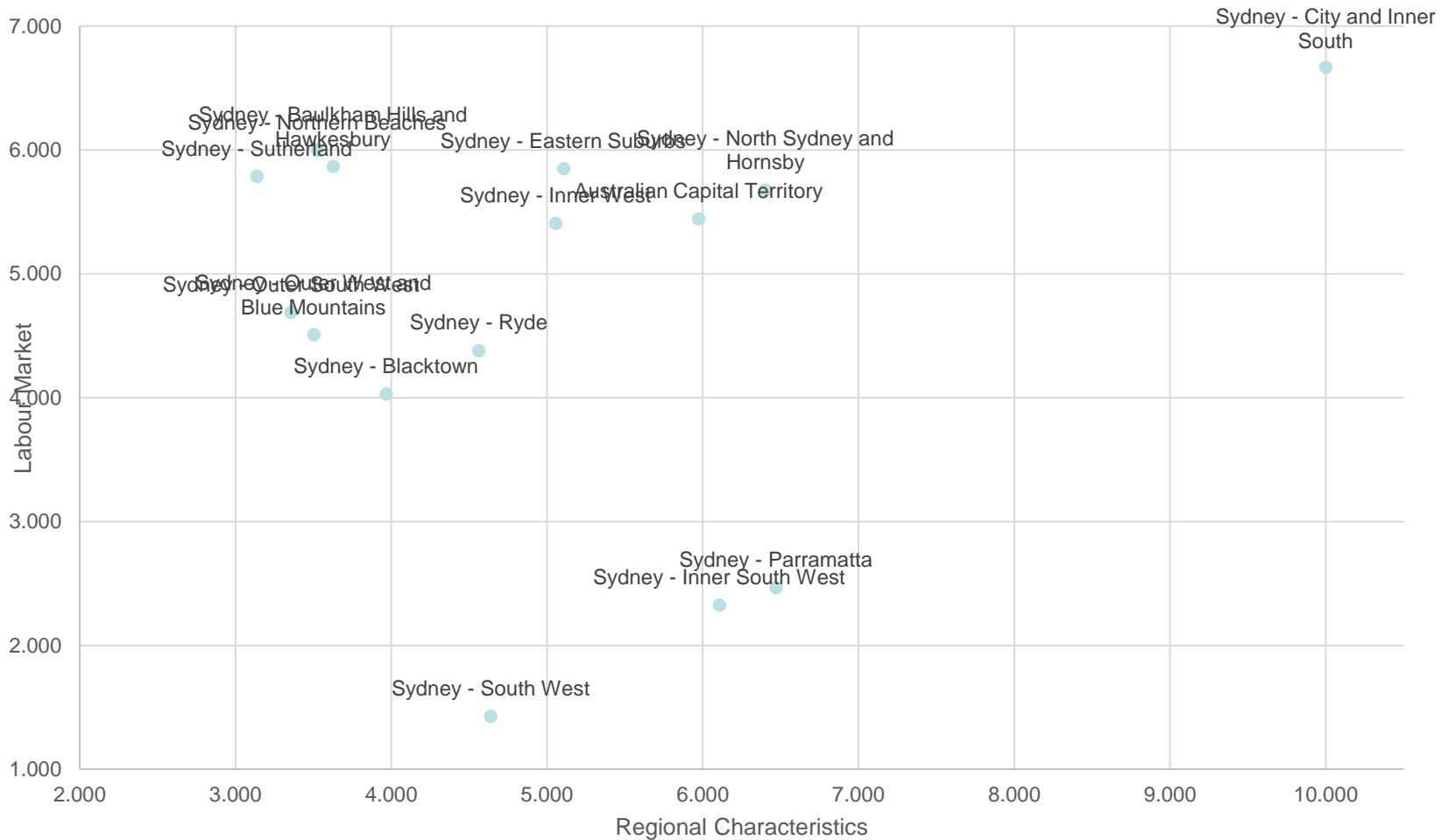
- We can derive an (5-year average) index on how each region scores on
 - the regional characteristics component
 - the labour market component
- Rescaled to between 0 and 10



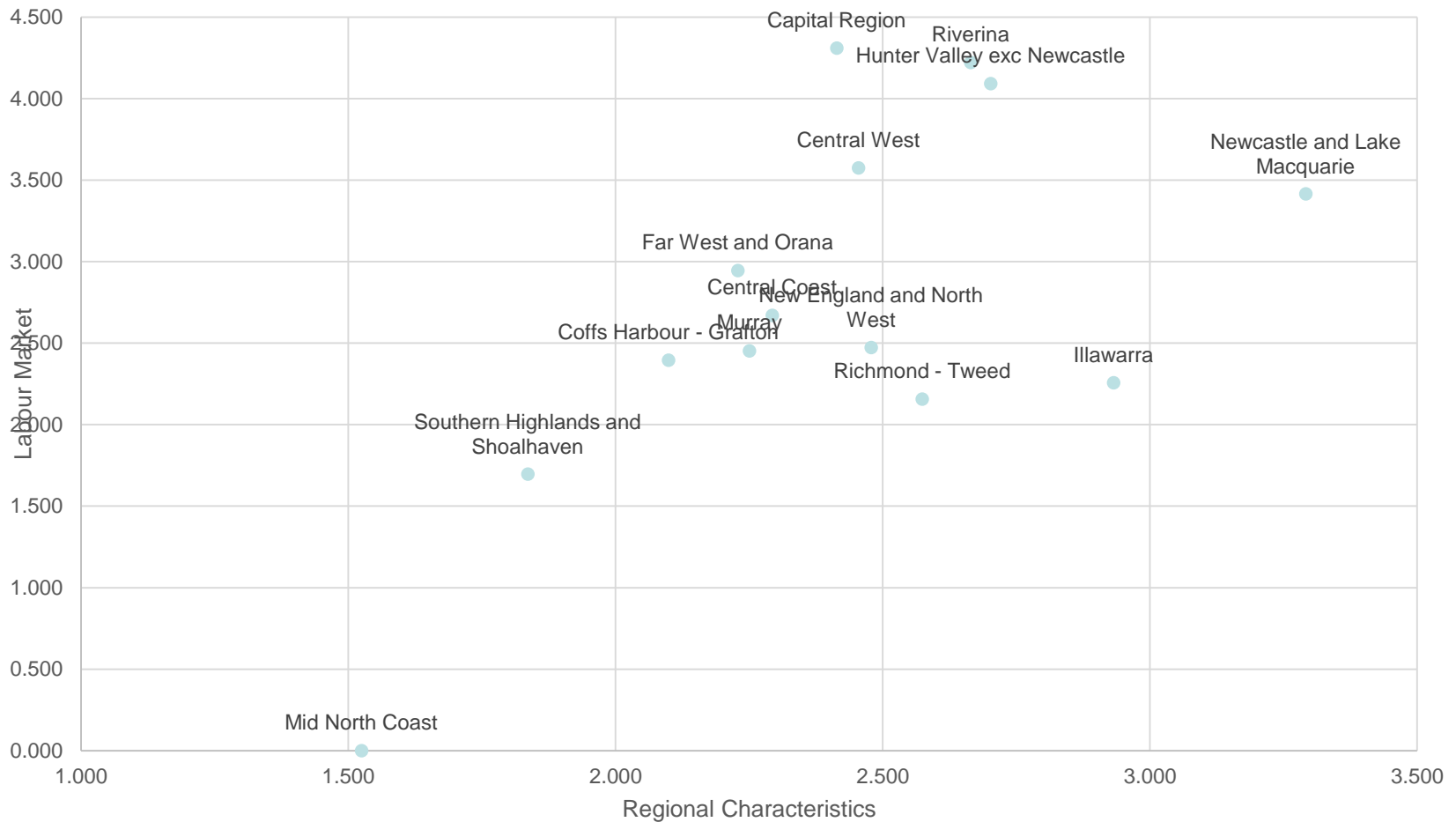
Regional Scores



Regional Scores: Sydney Regions

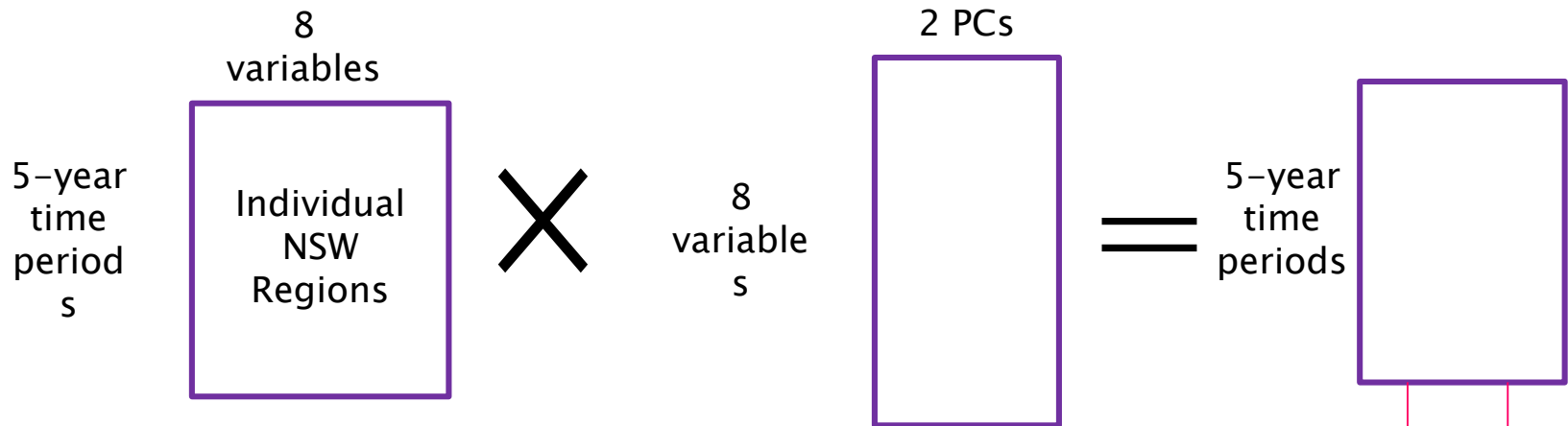


Regional Scores: Rest of NSW



Regional Resilience Index

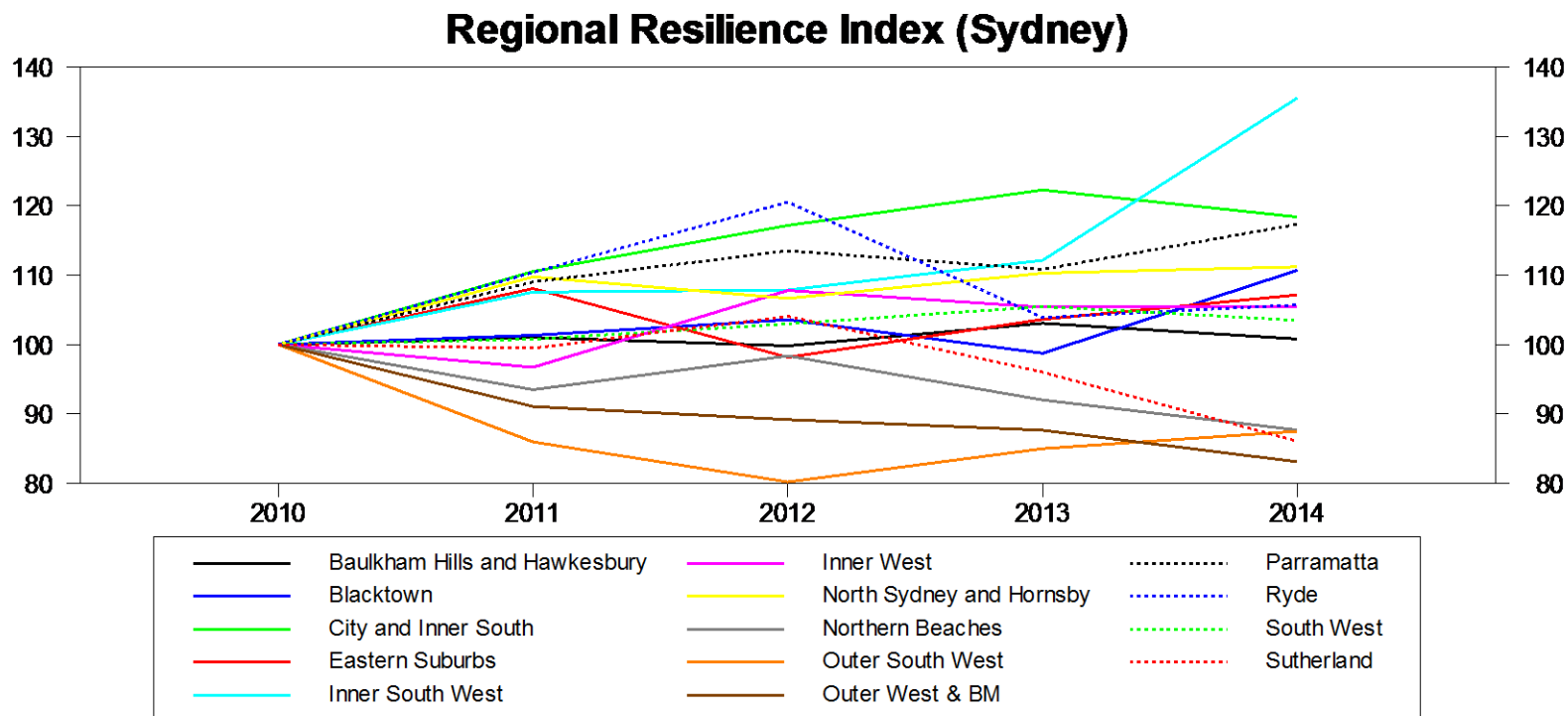
- An alternative way of exploring the original panel data is to look at each individual NSW region and its interaction with time
- More specifically, the differential dynamic for each NSW region is projected onto the PC space:



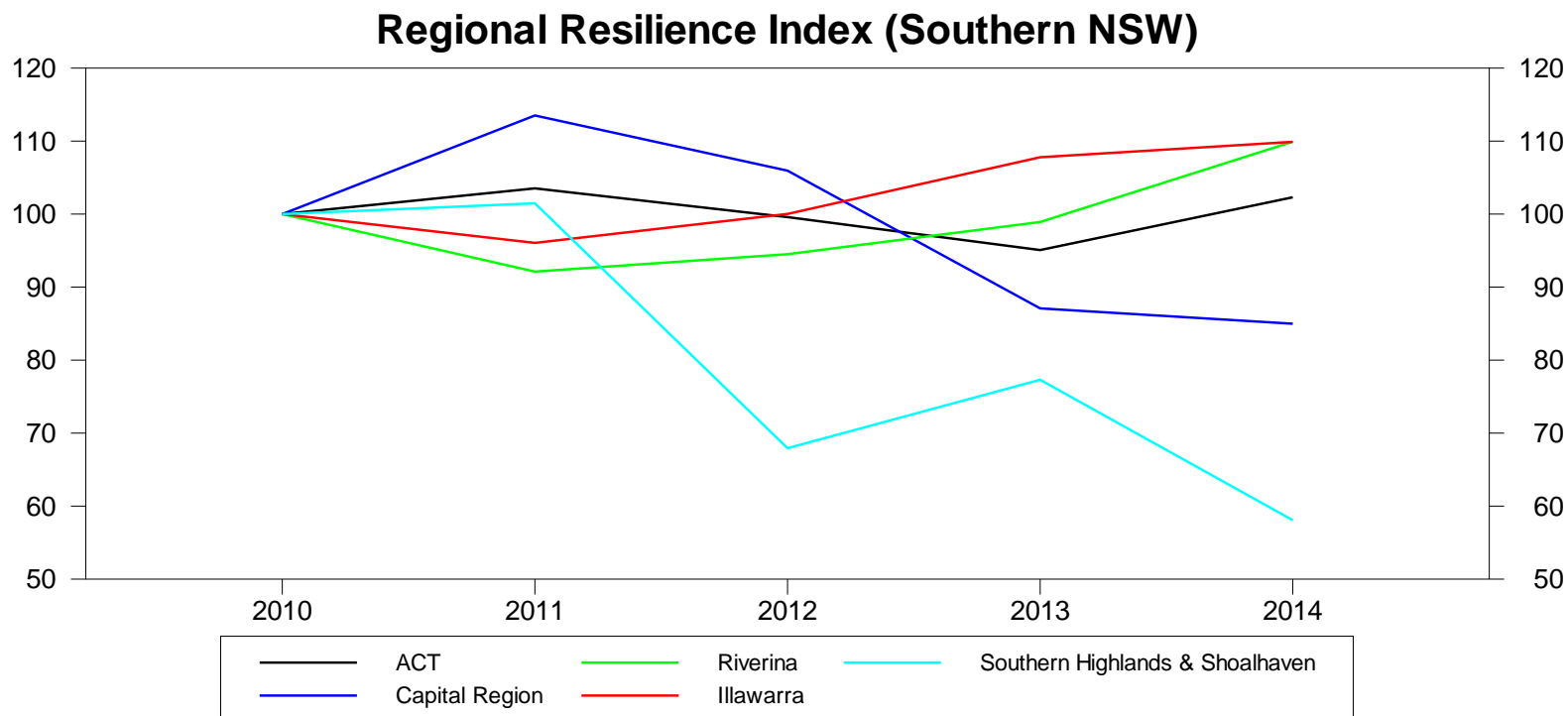
- Resilience Index in year t for each NSW region

$$= \sum (\text{proportion explained} \times \text{PC})$$
 - Year 2010 set to 100 as the base year

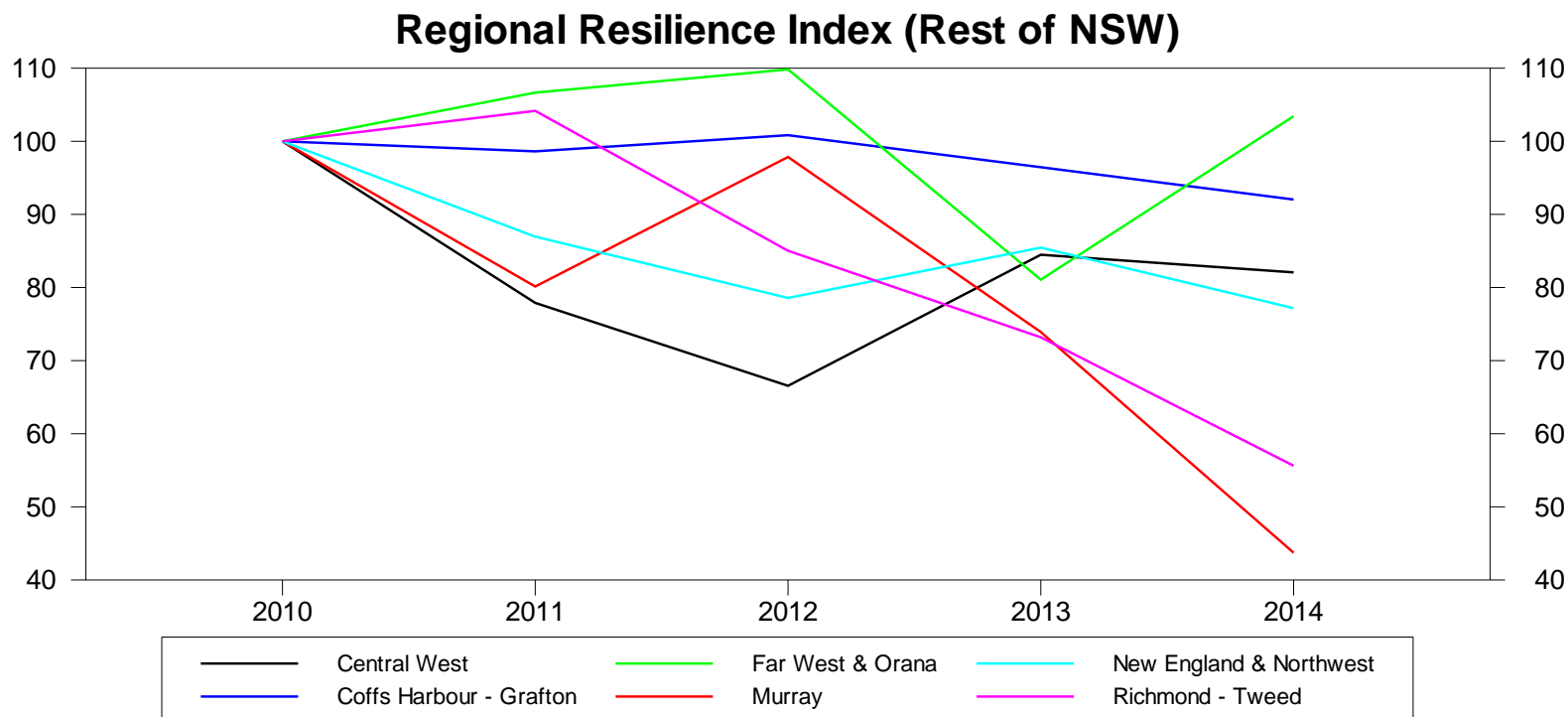
Regional Resilience Index (Sydney)



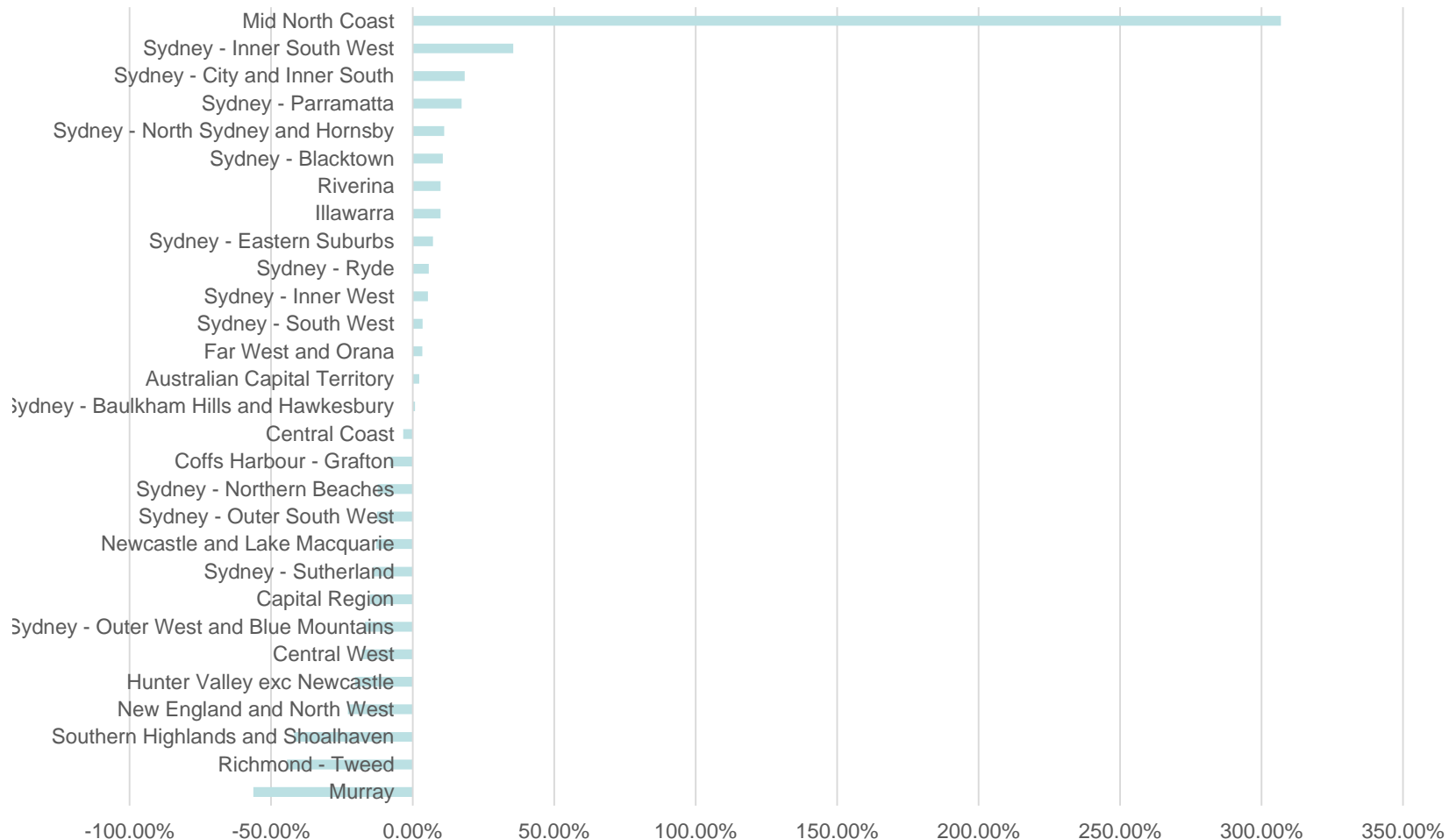
Regional Resilience Index (Southern NSW)



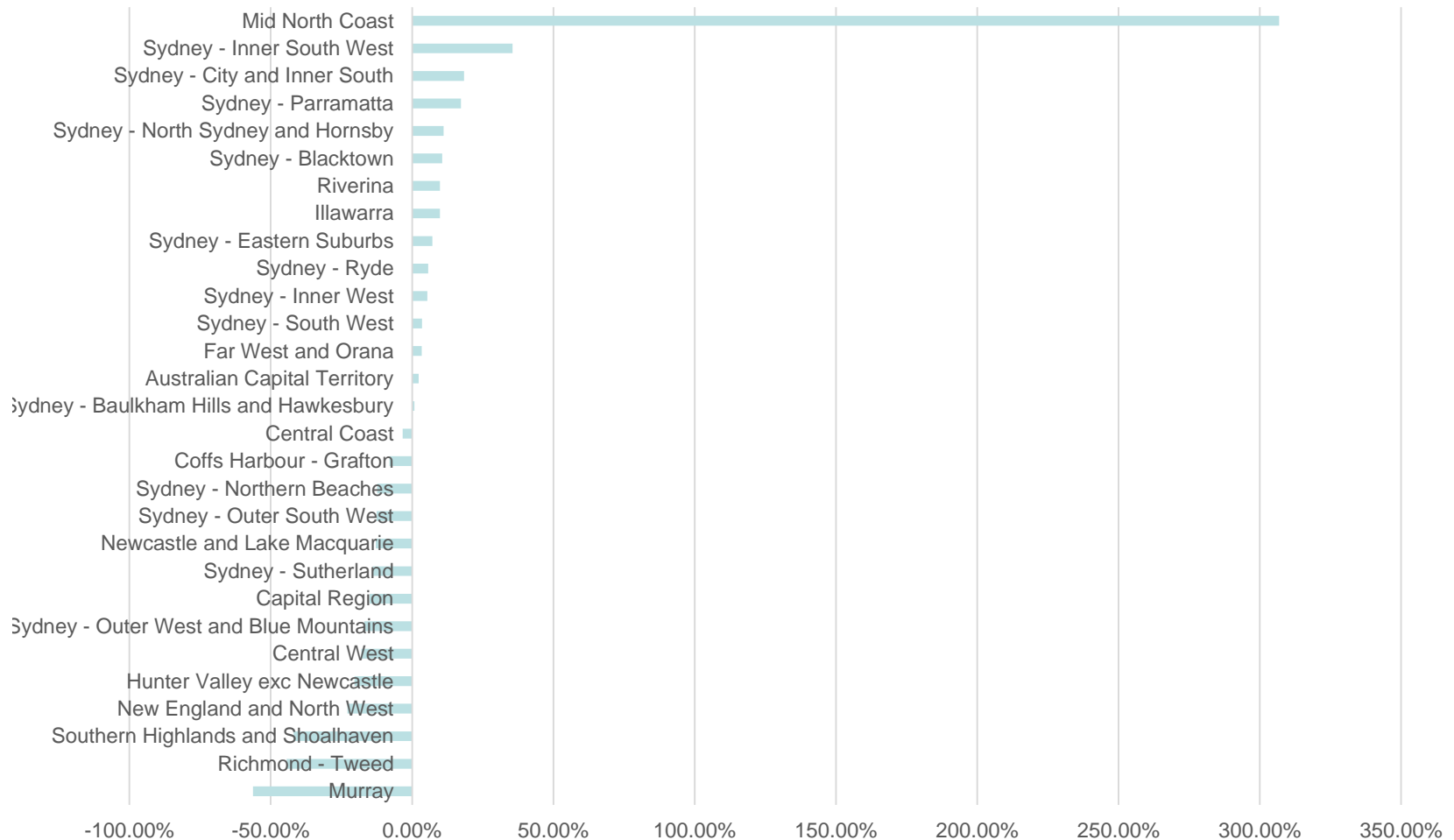
Regional Resilience Index (Rest of NSW)



5 Year Percentage Change in Resilience Index



5 Year Percentage Change in Resilience Index



What value to the discussions does this add?

- Clear, concise composite indicator based on a number of different factors
 - Able to produce a health check on regional economies
- Scope to include proximity (ARIA+ index

Data Sources

- ABS Hierarchical Regional Data
 - Regional Statistics by ASGS: The National Regional Profile (NRP) <http://stat.data.abs.gov.au/>, accessed 30/11/2016
 - Employment statistics: Labour Force, Australia, Detailed – Electronic Delivery, catalogue number 6291.0.55.001
<http://abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/6291.0.55.001Nov%202016?OpenDocument>
accessed 29/12/2016