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

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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
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
Panel Data

29 NSW regions

8 variables

$t = 2010$

8 variables

$t = 2011$

8 variables

$t = 2014$

5 years
### Three-way Anova

<table>
<thead>
<tr>
<th>Effect</th>
<th>SS</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regions</td>
<td>63.304</td>
<td>5.56</td>
</tr>
<tr>
<td>Variables</td>
<td>366.333</td>
<td>32.20</td>
</tr>
<tr>
<td>Time</td>
<td>1.723</td>
<td>0.15</td>
</tr>
<tr>
<td>Regions × Variables</td>
<td>635.211</td>
<td>55.84</td>
</tr>
<tr>
<td>Regions × Time</td>
<td>8.081</td>
<td>0.71</td>
</tr>
<tr>
<td>Variables × Time</td>
<td>8.825</td>
<td>0.78</td>
</tr>
<tr>
<td>Regions × Variables × Time</td>
<td>54.094</td>
<td>4.76</td>
</tr>
<tr>
<td><strong>Total SS</strong></td>
<td>1137.571</td>
<td>100.00</td>
</tr>
</tbody>
</table>

- 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

- 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
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: Sydney Regions

Regional Characteristics

Labour Market

Regional Scores: Sydney Regions

Regional Characteristics

Labour Market

Regional Scores: Sydney Regions

Regional Characteristics

Labour Market

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Regional Scores: Sydney Regions

Regional Characteristics

Labour Market
Regional Scores: Rest of NSW

Labour Market Regional Characteristics vs. Regional Characteristics

Regions:
- Capital Region
- Hunter Valley exc Newcastle
- Central West
- New England and North West
- Newcastle and Lake Macquarie
- Northern Rivers
- Grafton
- Coffs Harbour
- Centre Coast
- Central West
- Far West and Orana
- Murray
- New England and North West
- Illawarra
- Richmond - Tweed
- Southern Highlands and Shoalhaven
- Mid North Coast

Values on the graph represent scores for each region.
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:

\[
\text{Resilience Index in year } t \text{ for each NSW region} = \sum (\text{proportion explained } \times \text{PC})
\]

- Year 2010 set to 100 as the base year.
Regional Resilience Index (Sydney)
Regional Resilience Index (Southern NSW)
Regional Resilience Index (Rest of NSW)

Central West
Coffs Harbour - Grafton
Far West & Orana
Murray
New England & Northwest
Richmond - Tweed

2010 2011 2012 2013 2014

40 40
50 50
60 60
70 70
80 80
90 90
100 100
110 110

Central West
Coffs Harbour - Grafton
Far West & Orana
Murray
New England & Northwest
Richmond - Tweed
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 Hierachical Regional Data