bushfire&natural HAZARDSCRC

PRE-DISASTER MULTI-HAZARD DAMAGE AND ECONOMIC LOSS ESTIMATION MODEL

NATURAL DISASTERS AND SECTORAL ECONOMIC DEVELOPMENT: EVIDENCE FROM AUSTRALIA

DR. MUHAMMAD HABIBUR RAHMAN
DEPARTMENT OF ECONOMİCS, DEAKIN UNIVERSITY

Date: 30 AUG, 2016

An Australian Government Initiative

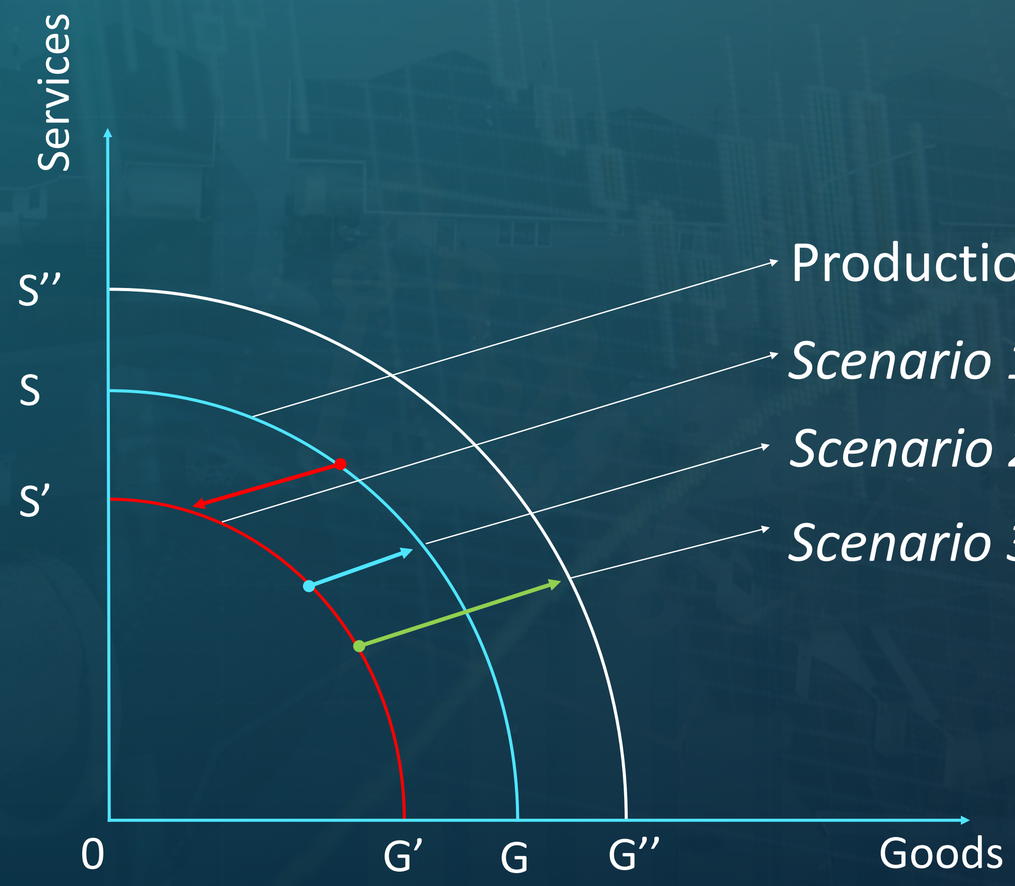
CRC AUSTRALIA

THE UNIVERSITY OF MELBOURNE

DEAKIN UNIVERSITY AUSTRALIA Worldly

MOTIVATION OF THE RESEARCH

Motivation



Production Possibility Frontier (PPF)

Scenario 1: No Recovery

Scenario 2: Build Back to Normal

Scenario 3: Build Back Better

Motivation

The emerging literature on the nexus between natural disasters and economic development remains inconclusive (Cavallo and Noy, 2010):

Motivation

NEGATIVE

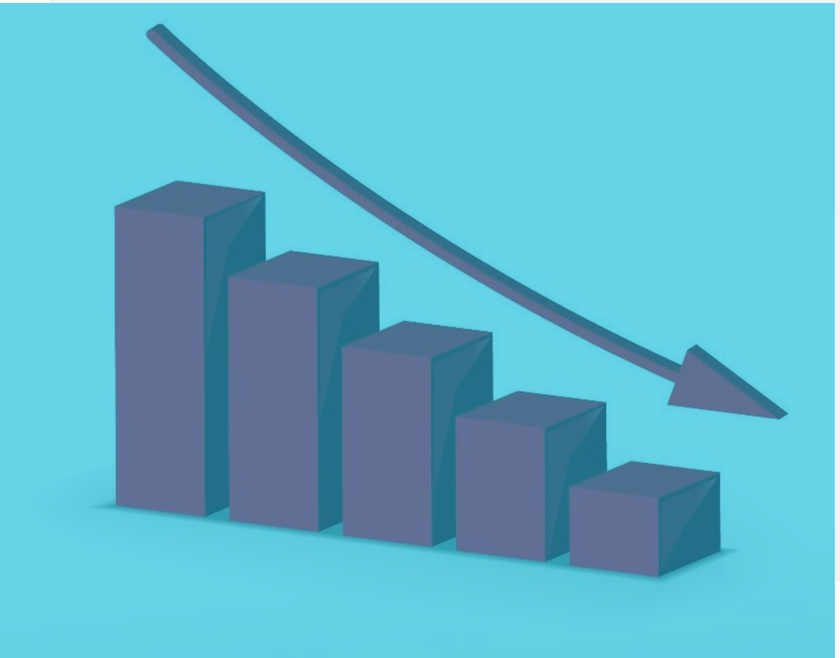
Rasmussen (2004), Cavallo et al. (2010), Cuaresma et al. (2008), Leiter, Oberhofer and Raschky (2009), Raddatz (2007 and 2009), Noy (2009), and Strobl (2011).

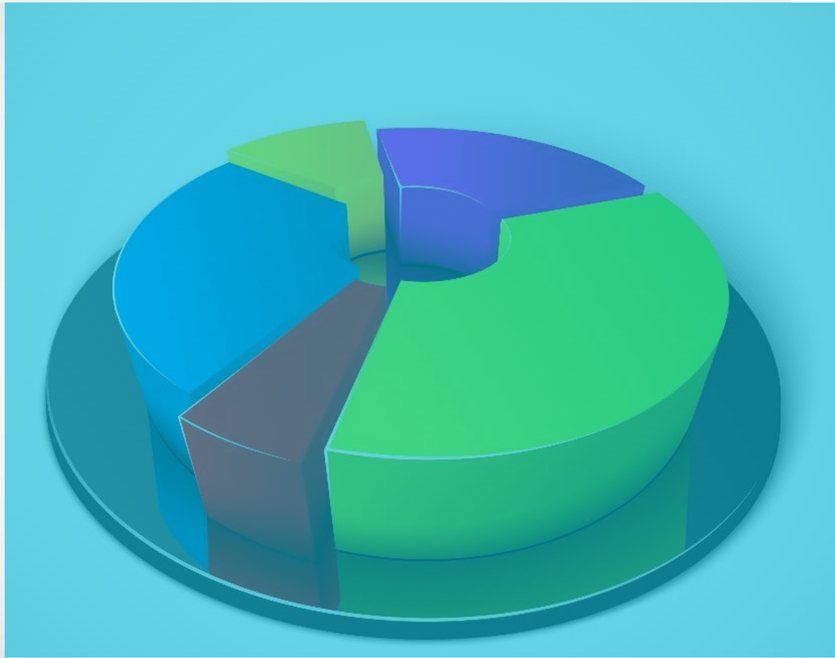
POSITIVE

Skidmore and Toya (2002), Leiter et al. (2009), Loayza et al. (2012), and Fomby et al. (2013).

NO EFFECT

Caselli and Malhotra (2004), Albala-Bertrand (1993), and Cavallo et al. (2013).





Motivation

Five reasons behind such mixed findings:

1. DIFFERENT SAMPLES

Almost all are at cross-country settings focusing on different regions;

All Countries: Fomby, Ikeda and Loayza (2011); Stromberg (2007); Cavallo et al. (2013); Skidmore and Toya (2002).
Developed Countries: Melecky and Raddatz (2014)
Developing Countries: Raddatz (2007); Cuaresma et al. (2008).

Vigdor (2008); Kelman (2007)

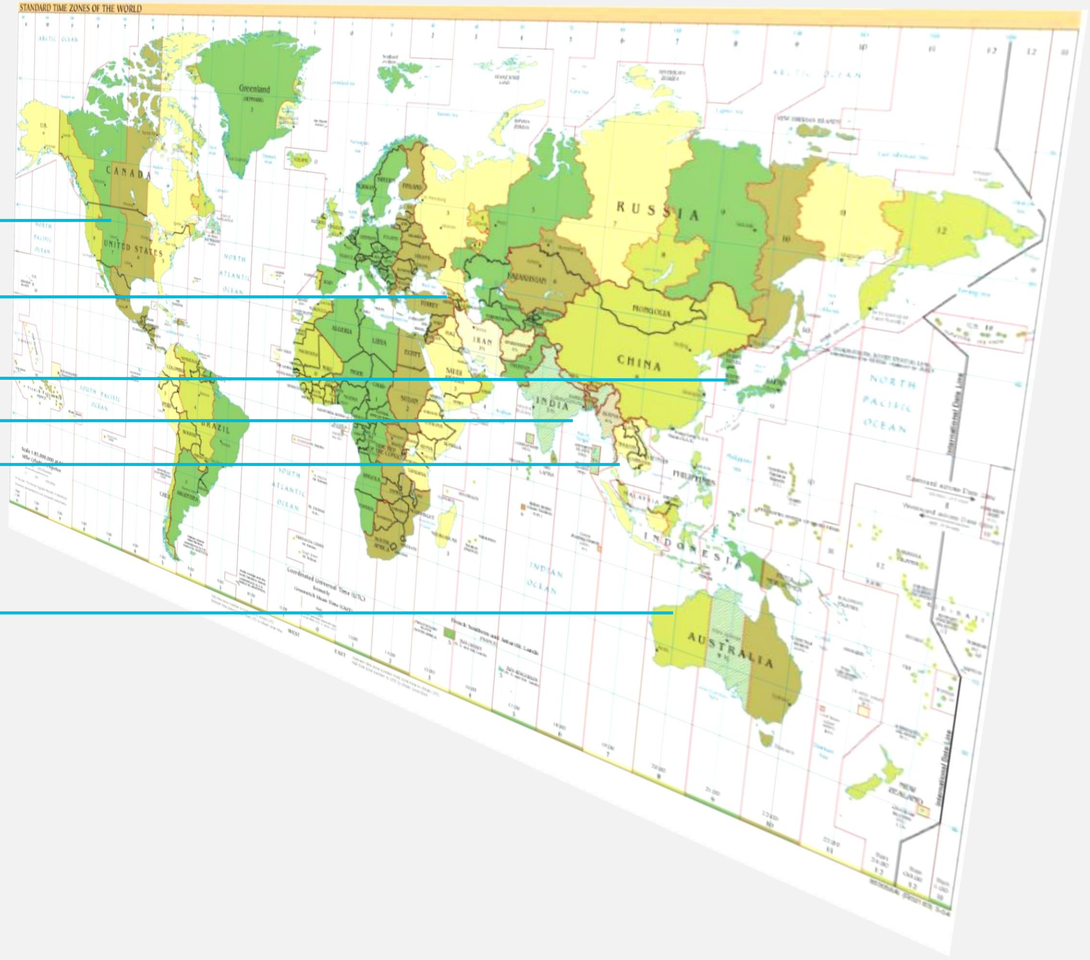
Selcuk and Yeldan (2001)

Horwich (2000)

Athukorala & Resosudarmo (2005)

Benson (1997)

Crompton and McAneney (2008)

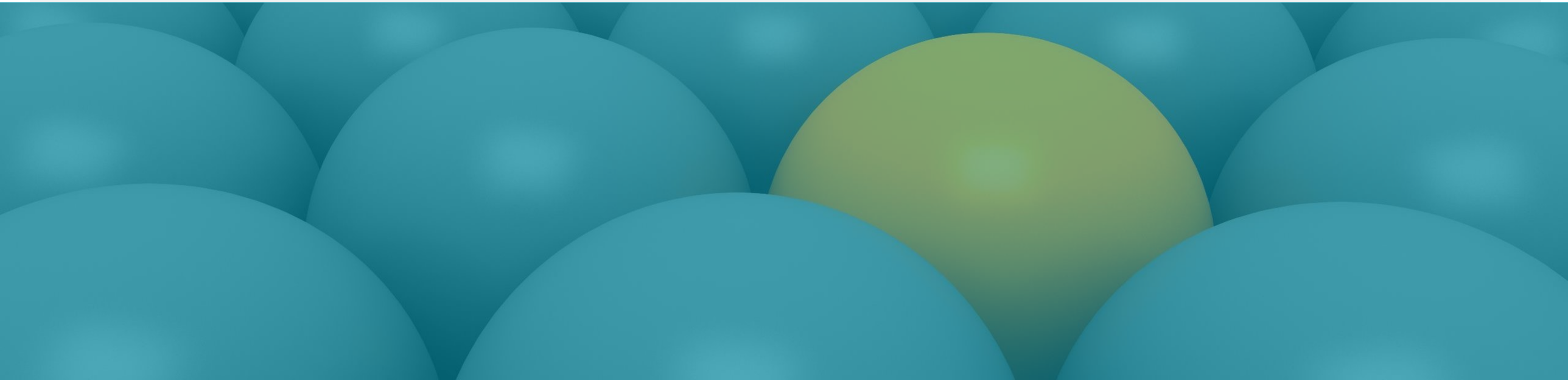


Motivation

2. DEFINITION OF DISASTERS

Various aggregation of natural disasters;

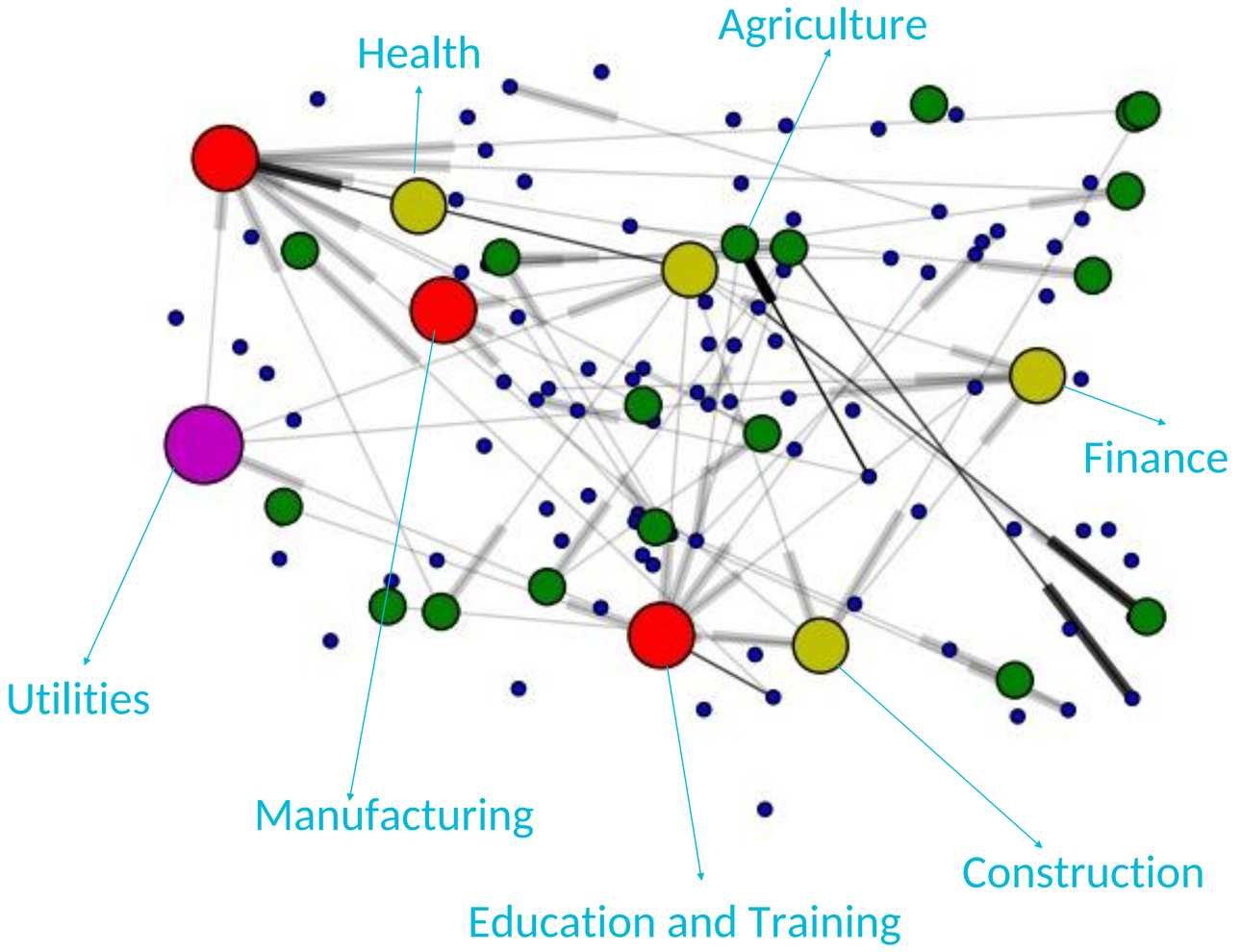
- Geological vs. climatological disasters
- Disaster-specific variables vs. disaster index



3. AGGREGATED OUTPUT

mostly disasters hit a particular sector rather than the whole economy;

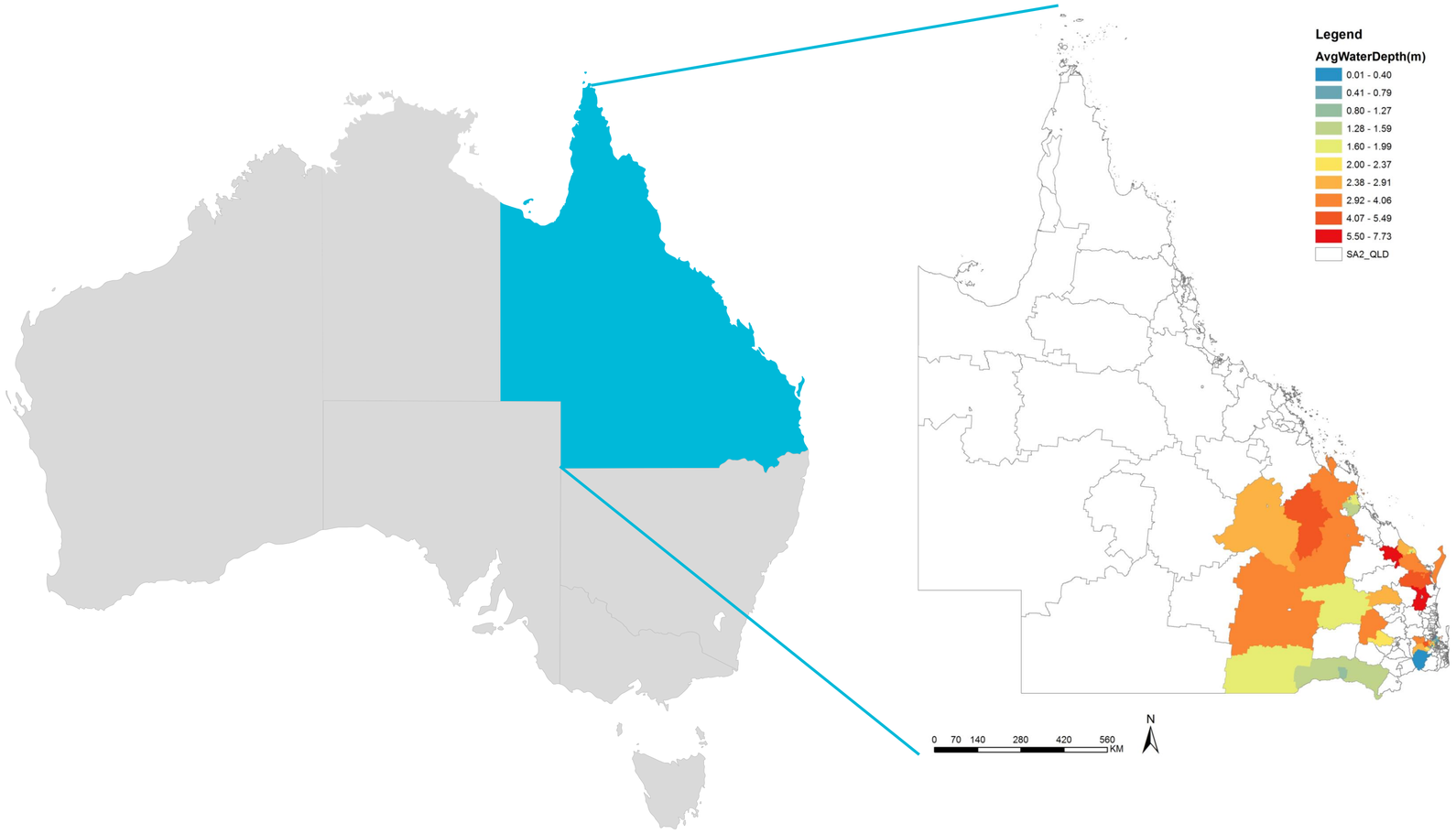
Motivation



Motivation

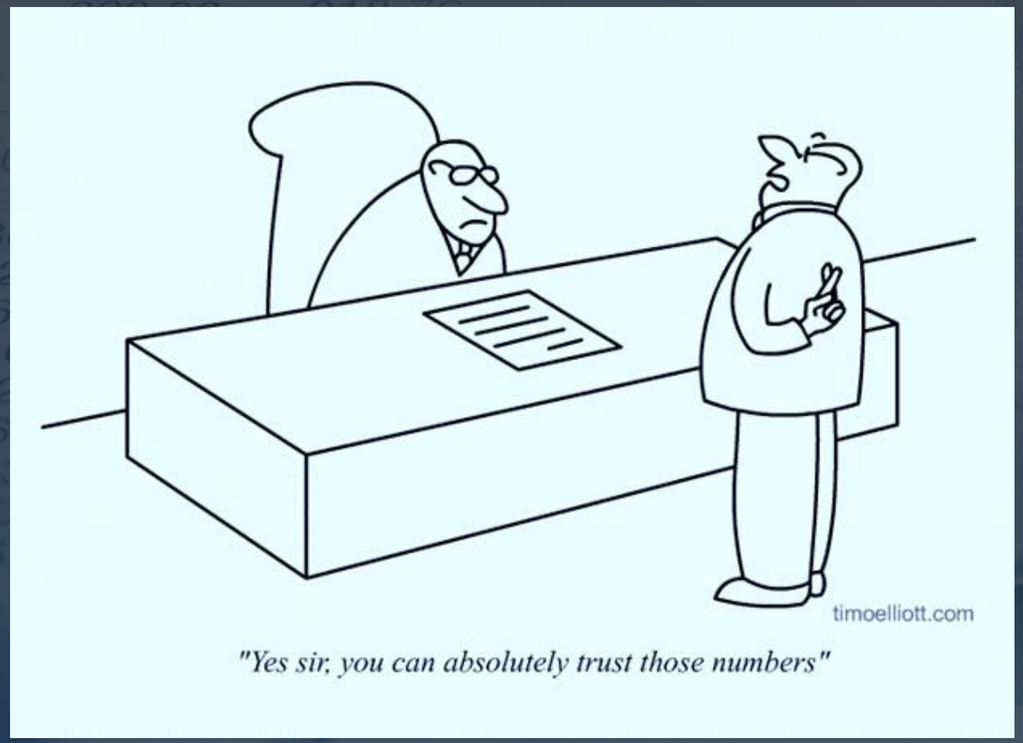
4. LOCALISED EVENTS

Disasters are local;



5. QUALITY OF DATA

EM-DAT is a outcome-based dataset depending mostly on human casualties. It triggers endogeneity in estimation.



OBJECTIVES OF THE RESEARCH

Objective of this Research

To estimate the sector-specific income effect of natural disasters in Australia using state level data.

WHY AUSTRALIA ?

WHY AUSTRALIA ?...

Black Saturday Bushfire, 2009; Source: www.royalcommission.vic.gov.au

Queensland Flood, 2010; Source: 7news.com.au

NSW earthquake, 1994; Source: www.emknowledge.gov.au

Cyclone Larry, 2006; Source: willsgeographyblog

Why Australia ?

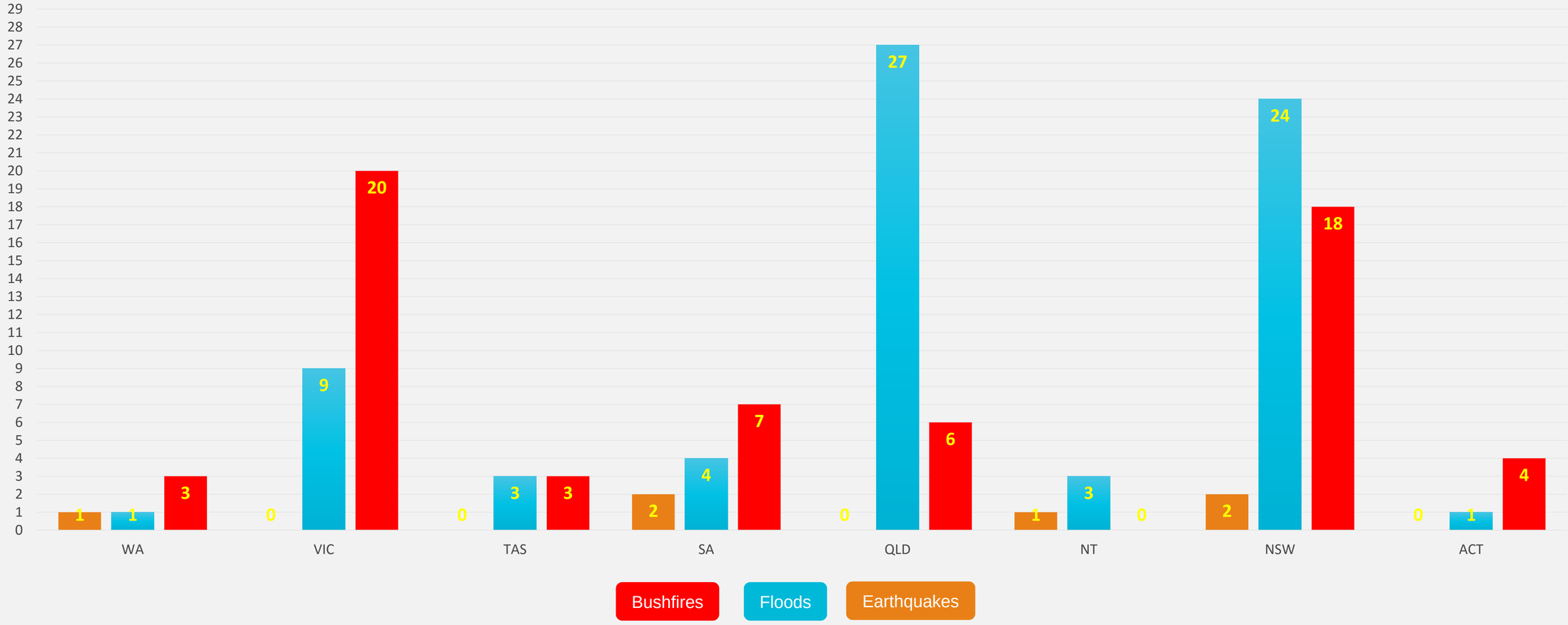


Table 2: Significant Natural Disasters in Australia, 1851 - 2014

Source: Australian Emergency Management Knowledge Hub, 2015;

DATA AND MEASUREMENT

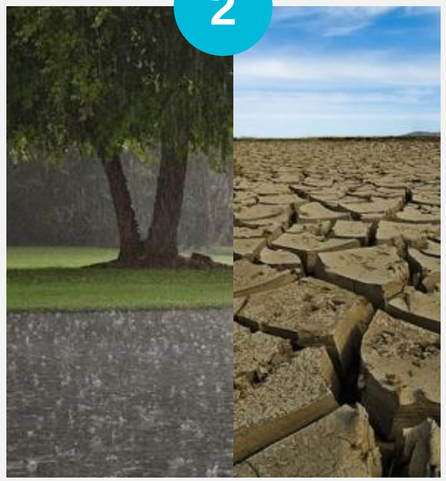
DATA

1

DATA 1

Data on Natural Disasters
(i.e., Floods and Bushfires)

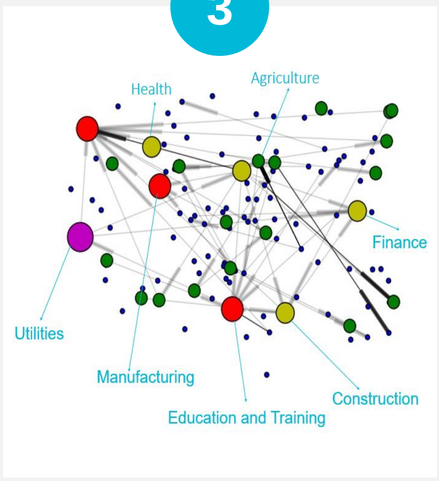
2



DATA 2

Data on extreme rainfall
and extreme temperature

3



DATA 3

Data on state level
sector-specific GDP

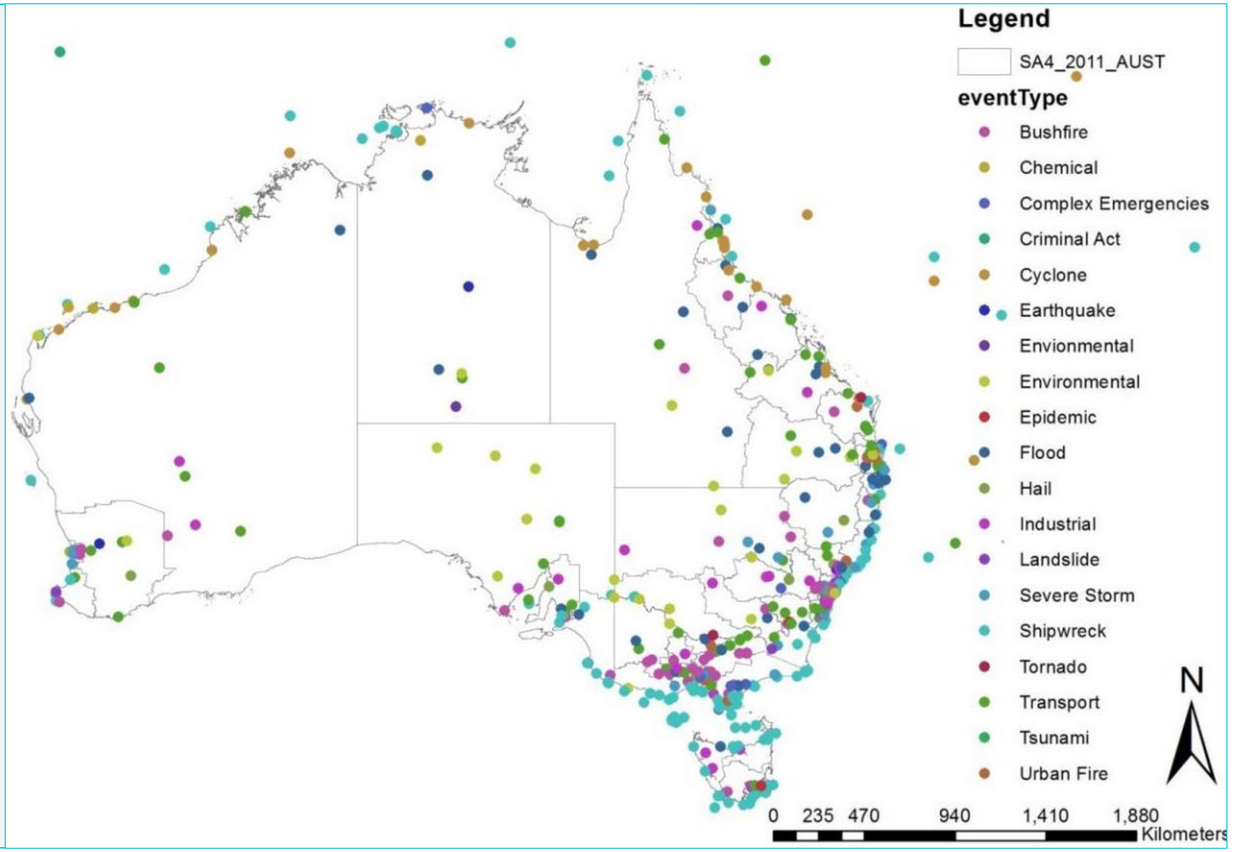
DATA

Data on Natural Disasters:

Emergency Management Australia revises data in 2014 that provides spatial information as well.

Analyses

We analyse floods and bushfires in this study.



DATA

Data on State Level

Data on state level sector-specific GDP, 1990-2014 : Australian Bureau of Statistics

Economic Sectors

we aggregate 19 economic sectors into four groups:

ESTIMATION MODEL

Estimation Model

We use a difference-in-differences (DD) estimation approach with continuous shocks:

$$lGDP_{s,t} = \alpha_i + \rho_i t + \emptyset_t + \beta_1 Climate\ Extreme_{s,t} + \beta_2 Disaster_{s,t} + \beta_3 (Climate\ Extreme_{s,t} \times Disaster_{s,t}) + \varepsilon_{s,t}$$

Where,

ε = Disturbance term

α = State-specific fixed effect

t = State-specific time trend

$\emptyset$ = Common time-varying shocks

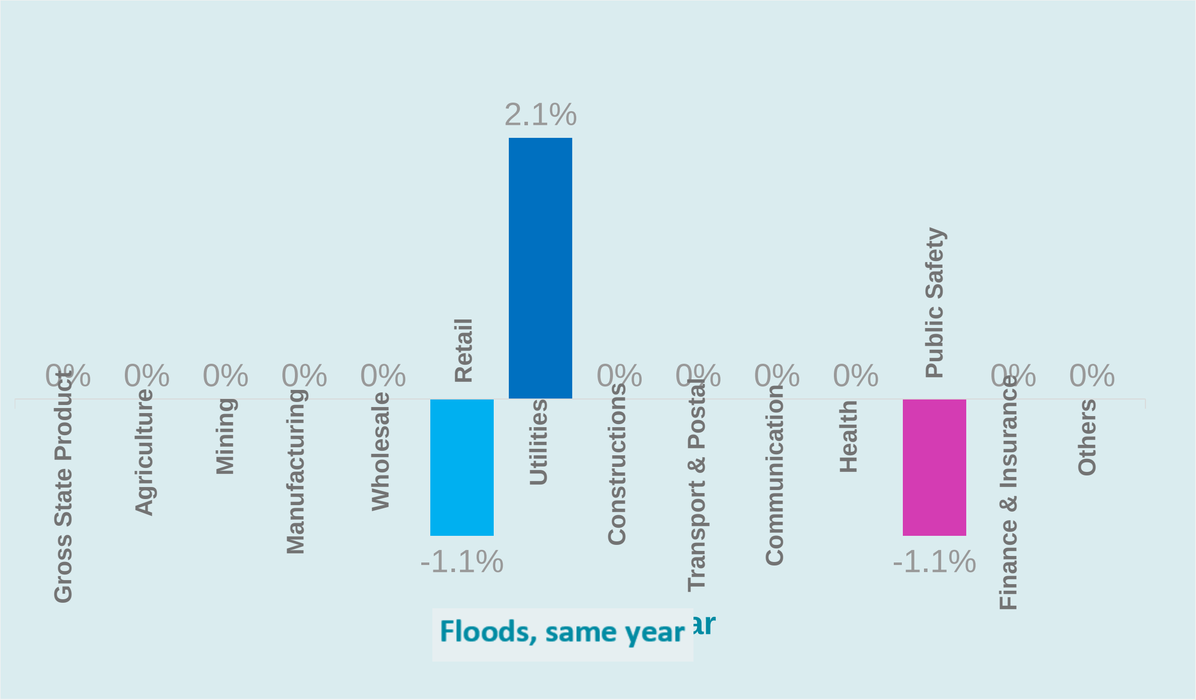
s = State

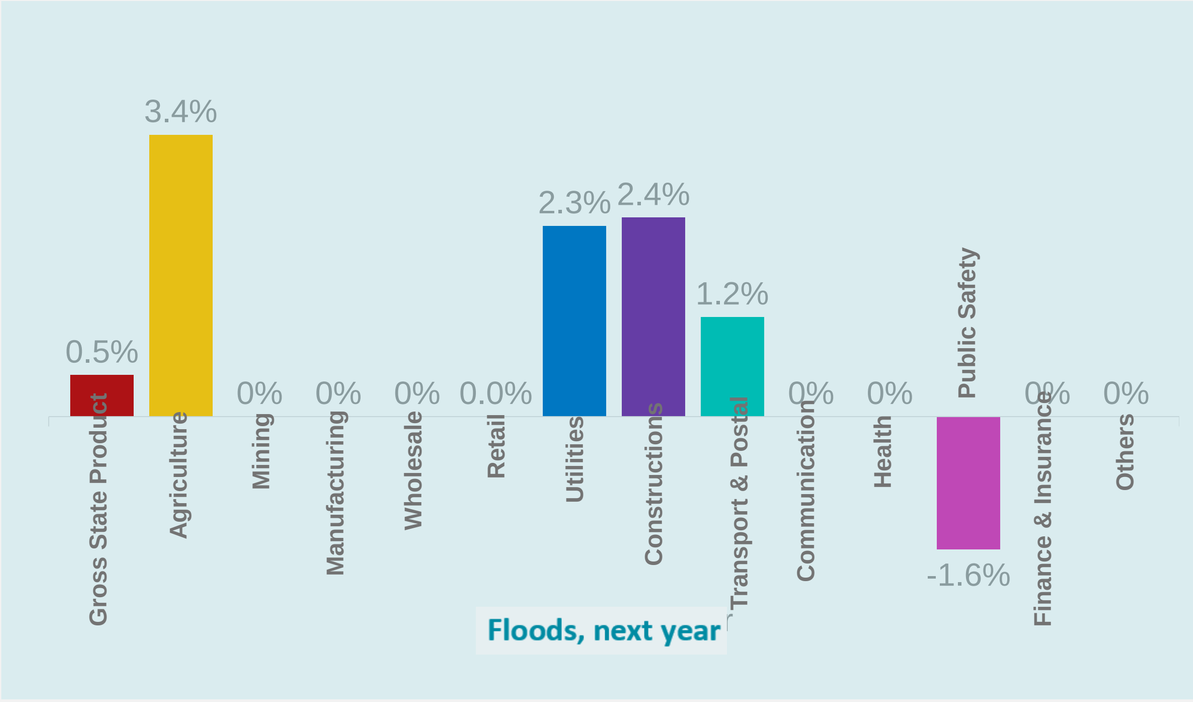
t = Year


RESULTS

Results

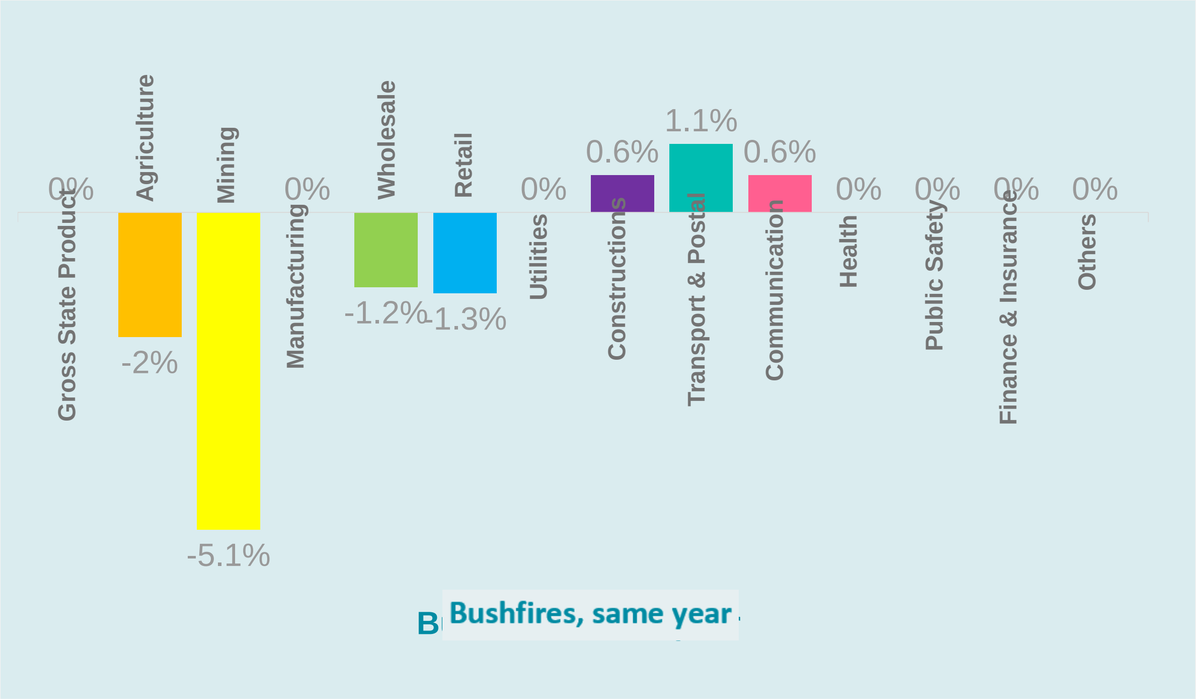
Table 1: Effects of natural disasters on economic sectors by ANZSIC 2006 division codes

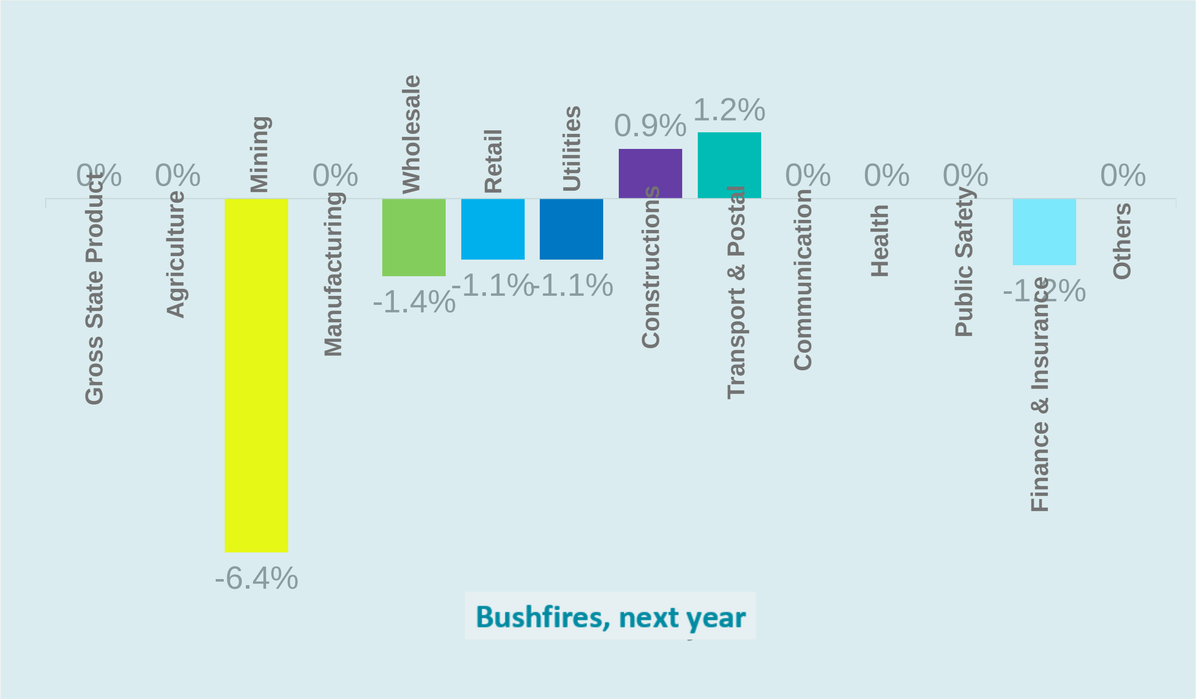




Results

Table 2: Effects of natural disasters on economic sectors by ANZSIC 2006 division codes





DATA

PRODUCTION

Agriculture

Mining

Manufacturing

Wholesale Trade

Retail Trade

Accommodation and Food Services

Rental, Hiring and Real Estate Services

Professional, Scientific and Technical Services

Arts and Recreation Services

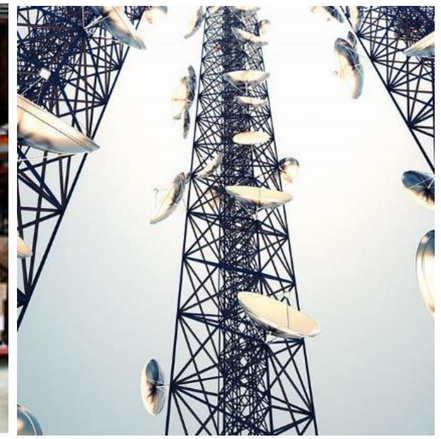
DATA

INFRASTRUCTURE

Electricity, Gas, Water and Waste Services

Construction

Transport, Postal and Warehousing



Information Media & Telecommunication

SOCIAL

Education and Training

Health Care and Social Assistance

Public Administration and Safety

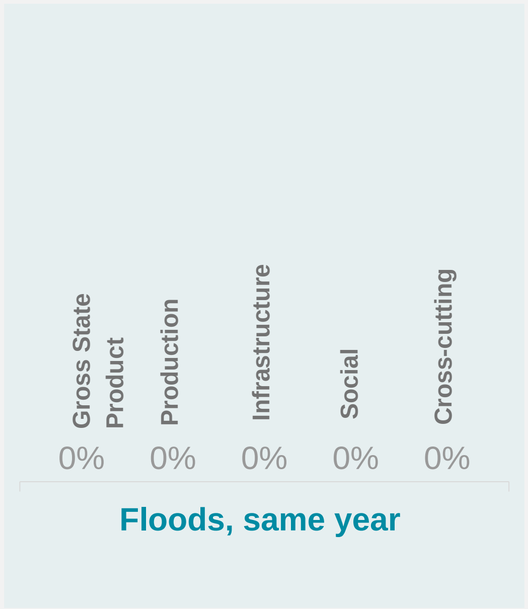
CROSS-CUTTING

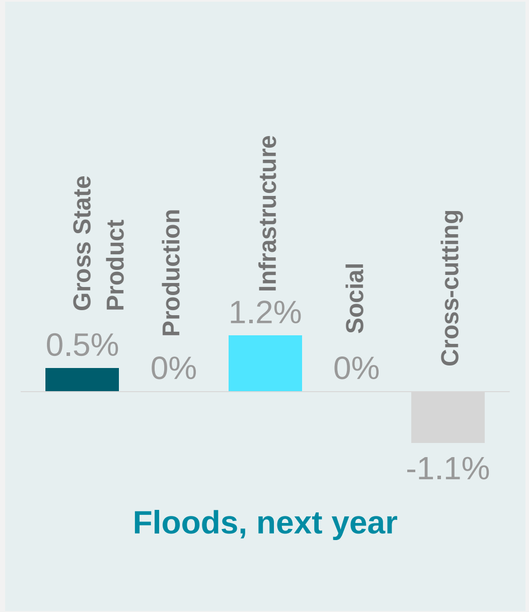
Financial and Insurance Services

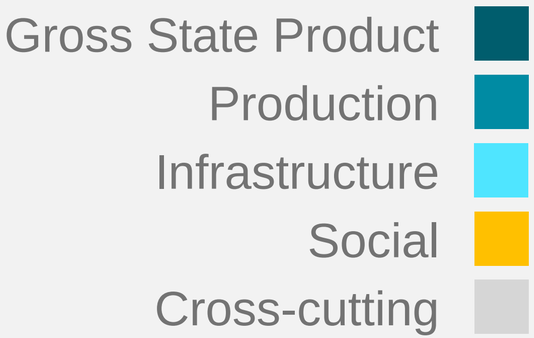
Administrative and Support Services

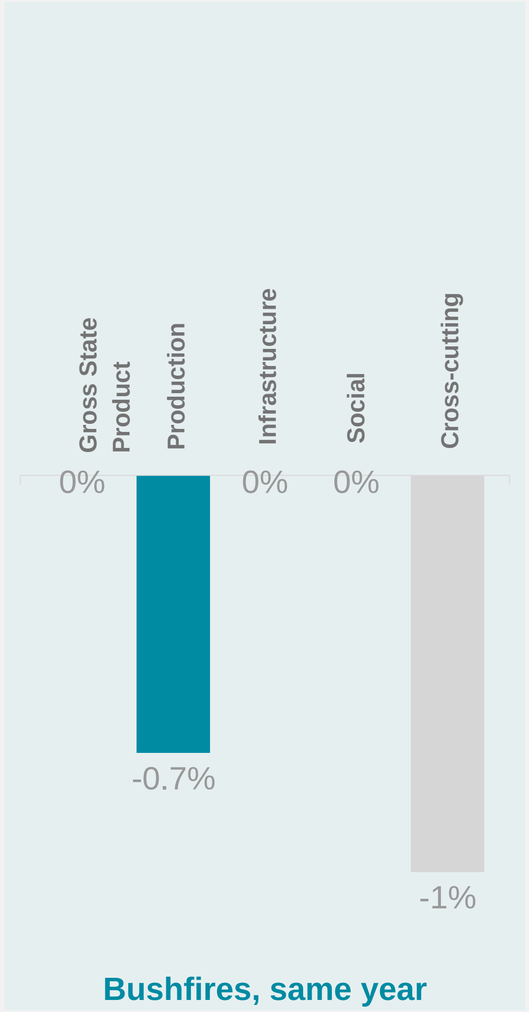
Results

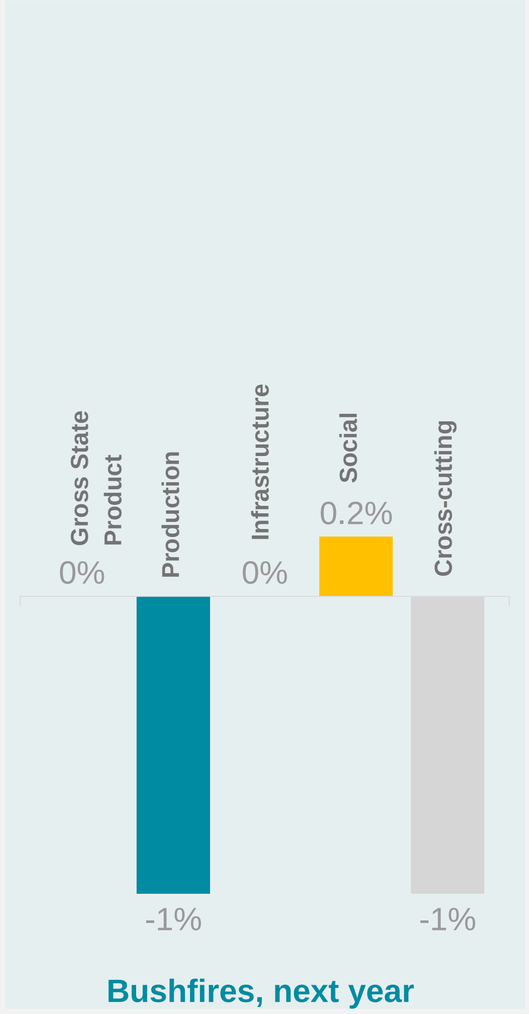
Table 3: Effects of natural disasters on production, infrastructure, social and cross-cutting sectors





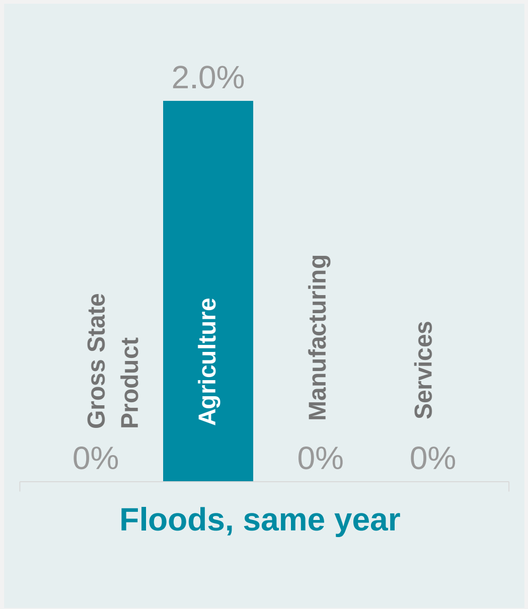


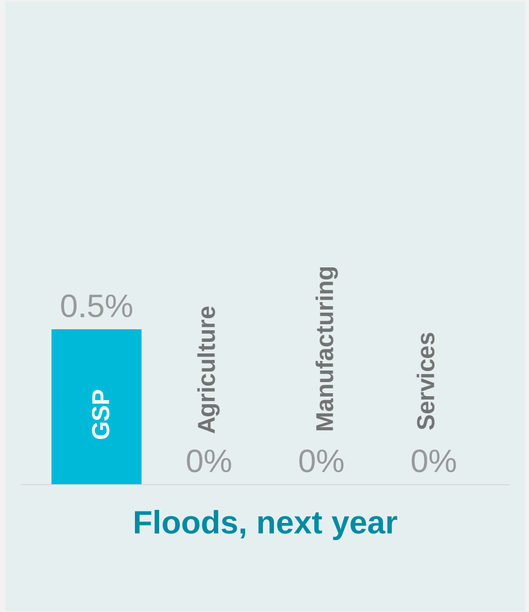


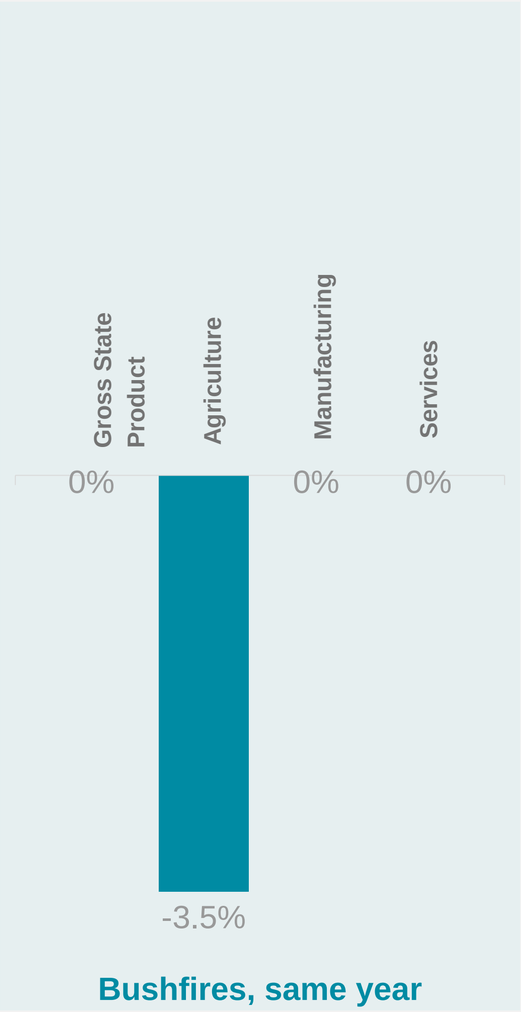


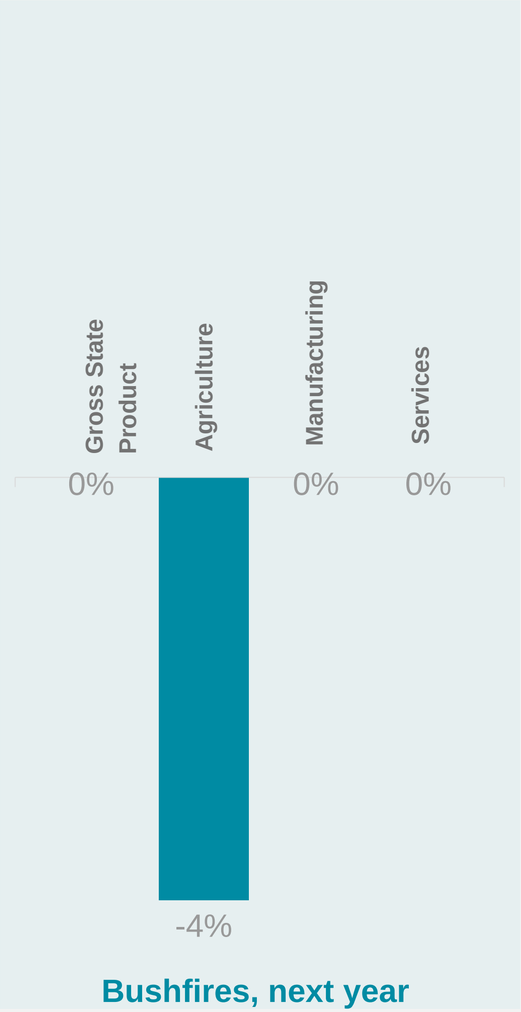
Results

Table 4: Effects of natural disasters on primary, secondary and tertiary sectors









Summary of Results

- **Significant income effects**

KEY TAKE AWAY

Australia experiences both *positive and negative effects* of natural disasters

Summary of Results

- **Each type of disasters is unique**

Different disasters affect different economic sectors differently. Hence, the insights obtained with over-aggregation can be misleading.

Summary of Results

Policy implications

Policies related to disaster risk reduction (DRR) should not be generic, as one policy does not fit all; rather they should be designed in considering their potential effects on the economy by *disaster* and by *sector*.

Q&A SESSION


THANK YOU