OPTIMISING POST-DISASTER RECOVERY INTERVENTIONS IN AUSTRALIA

UTILISING CENSUS DATA TO INFORM PUBLIC POLICY:
THE QUEENSLAND FLOODS 2010-11
THE BLACK SATURDAY BUSHFIRES 2009

MEHMET ULUBASOGLU, PROFESSOR
DEPARTMENT OF ECONOMICS, DEAKIN UNIVERSITY

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Research Team

Prof. Mehmet Ulubasoglu (Lead CI), Deakin University
Dr Muhammad Habibur Rahman, Deakin University

End-User representatives

Mr Ed Pikusa  South Australia Fire and Emergency Services Commission (SAFECOM)
Mr Aaron Verlin  Emergency Management Australia, Attorney General’s Department
Ms Laura Little  Department of Environment, Land, Water and Planning (DELWP), Victoria

POTENTIAL END USERS:
• Queensland Reconstruction Authority
• Department of Treasury and Finance Victoria
• Queensland Treasury
PRESENTATION OVERVIEW

1. THE PROJECT
2. OBJECTIVES & METHODOLOGY
3. FINDINGS: QUEENSLAND FLOODS 2010-11
4. BLACK SATURDAY BUSHFIRES 2009
5. PROGRESS TO DATE
6. THE WAY FORWARD
1. OBJECTIVES OF THE PROJECT
To estimate the effects of severe natural disasters on individuals’ income by sector:

- Identify the economic sectors that are ‘vulnerable’ to bushfires
- Identify the economic sectors that are ‘beneficiaries’ of bushfires
- Identify the economic sectors that are ‘unlikely to be affected’ by bushfires

Develop a ranked list of the economic sectors that seek more attention for policy intervention to minimise potential adverse effects of bushfires

To guide budget allocation across economic sectors in post-disaster recovery phase
2 CASE STUDIES

QLD Floods 2010-11

Black Saturday Bushfires 09

Cyclone Oswald, 2013
2. OUR METHODOLOGY
How do natural disasters affect individuals’ incomes?

How do natural disasters affect firms’ revenues?
Experimental Design: Our Estimation Approach
DATA ON QUEENSLAND FLOODS 2010-11

Brisbane and SE QLD flood map: Dec 2010 - Jan 2011
Bureau of Meteorology (BoM), Govt. of Australia

Map: Flooded Areas in Queensland, January 2011

We calculate “flood-water height” at SA2 level overlaying:
- Flooded-area map
- Digital elevation map
524 Statistical Area 2 units in Queensland
QUEENSLAND FLOODS IN 2010-11

SA2

140
374

Flooded SA2  Non-flooded SA2
Australian Census Longitudinal Dataset, 2006 and 2011. Conducted in August 2006 and August 2011, respectively.

- The ACLD is a random 5% sample of persons enumerated in Australia on Census Nights, 8 August 2006 and 9 August 2011
- Two censuses linked by the ABS to generate a longitudinal dataset
- Anonymised
We use a Difference-in-differences design:

\[ Y_{ict} = \text{cons} + \alpha_i + \beta_1 \text{Treat}_{it} + \beta_2 \text{PostDisaster}_{ct} + \beta_3 \text{Treat}_{it} \times \text{PostDisaster}_{ct} + \varepsilon_{ict} \]

where,

- \( \alpha \) = Individual fixed effect
- \( i \) = Individuals
- \( c \) = Cluster/SA2
- \( t \) = 2006, 2011
- \( \varepsilon \) = Disturbance Term

- We also include the following covariates in the model:
  - Length of shared boundary between treated and comparison SA2s
  - Distance from the nearest disaster affected SA2
3. KEY FINDINGS:
QUEENSLAND FLOOD 2010-11
### Sectors that experienced NO income difference:

- Agriculture, Forestry and Fishing
- Manufacturing
- Electricity, Gas, Water and Waste Services
- Construction
- Wholesale Trade
- Retail Trade
- Accommodation and food services
- Information Media and Telecommunications
- Financial and Insurance Services
- Professional, Scientific and Technical Services
- Administrative and Support Services
- Public Administration and Safety
- Education and Training
- Health Care and Social Assistance
- Arts and Recreation Services
- Other Services

### Sectors and Change in Income

<table>
<thead>
<tr>
<th>Sectors</th>
<th>Change in Income (% / AU$)</th>
</tr>
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<tbody>
<tr>
<td>Transport, Postal and Warehousing</td>
<td>+2.3% (AUD 1,150)</td>
</tr>
<tr>
<td>Rental, Hiring and Real Estate Services</td>
<td>+8.8% (AUD 4,400)</td>
</tr>
<tr>
<td>Mining</td>
<td>-2.5% (AUD -1,250)</td>
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</tbody>
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3. KEY FINDINGS: SECTOR-SPECIFIC INCOME CHANGES OF INDIVIDUALS DUE TO THE QLD FLOODS 2010-11
THE QUEENSLAND FLOODS 2010-11

3. KEY FINDINGS: ‘VULNERABLE’ SOCIOECONOMIC GROUPS

By Income Group:

- **Low Income Group**: Increase in income by 5.4% (i.e., AUD 1,234)
- **Middle Income Group**: No Change in income
- **High Income Group**: No Change in income

By Gender:

- **Males**: Decrease in income by 2.7% (i.e., AUD 1,350)

By Employment:

- **Unemployment**: Decreased by 0.15% (3,257 persons) compared to the nonflooded areas
- **Part-time Employed to Full-time Employed**: 0.20% (4,342 persons) increased compared to the nonflooded areas

By Work-Leisure Tradeoff:

- **Weekly Working Hours**: +9 minutes per person
4. THE BLACK SATURDAY BUSHFIRES 2009
BLACK SATURDAY BUSHFIRES: 07 FEB 2009

The most devastating Bushfires in Australian history
BLACK SATURDAY
BUSHFIRES:
07 FEB 2009

Forest FDI: 172

• Max. Temperature: 46° c
• Min. Relative Humidity: 4%
• Max. Wind Speed: 69 km/h
• Grassland FDI: 241
EXISTING ASSESSMENT REPORTS
BLACK SATURDAY BUSHFIRES: 07 FEB 2009

• $3.9 billion in Losses (Deloitte Access Economics, 2016)
FOR COMPARABILITY:

BUSHFIRE ZONES AFFECTED ON BLACK SATURDAY 2009

Versus

BUSHFIRE ZONES NOT AFFECTED ON BLACK SATURDAY 2009
435 Statistical Area 2 units in Victoria
BLACK SATURDAY BUSHFIRES IN 2009

SA2
+ DATA ON BLACK SATURDAY BUSHFIRES: 07 FEB 2009

2009 Victorian Bushfires Royal Commission

Government of Australia

**Map: The Churchill Fire, 2009**

- **Maximum temperature:** The maximum temperature recorded was 46.1°C at Latrobe Valley automatic weather station at 16:02.¹
- **Minimum relative humidity:** The minimum relative humidity recorded on 7 February was 8 per cent at Latrobe Valley AWS at 15:43.²
- **Wind:** The maximum winds recorded before the wind change were north-north-westerly at 44 kilometres an hour at Latrobe Valley AWS at 15:43.³
  The south-westerly wind change was recorded by the Latrobe Valley AWS at 18:18.⁴
  The maximum winds recorded after the wind change were 46 kilometres an hour at Latrobe Valley AWS at 18:30.⁵
- **Fire danger index:** The maximum Forest Fire Danger Index was 131 at Latrobe Valley AWS at 16:00.⁶
- **Cause:** Suspicious.⁷
- **Fatalities:** Eleven fatalities.⁸
- **Casualties:** Thirty-five casualties.⁹
- **Houses destroyed:** One hundred and forty-five houses.¹⁰
- **Overall area burnt:** 25,851 hectares.¹¹
- **Firefighting resources:** On 7 February 458 CFA and 167 NEM personnel attended the fire. They were supported by 76 CFA appliances, 29 NEM appliances and 4 aircraft. 33 HVP Firefighters also provided support.¹²
The Household, Income and Labour Dynamics in Australia (HILDA) Survey is a household-based panel study which began in 2001. It has the following key features:

- It collects information about economic and subjective well-being, labour market dynamics and family dynamics.
- Special questionnaire modules are included each wave.
- Hundreds of questions in each wave
- Wave 1 panel consisted of 7682 households and 19,914 individuals.
- Interviews are conducted annually with all adult members of each household.
- Panel members are followed over time.
- Data releases usually occur in January.

- Wave 1: 2001
- Wave 2: 2002
- Wave 3: 2003
- Wave 4: 2004
- Wave 5: 2005
- Wave 6: 2006
- Wave 15 is now available
We use a Difference-in-differences design:

\[ Y_{ict} = \text{cons} + \alpha_i + \beta_1 \text{Treat}_{it} + \beta_2 \text{PostBushfire}_{ct} + \beta_3 \text{Treat}_{it} \times \text{PostBushfire}_{ct} + \epsilon_{ict} \]

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- We also include the following covariates in the model:
  - Length of shared boundary between treated and comparison SA2s
  - Distance from the nearest Black Saturday Bushfires SA2
Labour-leisure tradeoff: Bushfire-affected individuals who used to work $A$ hours in a day had to work around $B$ hours in the aftermath of the floods such that $B > A$

What happened to economically vulnerable groups?

These aspects are currently under scrutiny:

- **Gender sensitiveness**: income effects of floods on male and female labor force
- **Employment status**: full-employment, part-time employment, and unemployment
- **Employment structure**: wage- vs. self employed, incorporated vs. unincorporated employees
- **Income gaps**: Low- vs. high-income earners
- **Social impact**: family violence, health and wellbeing, and crime (with HILDA dataset)
5. PROGRESS 2016-17
Key Utilisation Activities Since the Last RAF, May 2016

• A Meeting with the Attorney General’s Department (AGD) on 13 OCT 2016:
  ✓ Understanding the effectiveness of the federal government recovery intervention schemes
  ✓ Cyclone Oswald needs to be examined

• A Meeting with the Department of Environment, Land, Water and Planning, Victoria on 28 Mar 2017:
  ✓ Long-term impacts of the Black Saturday Bushfires 2009
  ✓ The Cascading effect of bushfires on economic sectors
  ✓ Impact assessment by different geographic areas
  ✓ Both physical and mental health implications
Key Research Outputs Since the Last RAF, May 2016

- A Paper presented at AFAC 2016, Brisbane

- A Paper has been accepted for presentation at AFAC 2017, Sydney

- A research report on “The Heterogeneous Impact of Natural Disasters in an Advanced Economy: Evidence from Australia” has been completed

- Fine-tuning a Case Study on the “Sectoral Economic Impact of the Queensland Floods 2010-11”
6. THE WAY FORWARD
6. THE WAY FORWARD

• Data To Be Collected:
  - The Black Saturday Bushfires 2009 Severity Map at SA2 Level
  - Victoria Land Use/Bushfires Zonal Map
  - Victoria Vegetation/Forest Density Map

• Comparing Affected Cohorts with Unaffected Ones:
  - Matching affected individuals with identical unaffected individuals in terms of:
    - Geographic setting
    - Economic Indicators
    - Social Status

• Firm-Level Analyses:
  - The Queensland Floods 2010-11
  - The Black Saturday Bushfires 2009

• A Meeting with AGD in June 2017
How do natural disasters affect firms’ revenues?

Business Longitudinal Dataset (BLD), ABS
Period: 2009-10 to 2013-14
Q&A SESSION
THANK YOU