UNSW Business School

Centre for Applied Economic Research

Productivity Inequality

Potential for levelling up by industry and state

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CAER-Productivity Commission Workshop
Prospects for a Post-pandemic Productivity Boom

11 November 2022

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Summary

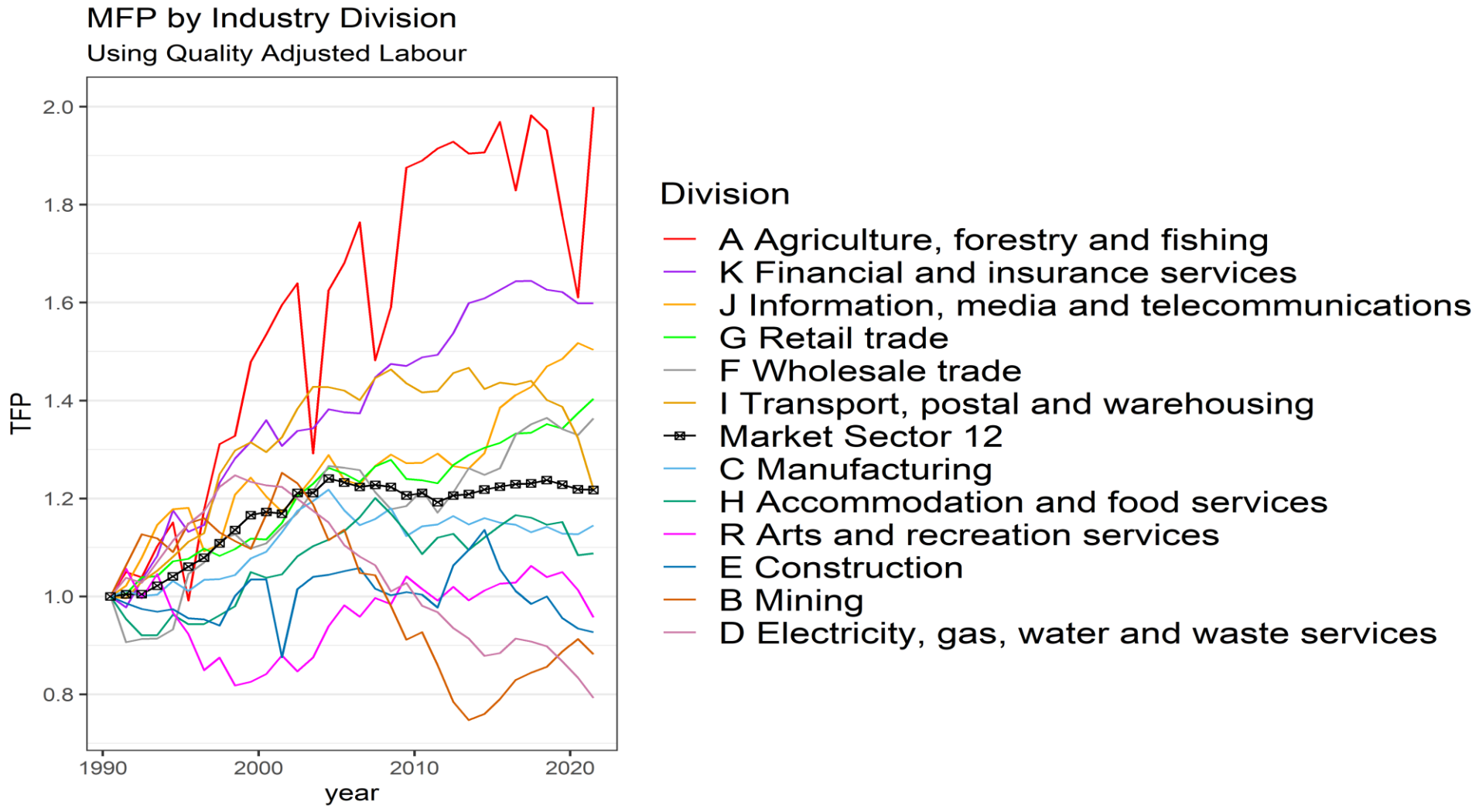
- **To the extent that productivity drives long-run living standards, productivity differences across time, industries and regions can affect regional development and welfare outcomes.**

- **The case of Australia is considered, using decompositions of official industry-level value added and productivity statistics into components such as technical progress and inefficiency change.**

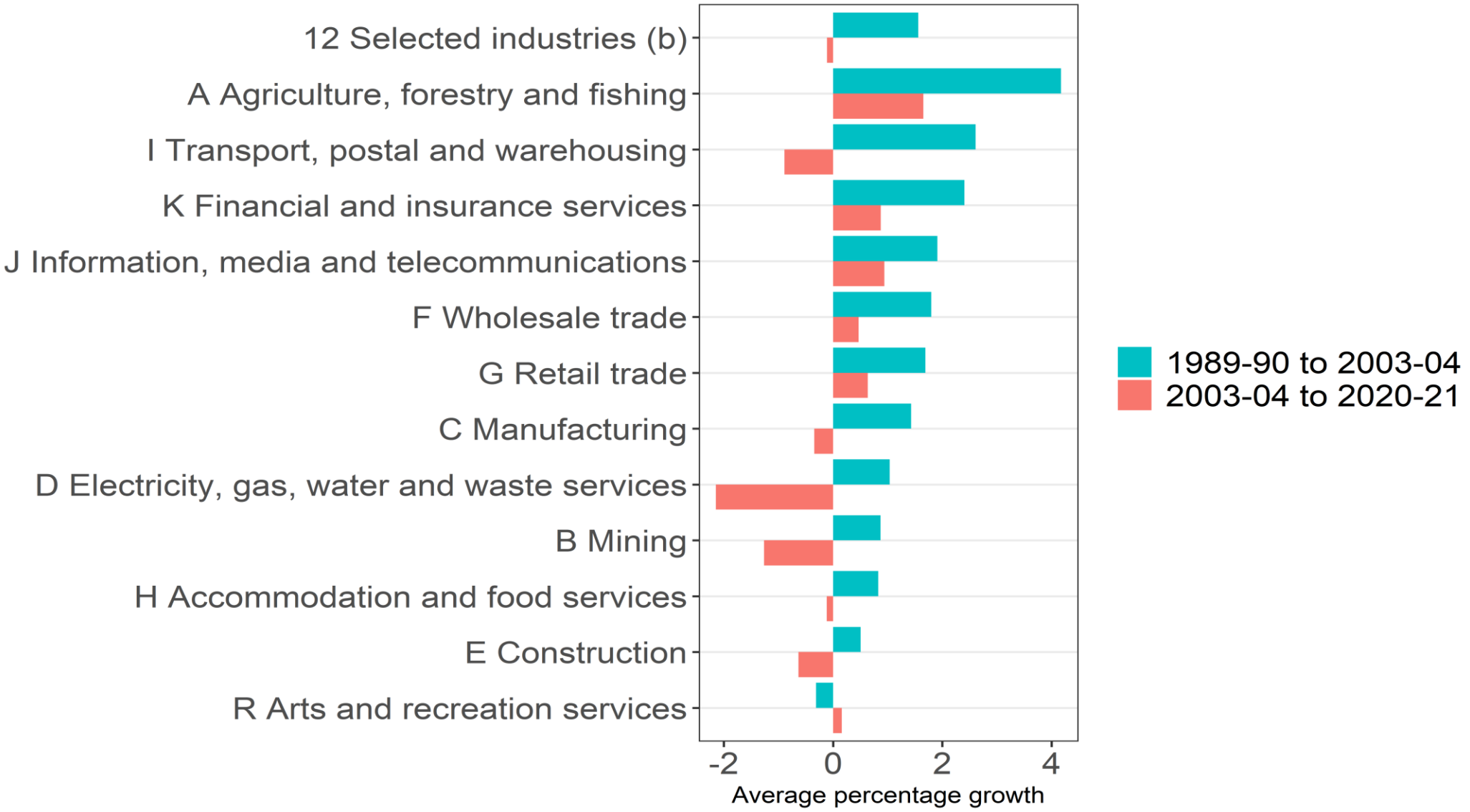
- **The results indicate diverse experiences across industries and states.**

- **An analysis of mining states versus non-mining states is provided, along with some early observations on the impact of the Covid-19 pandemic on productivity.**

12 Industry Market Sector MFP



Average Industry MFP Growth Across Sub-periods



Approach

Decompose nominal value added growth for the Australian Market Sector

Explanatory factors are

- **efficiency changes,**
- **changes in output prices,**
- **changes in primary inputs,**
- **changes in input prices, and**
- **technical progress**

Approach

- **Draws on:**

  Diewert, W.E. and K.J. Fox (2018) "Decomposing Value Added Growth into Explanatory Factors," in E. Grifell-Tatjé, C.A.K. Lovell and R. Sickles (eds.), *The Oxford Handbook of Productivity Analysis*, Oxford University Press, New York, NY, 625-662.

  Zeng, S., S. Parsons, W.E. Diewert and K.J. Fox (2021) "Productivity Inequality", presentation to the North American Productivity Workshop, 7 June 2021

- **Method allows for the decomposition of both value added and productivity**

TFP Growth = (efficiency change) x (technical progress) x (input mix)

- **Use the official Australian Bureau of Statistics Multifactor Productivity data cube:**

  https://www.abs.gov.au/statistics/industry/industry-overview/estimates-industry-multifactor-productivity/latest-release#data-download

Use "TFP" and "MFP" interchangeably

Approach

- **Need sector's best practice technology for the periods under consideration.**
- **Could use econometric or nonparametric (DEA) techniques**
- **Use a Free Disposal Hull approach – no convexity assumptions**
- **Our approach has the advantage that it does not involve econometric estimation, and involves only observable data.**
- **Rules out technical regress.**
- **Simple enough to be implemented by national statistical offices**

Australian Market Sector

Table 1: Industry classification of the market sector in Australia

Division	Industry
A	Agriculture, Forestry and Fishing
B	Mining
C	Manufacturing
D	Electricity, Gas, Water and Waste Services
E	Construction
F	Wholesale Trade
G	Retail Trade
H	Accommodation and Food Services
I	Transport, Postal and Warehousing
J	Information, Media and Telecommunications
K	Financial and Insurance Services
L	Rental, Hiring and Real Estate Services
M	Professional, Scientific and Technical Services
N	Administrative and Support Services
R	Arts and Recreation Services
S	Other Services

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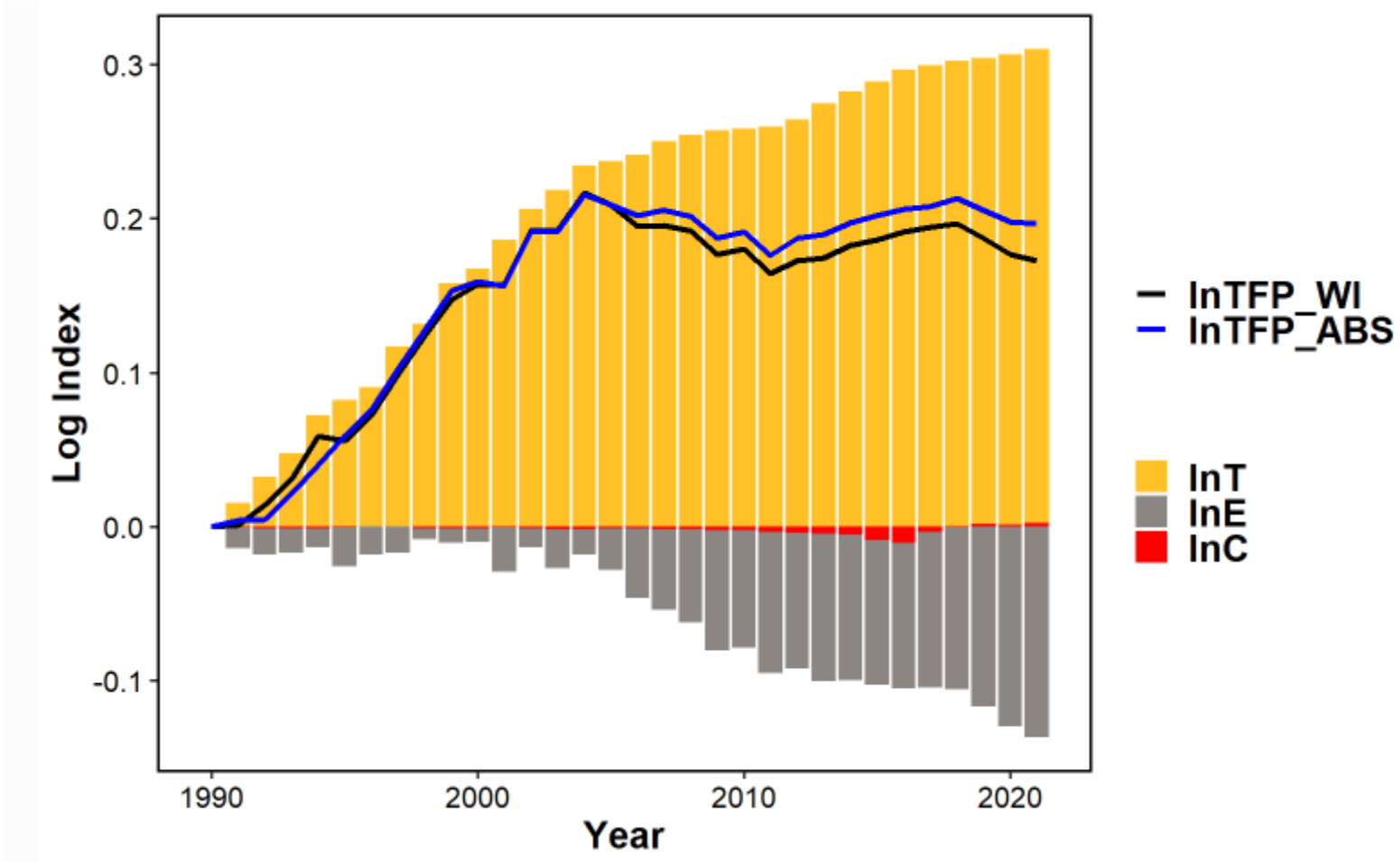
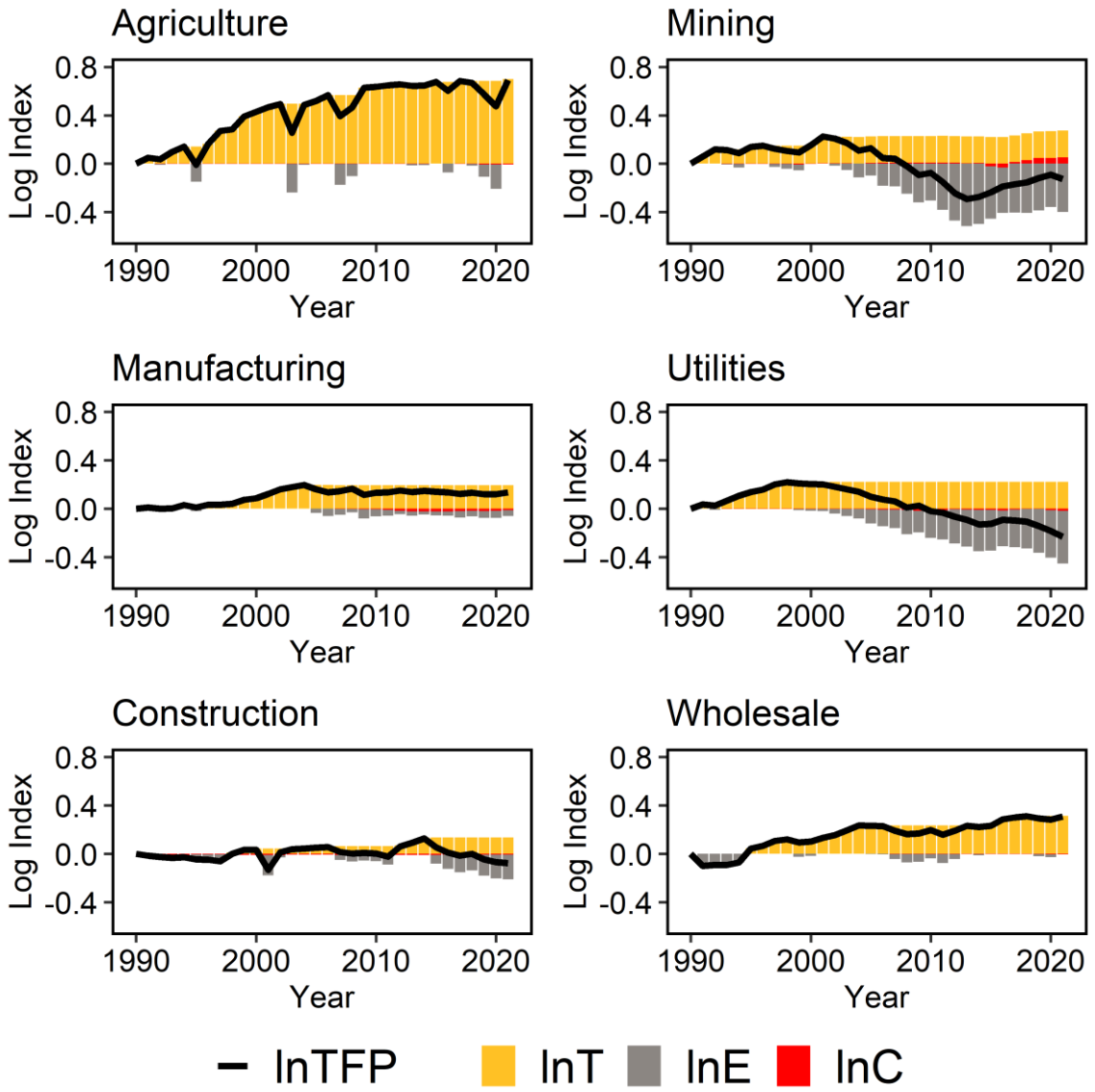
Contributions to Market Sector TFP Level



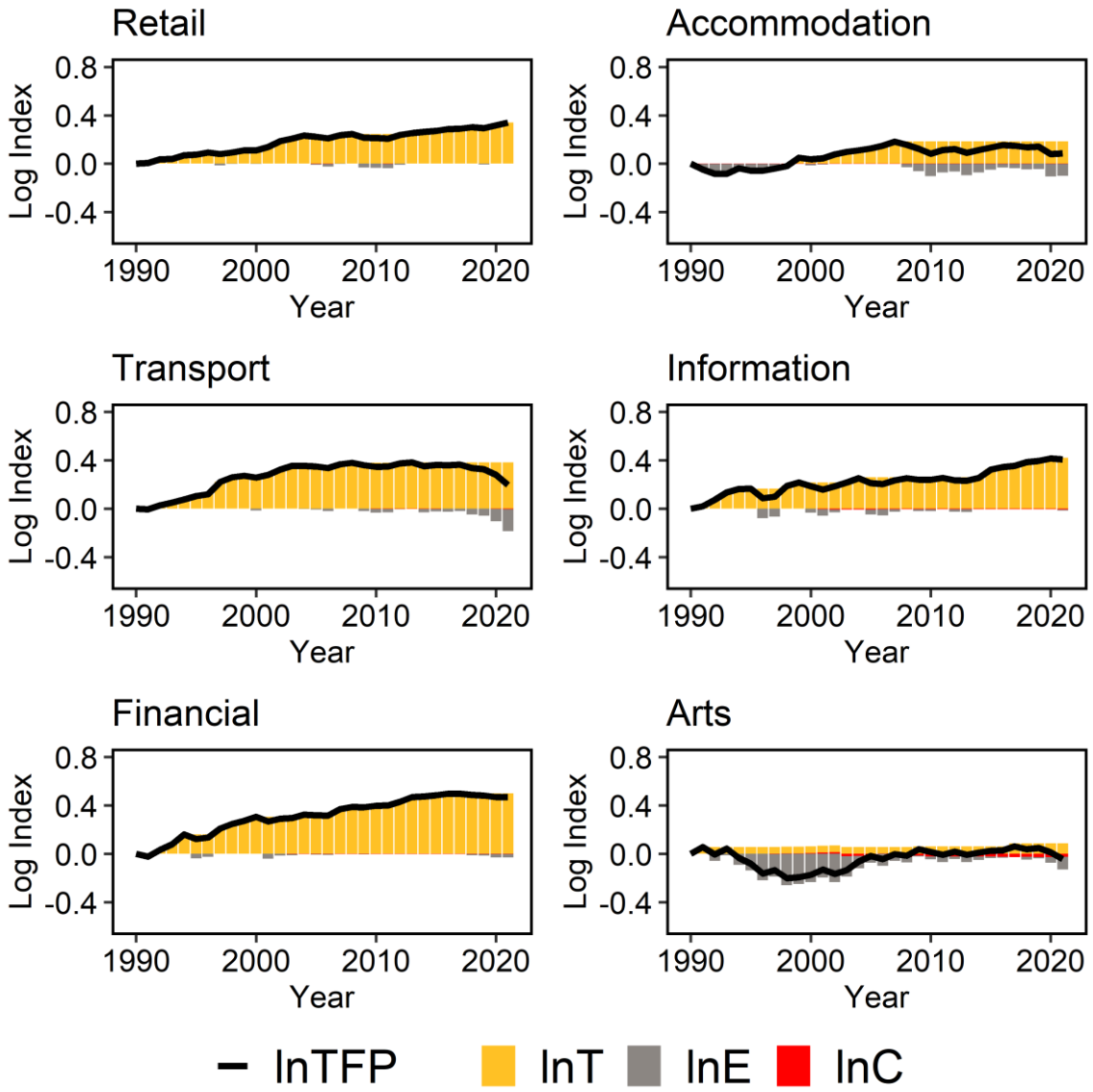
T = Technical change, E = Efficiency Change, C = Input Mix Change,

TFP_WI = Diewert-Fox weighted industry aggregation TFP

Decomposition of TFP into Technical, Efficiency and Input Mix Change



Decomposition of TFP into Technical, Efficiency and Input Mix Change



Decomposition of TFP into Technical, Efficiency and Input Mix Change

Only 5 industries showed considerable technical progress beyond 2004

- **Agriculture, forestry and fishing**
- **Retail trade**
- **Wholesale trade**
- **Financial and insurance services**
- **Information, media and telecommunications**

Some industries showed little technical progress even earlier than the 2004 peak

- **Mining (1996)**
- **Utilities (Electricity, gas, water and waste services) (1998)**
- **Arts and recreation services (1991)**

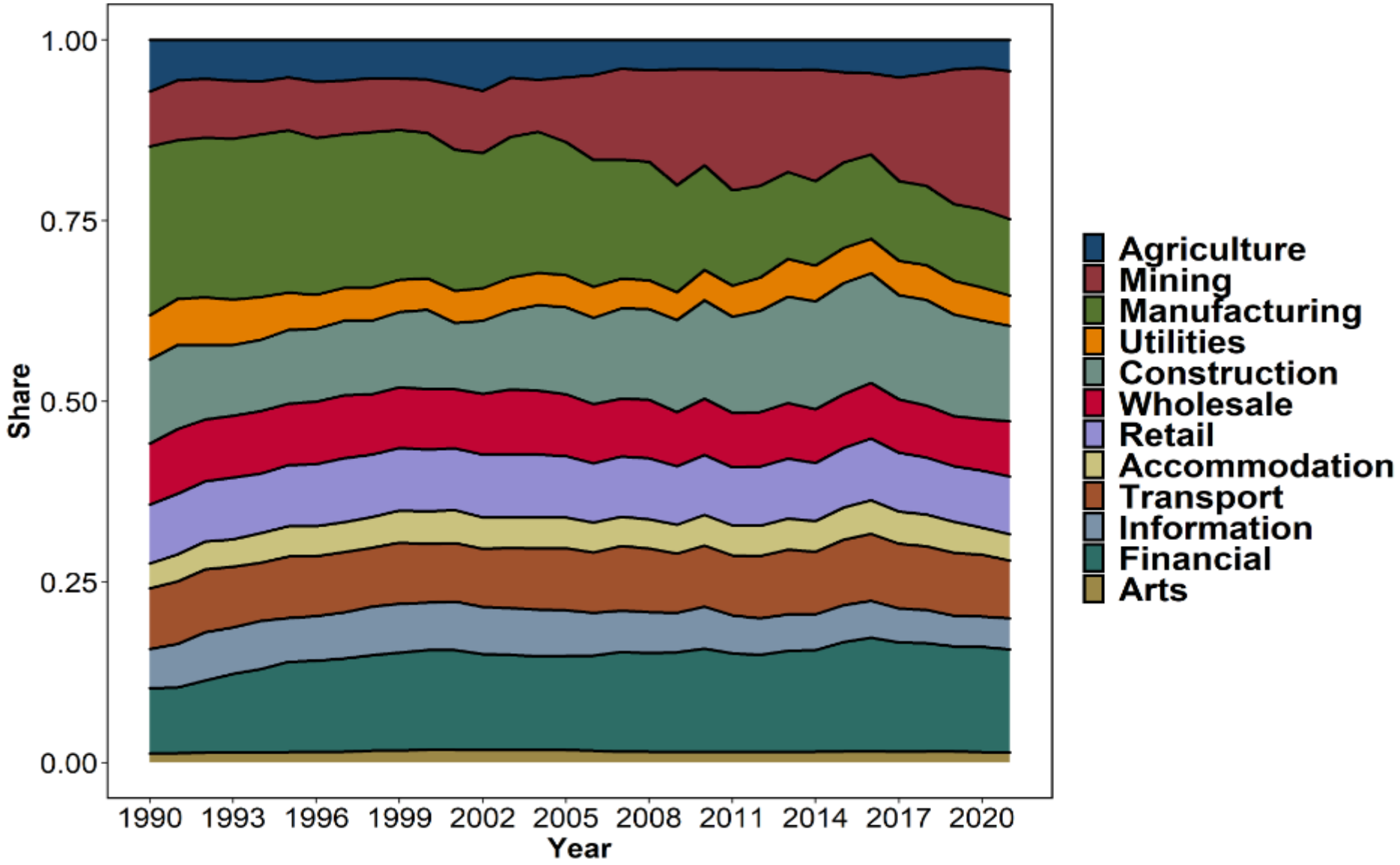
Observations on the Industry Results

The amount of inefficiency for some industries was huge relative to TFP level:

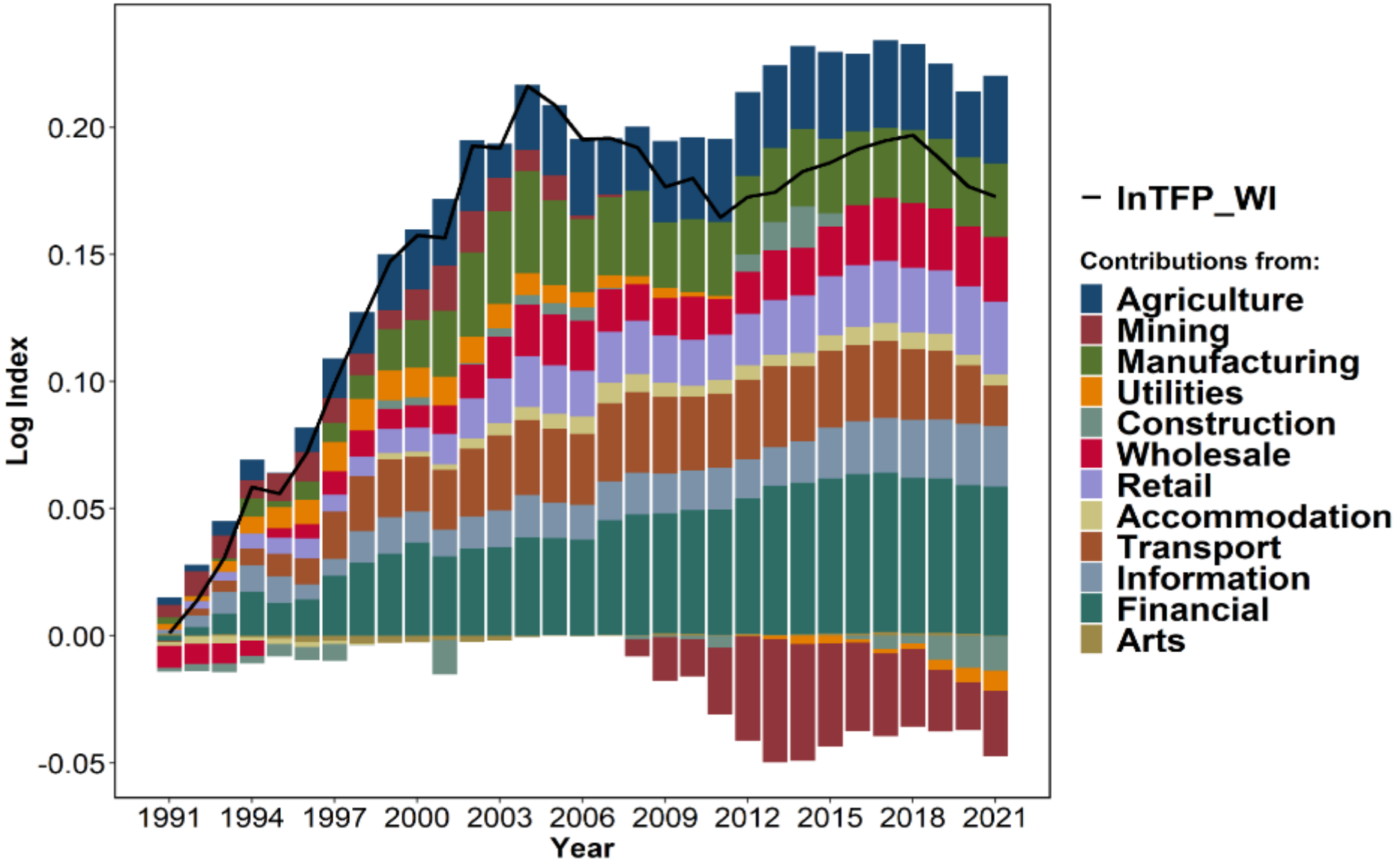
- **Mining**
- **Utilities**
- **Construction**
- **Accommodation and food services**
- **Arts and recreation services**

Some of this inefficiency is probably real and some of it probably indicates mismeasurement of inputs and outputs

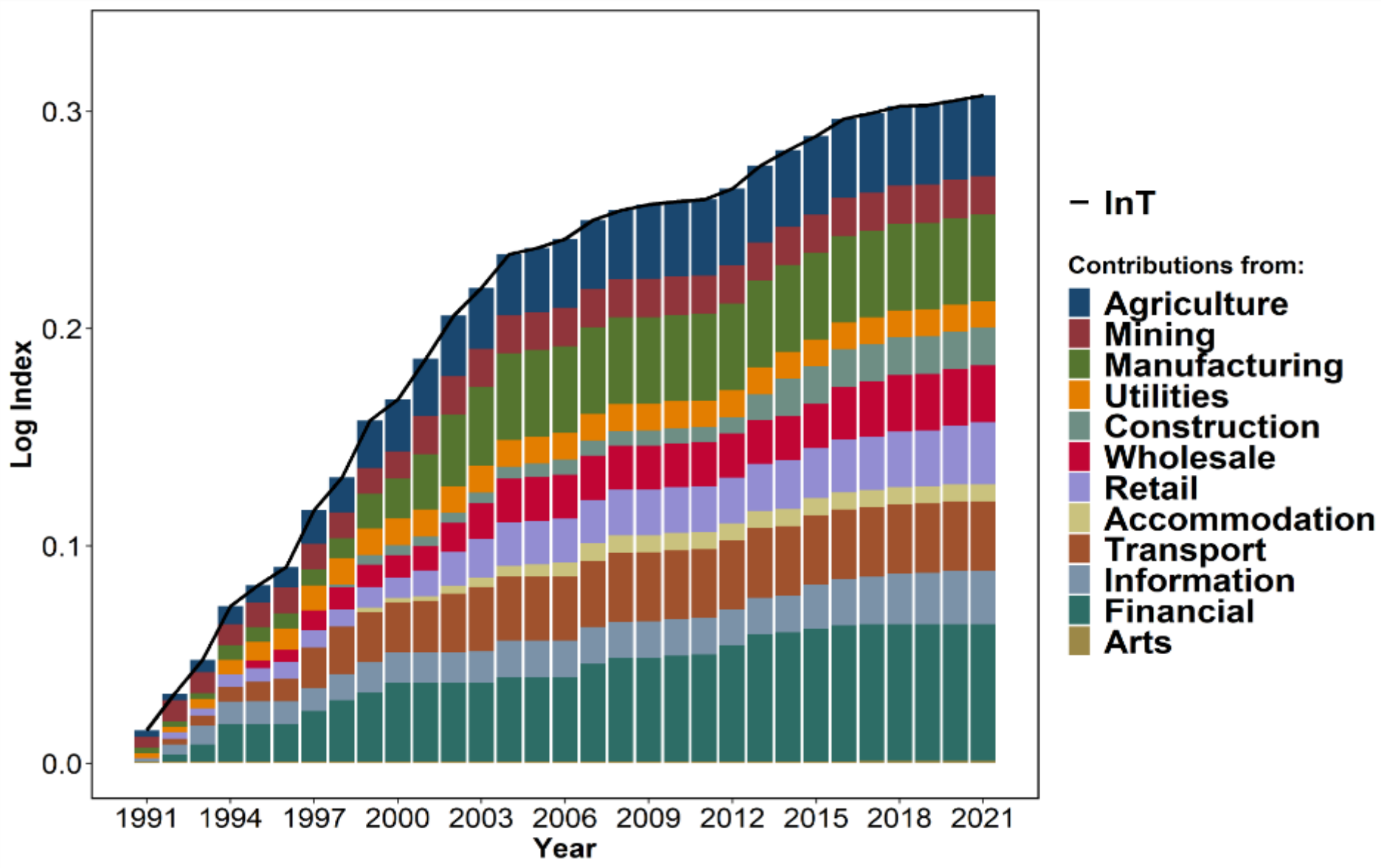
Value Added Shares



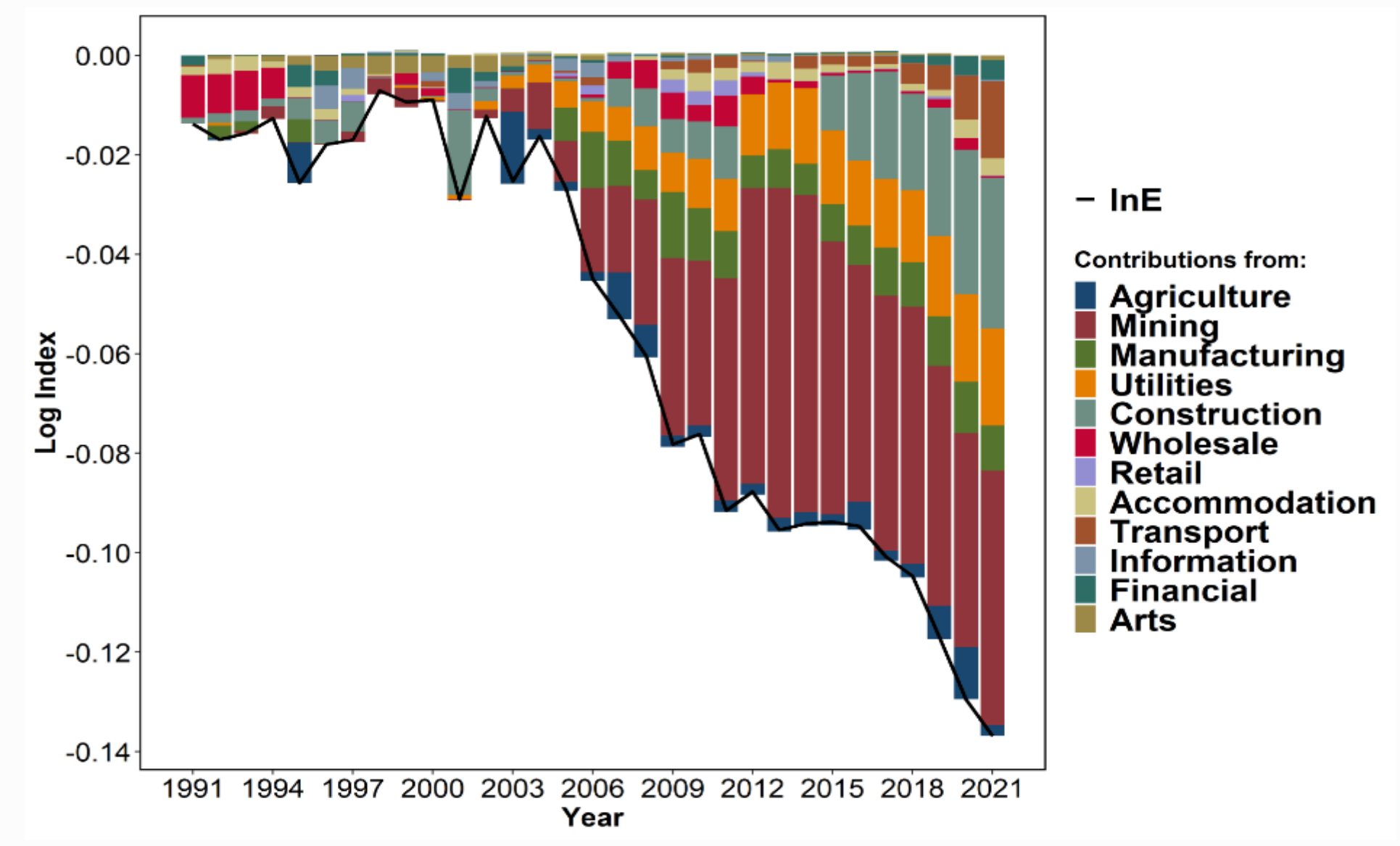
Contributions to Market Sector TFP Level



Contributions to Level of Technical Progress



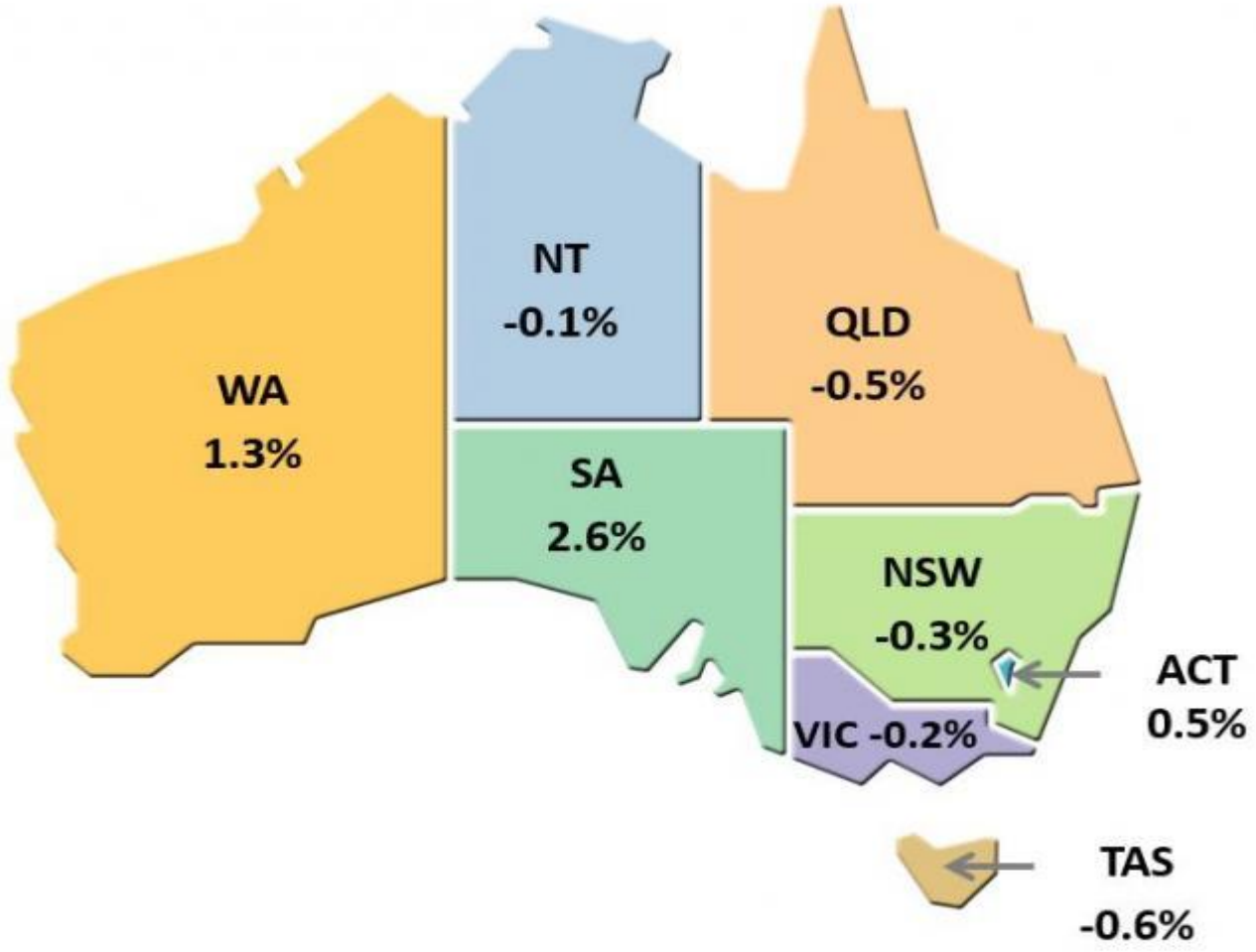
Contributions to Level of Efficiency



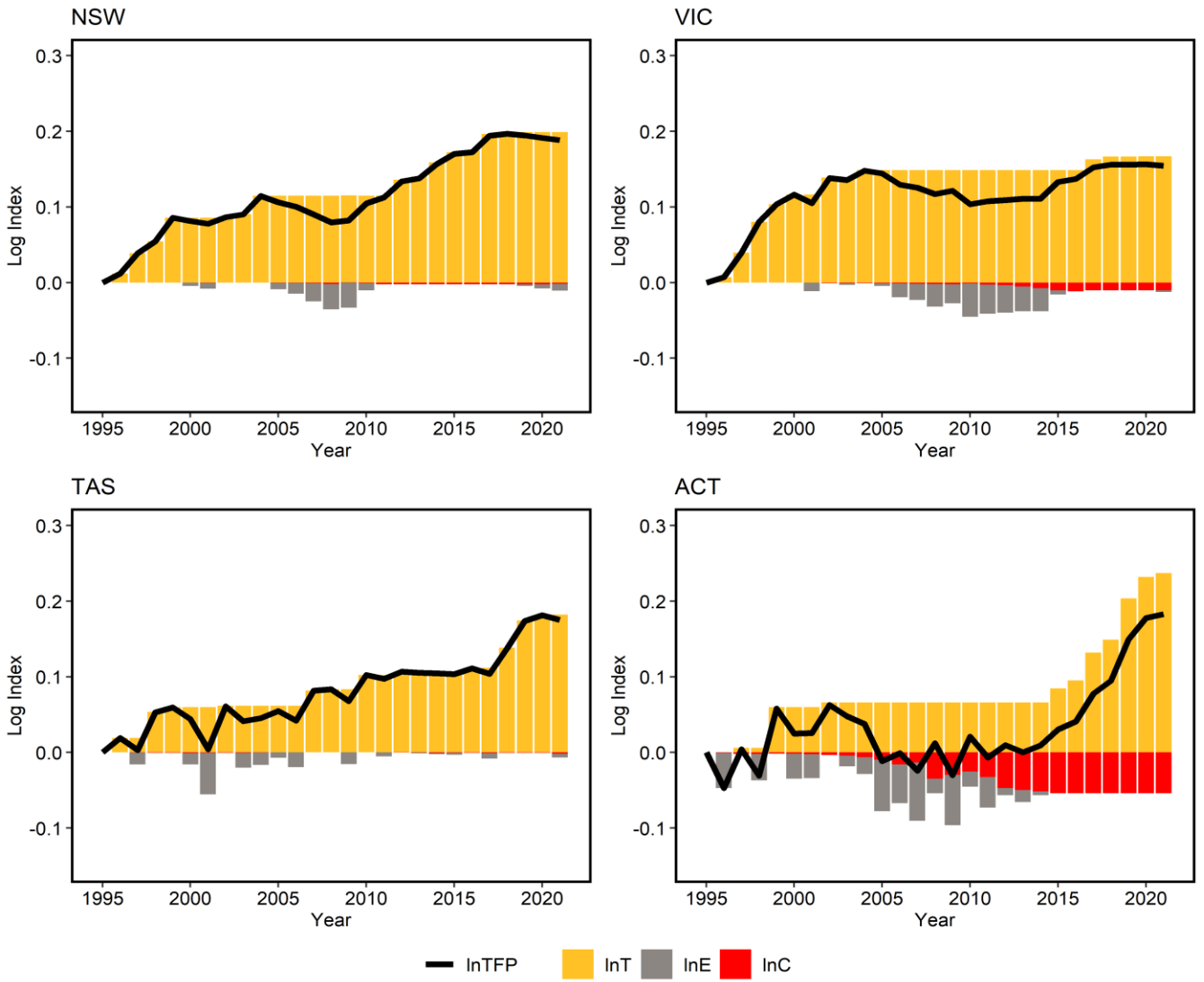
State Level Data

- **ABS published the first (experimental) estimates of state TFP in January 2018 for 1994/95 to 2016/17**
- **Data cover 16 selected industries (aggregate only), now up to 2020/21**
- **Less-populated states more prone to measurement error and volatility**

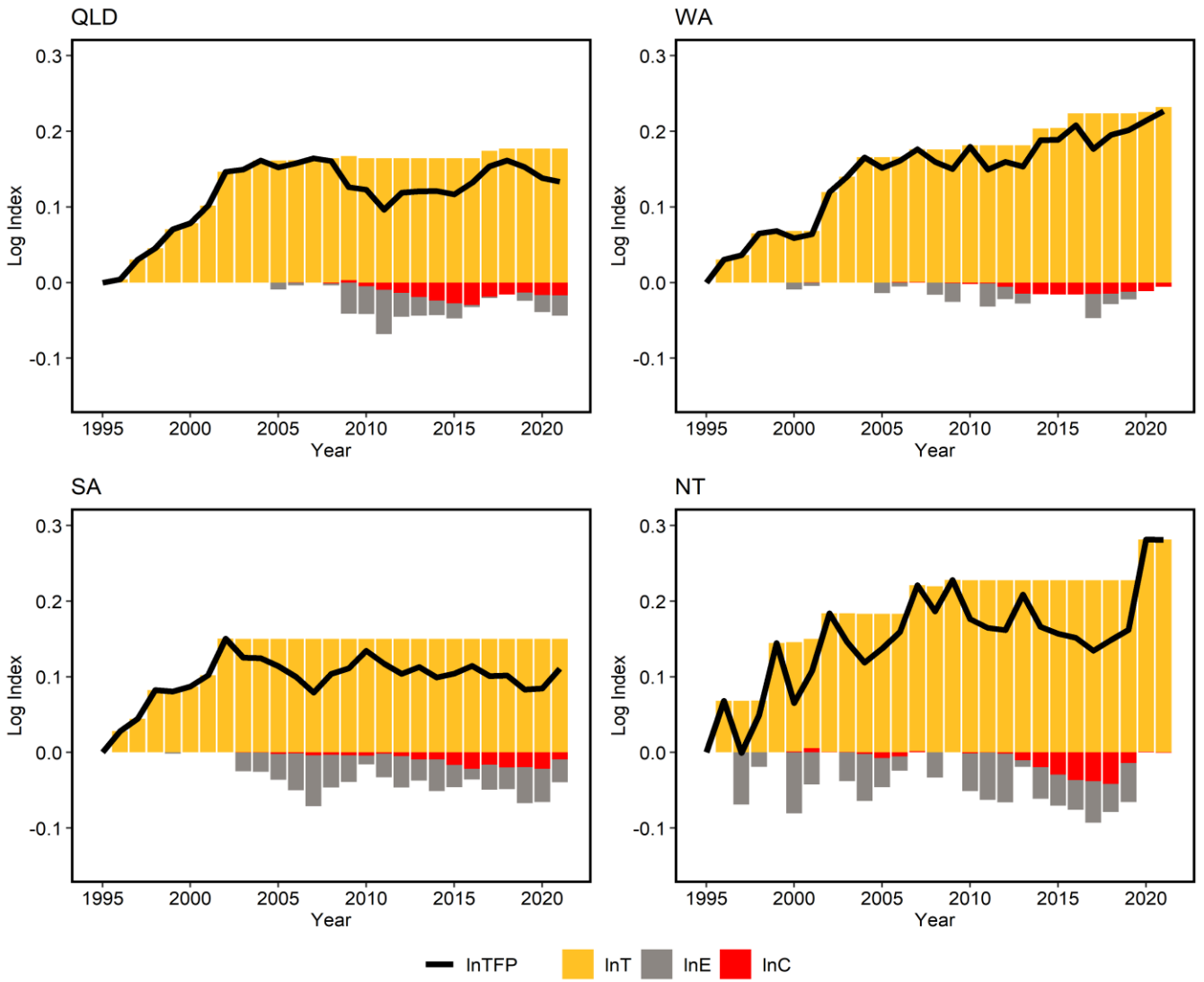
ABS Experimental State TFP Growth, 2020-21



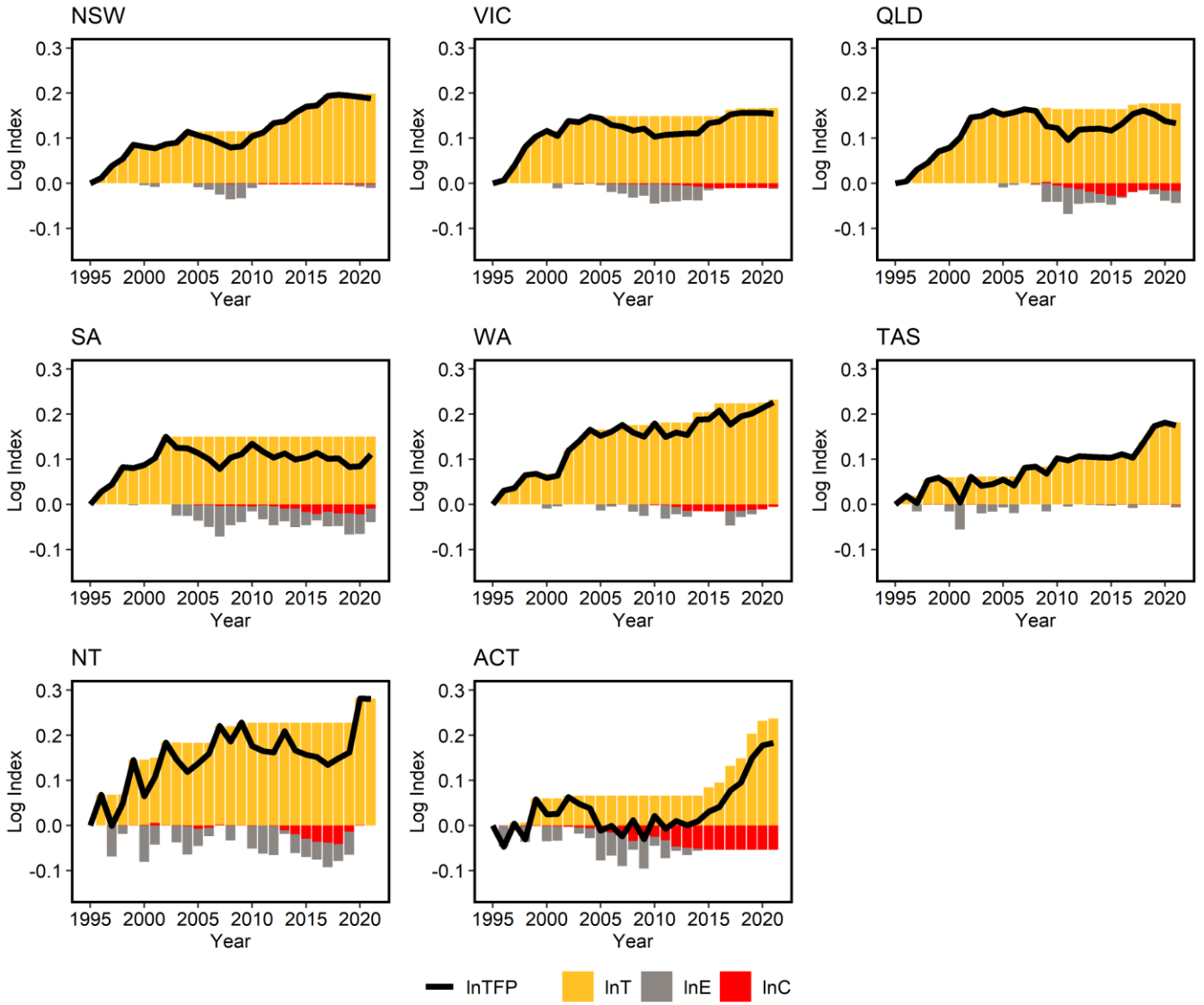
TFP Decompositions: Non-Mining States



TFP Decompositions: Mining States



TFP Decompositions: All States



Conclusions

- **Productivity is not driven only by technological change**
- **Efficiency in the management of resources matters**
- **Different industries have different productivity drivers**
- **Different states have different resource endowments and industry structures**

Conclusions

- **Diverse productivity experiences by industry and state.**

- **How to devise policies to address such diversity?**

> **`The Australian Research Council (ARC) will take on a new direction as the Morrison Government seeks to realise the significant opportunities for Australia in the 21st century and secure our economic recovery from the pandemic.'**
>
> **`The ARC will align its Linkage programs with the Government's research commercialisation agenda. For future rounds, the ARC will recommend 70 per cent of its applied research grants fall under the six National Manufacturing Priorities'**
>
> https://ministers.dese.gov.au/robert/new-direction-australian-research-council-help-secure-australias-recovery

- **Results suggest that policies directed at manufacturing are unlikely to result in an aggregate productivity boom.**

Conclusions

- **If inefficiencies are due to poor management, investment in business education and research would seem better investments**
- **Such investments are more general and transferable across industries**
- **Stranded assets are probably a problem post-pandemic due to changes in consumer preferences – e.g. hotels and office spaces that are too big, too many of the wrong sized buses and types of delivery vehicles**
- **Good economic management by firms is needed to address this issue**