# Income distributional analysis with frequent incomplete surveys - the case of Australia

UNIVERSITY OF CANBERRA

Nowcasting Workshop, University of Essex

INGRID2 Project

Jinjing Li

16 July 2021

Li, J., Vidyattama, Y., La, H. A., Miranti, R., & Sologon, D. M. (2020). The Impact of COVID-19 and Policy Responses on Australian Income Distribution and Poverty

# Outline

- Introduction
- Why existing datasets are not sufficient
- Methodology framework
- Application on Covid-19 impact analysis and its result

# Introduction

Historically, shocks tend to be unevenly distributed and have profound impact the income distribution

- Global financial crisis 2007/8
- Covid-19

Data is not always be available in time for policy making


Source: ABS Labour Force, Australia, August 2020

# Availabilities of different datasets

Some key income related data

- Biannual - Survey of Income and Housing (SIH)
- Annual - Household, Income and Labour Dynamics in Australia (HILDA)

Options for estimating the impact of current shocks

- Wait for new data release
- Simulate the shock (and the policy response) with the best assumptions we have
- Reconstruct from frequently updated (incomplete) data sources

# Availabilities of different datasets

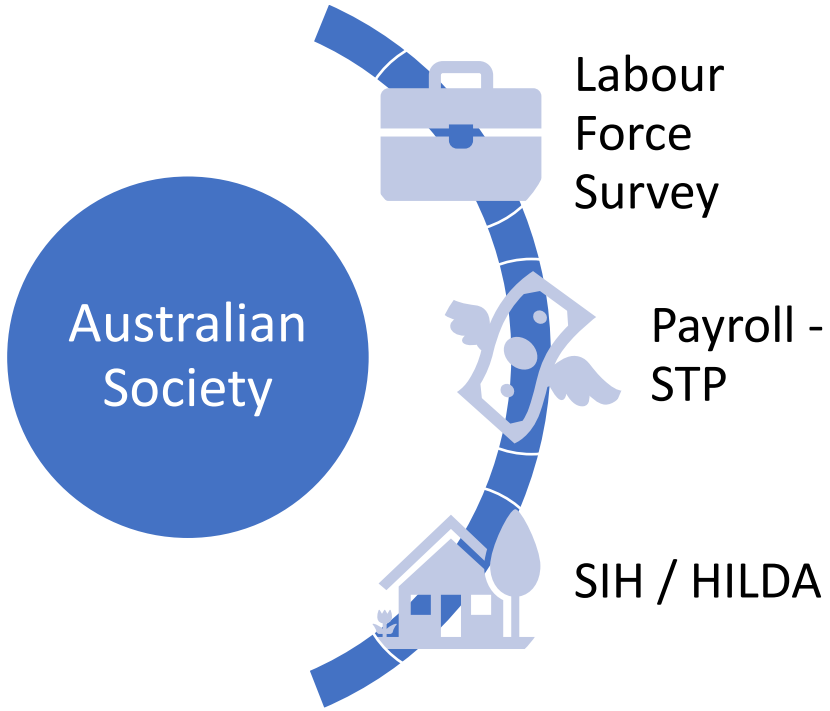
Some key income related data

- Biannual - Survey of Income and Housing (SIH)
- Annual - Household, Income and Labour Dynamics in Australia (HILDA)

- Quarterly – Key economic and welfare statistics
- Monthly - Longitudinal labour force survey (LFS)
- Weekly - Tax office statistics
- Daily to Quarterly – key economics indices

- Try to incorporate information from the more frequently updated datasets into the income distribution estimates

# Data




A framework of combining high-frequency but limited information and low frequency but rich information data

- 2018 Household survey
- Monthly ABS Longitudinal labour force survey (LLFS, unit-record)
- Weekly Payroll Data (aggregate)
- Other administrative and investment portfolio data

# Applications in Covid impact analysis

Estimate the impact of COVID-19 on the Australian income distribution

Decompose the changes into

- Income shock effect due to COVID-19 and the public health response
- (Welfare) Policy effect due to changes in welfare and labour market policy

Focus on the short-term impact

# Applications in Covid impact analysis

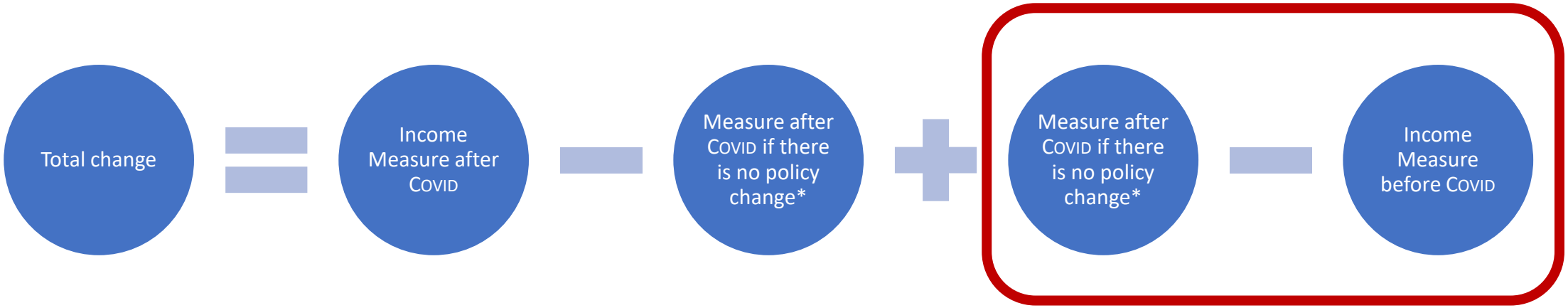
A decomposition framework based on counterfactual simulation (Bargain & Callan, 2010; Bargain et al., 2017)

# Applications in Covid impact analysis

A decomposition framework based on counterfactual simulation (Bargain & Callan, 2010; Bargain et al., 2017)

# Applications in Covid impact analysis

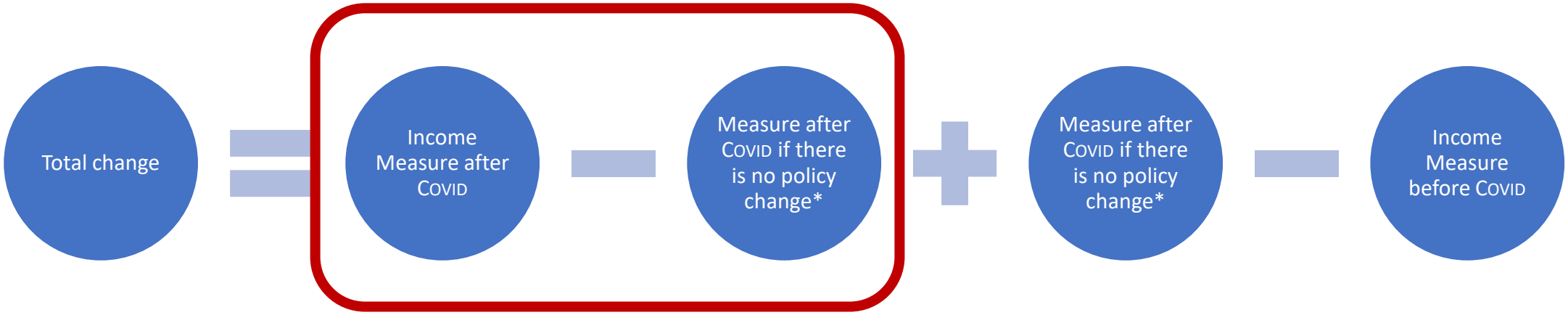
A decomposition framework based on counterfactual simulation (Bargain & Callan, 2010; Bargain et al., 2017)




COVID-19 Income Shock Effect

# Applications in Covid impact analysis

A decomposition framework based on counterfactual simulation (Bargain & Callan, 2010; Bargain et al., 2017)




Policy Response Effect

COVID-19 Income Shock Effect

# Applications in Covid impact analysis

We need three income distributions in 2020

- Income distribution just before the initial COVID-19 outbreak and lockdowns (February)
- Income distribution after the initial COVID-19 outbreak (March, April, May, June)
- Income distribution after the initial COVID-19 outbreak without policy intervention* (March, April, May, June)

# Applications in Covid impact analysis

Incorporate the observed changes in the intensive and extensive margins of the labour market (from LLFS) while preserving the observed conditional income distribution (from SIH)

We can reweight different segment of the distributions to create a counterfactual distribution (DiNardo et al, 1996) from SIH with a Bayesian transformation

$$w_{i,\text{SIH}\rightarrow\text{LLFS}} = w_{i,\text{SIH}} \frac{\Pr(X_i|\text{LLFS})}{\Pr(X_i|\text{SIH})} = w_{i,\text{SIH}} \frac{\Pr(\text{LLFS}|X_i)}{\Pr(\text{SIH}|X_i)} \gamma$$

$\gamma$ can be considered as the (ratio of) the prior

X contains personal, household and employment related characteristics (e.g. industry/occupation/working hours/type of employment)

# Modelling Income

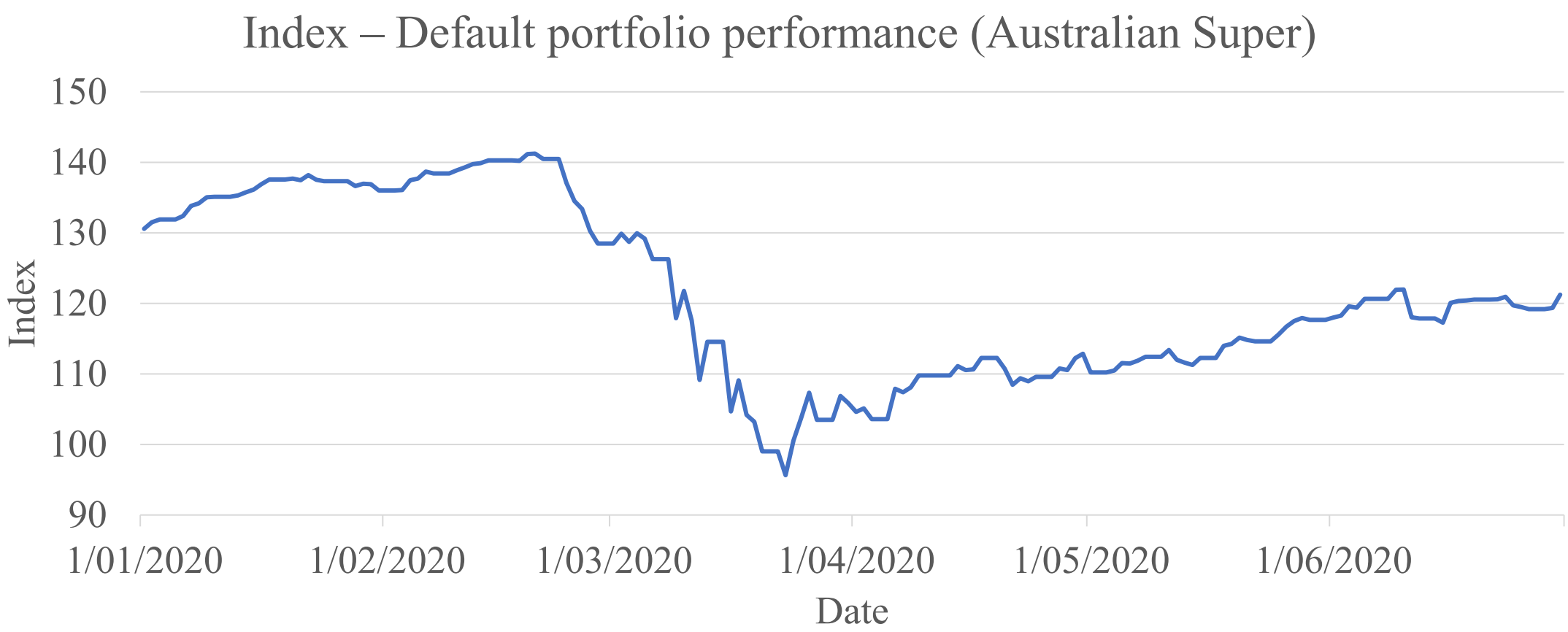
Wage income

- Use wage index (AWE) to inflate wage income between 2018 and Feb 2020
- Use Payroll data to reflect changes in the wage level (conditional on industry, age) between Feb and Jun

Investment Income

- 2.5% + CPI between 2018 and Feb 2020
- Australian Super default portfolio performance between Feb and Jun

# Modelling Income



# Modelling Income

Wage income

- AWE to index wage income between 2018 and Feb 2020
- Use Payroll data to reflect changes in the wage level (conditional on industry, age) between Feb and Jun

Investment Income

- 2.5% + CPI between 2018 and Feb 2020
- Australian Super Default Portfolio Performance between Feb and Jun

CPI indexation of the rest, including childcare expenses

# Modelling Policy Responses

One-off economic support payment (annualised)

Temporarily increased welfare payment

Changes in the welfare payment rules

- Suspension of the asset testing
- Taper rate change
- Relaxed requirement for unemployment benefit (JobSeeker)

Fully subsidised childcare between April and June

Wage subsidy (JobKeeper) for businesses with substantial loss in turnover

# Modelling Policy Responses

Most policy changes – straightforward from STINMOD+ (Australian tax transfer microsimulation model), except

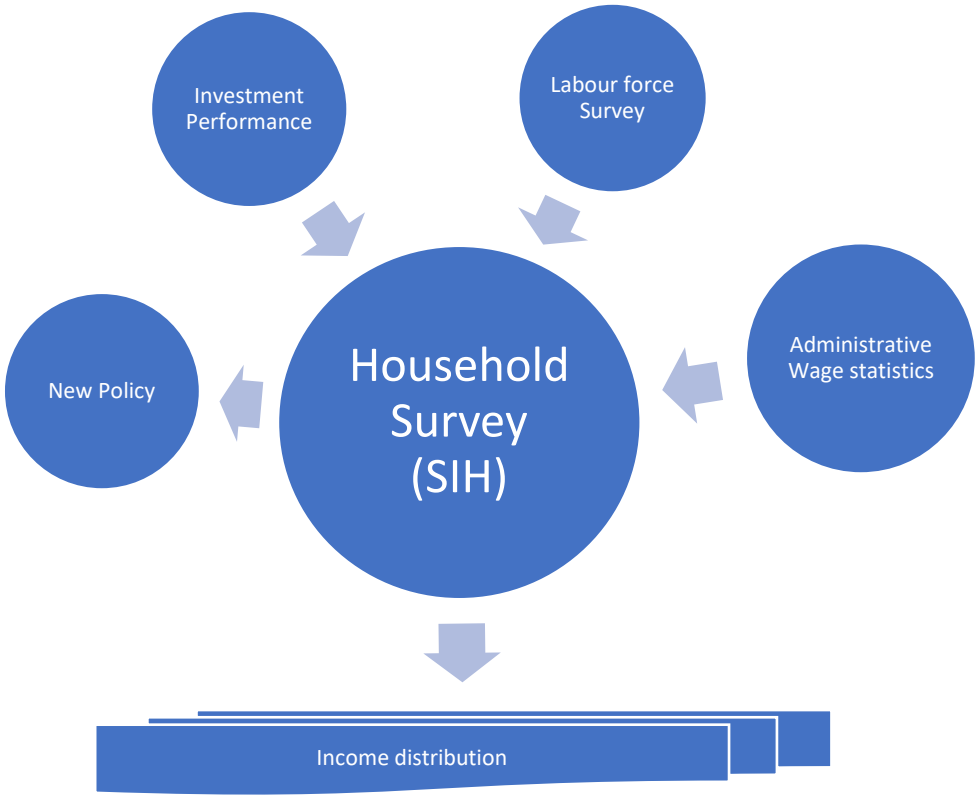
Wage Subsidy (Jobkeeper)

- Use the longitudinal variations in LLFS to identify those who are at risk of unemployment
- Use March-April estimates to avoid the job-preserving impact of Jobkeeper (paid from May onwards)
- Aligned to administrative data (the simulation yields a correlation of 0.8 on the industry distribution without alignment)

Unemployment benefit eligibility criteria change

- Use the longitudinal information in LLFS to identify those who are unemployed for welfare purpose but may be classified as out of labour market

# Applications in Covid impact analysis




- Use the employment and occupational change from the labour force survey (monthly)
- Use the conditional distribution from the household survey (bi-annual) as the income model
- Use administrative wage statistics to update labour income (weekly)
- Use investment performance indices to update investment income (current)
- Use microsimulation model to incorporate policy change (current)
- A nowcasted dataset for income distribution analysis

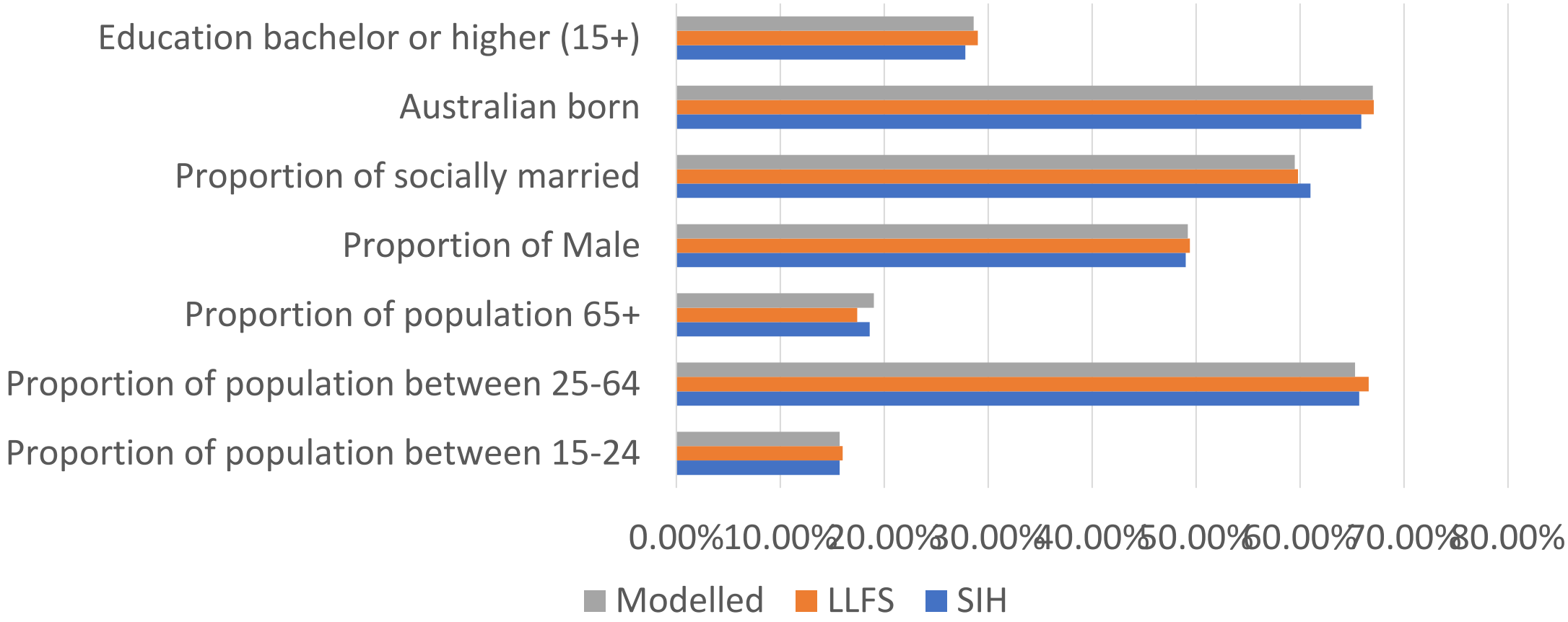
# Reconstruct Income Distribution

Income distribution just before the COVID-19 initial outbreak and lockdowns (February)

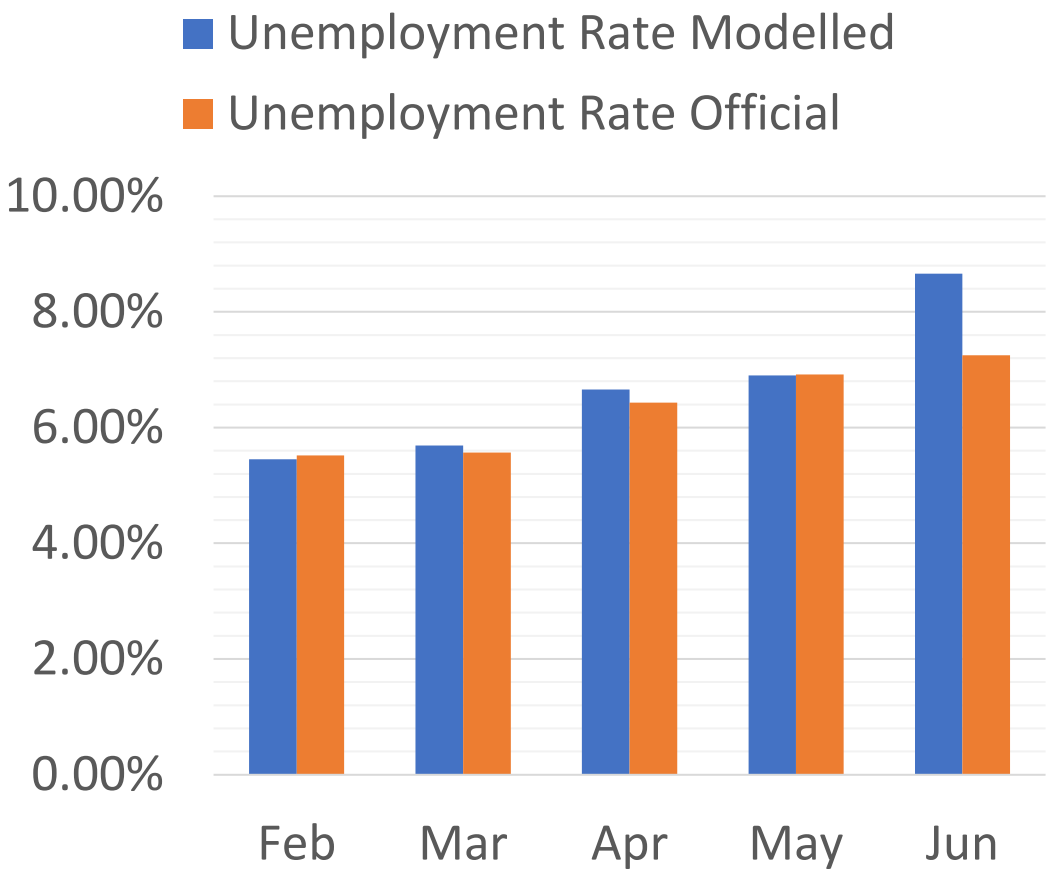
Income distribution after the initial COVID-19 outbreak (March, April, May, June)

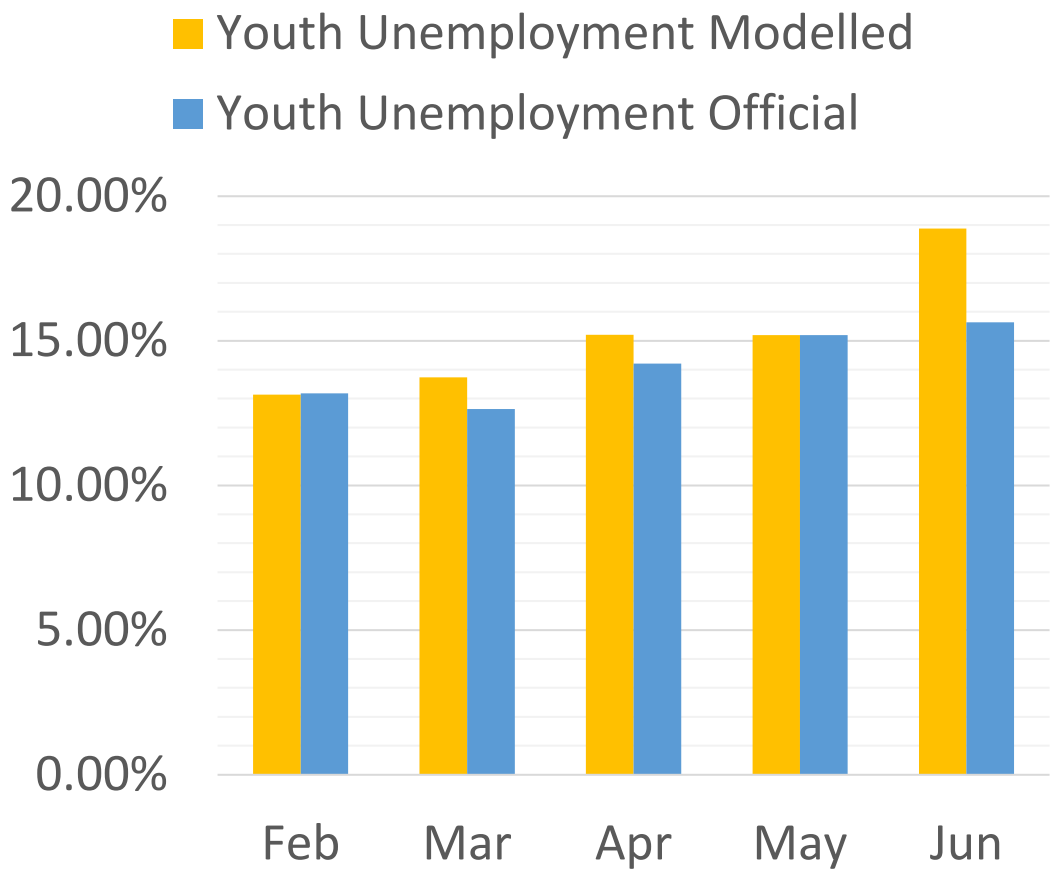
Income distribution after the initial COVID-19 outbreak without policy intervention* (March, April, May, June)

# Results - Validations

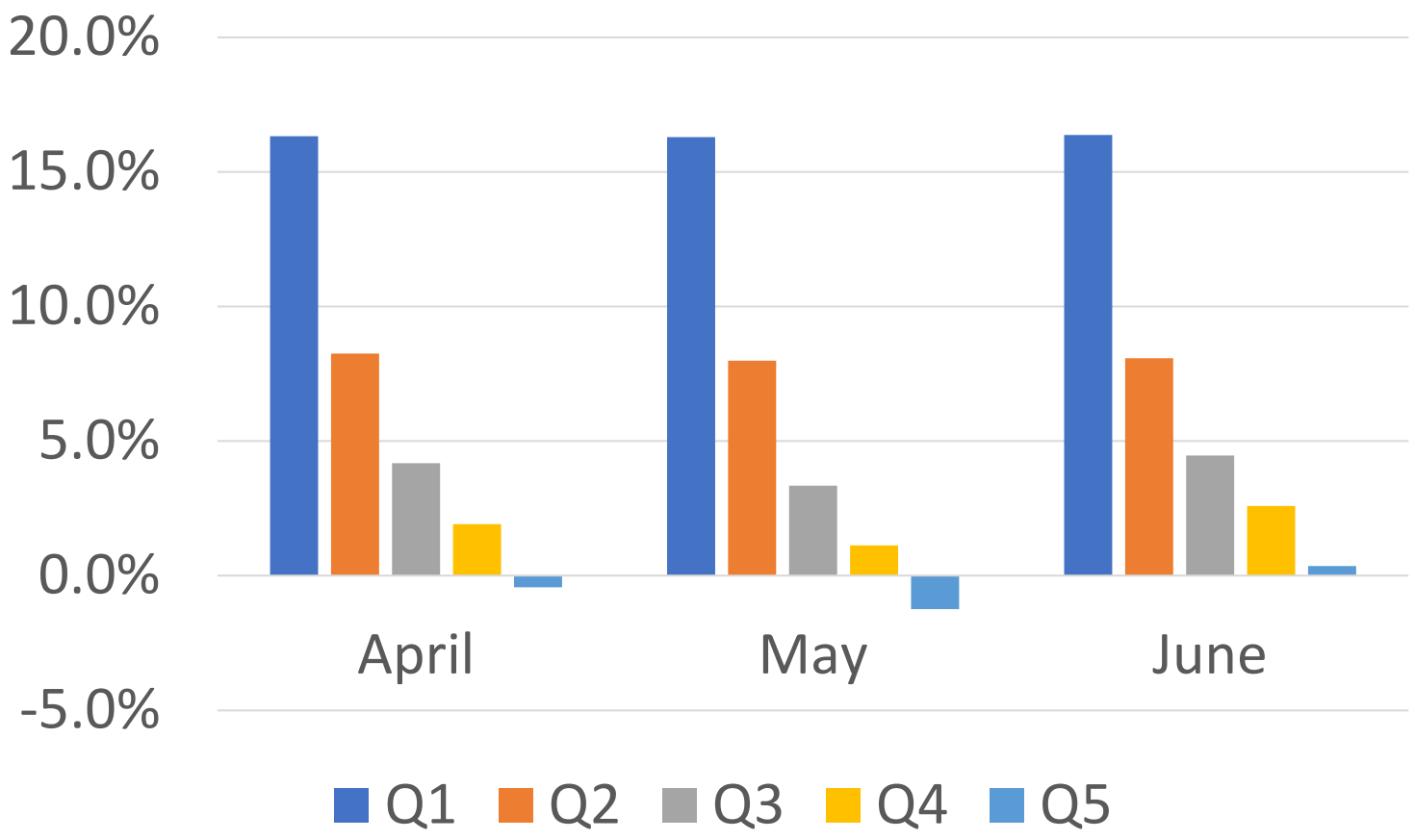


# Results - Validations



# Result - Disposable Income




Main causes of change

Social welfare measures

Changes in gross income

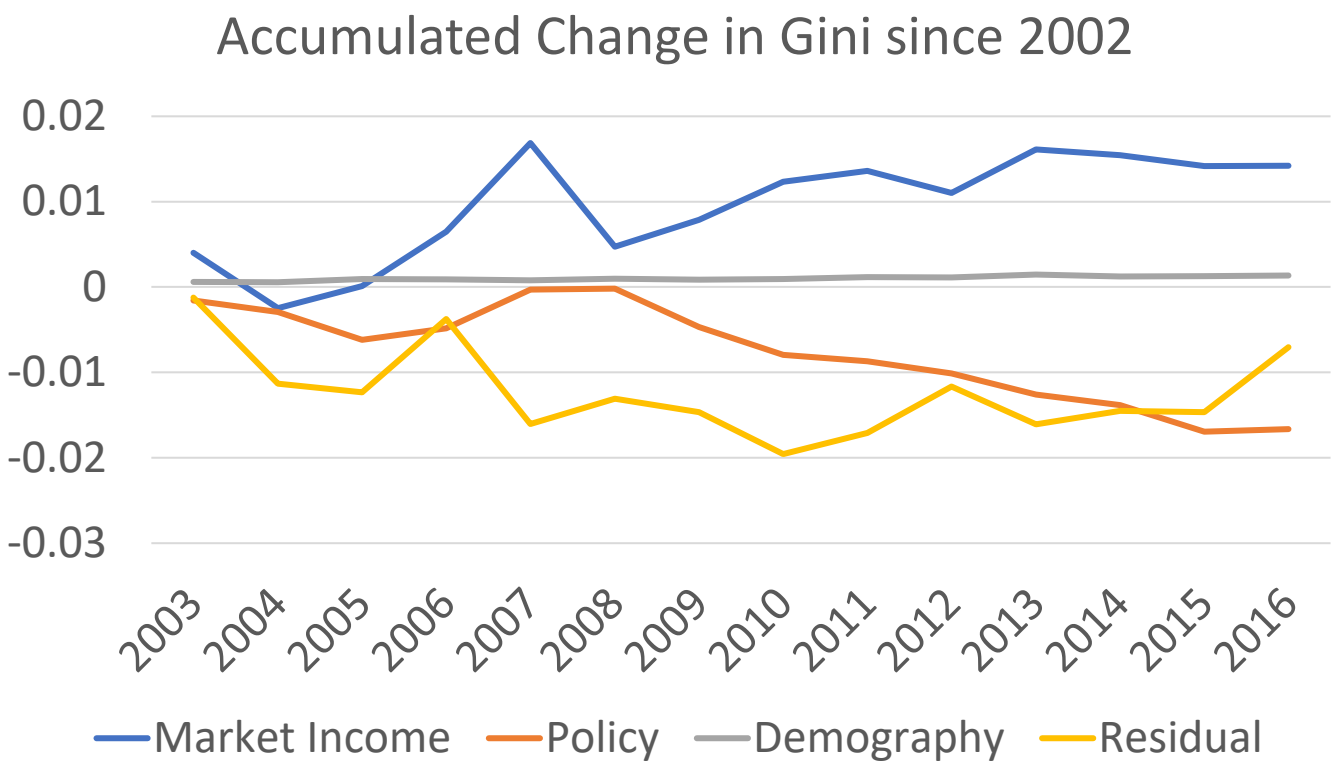
Free childcare

# Result - Income Inequality change

Australian Gini usually around 0.31~0.33

Australian income inequality are mostly driven by policy and the market shocks (Li et al, 2020)

Equalized disposable income (modified OECD-scale) post-childcare cost



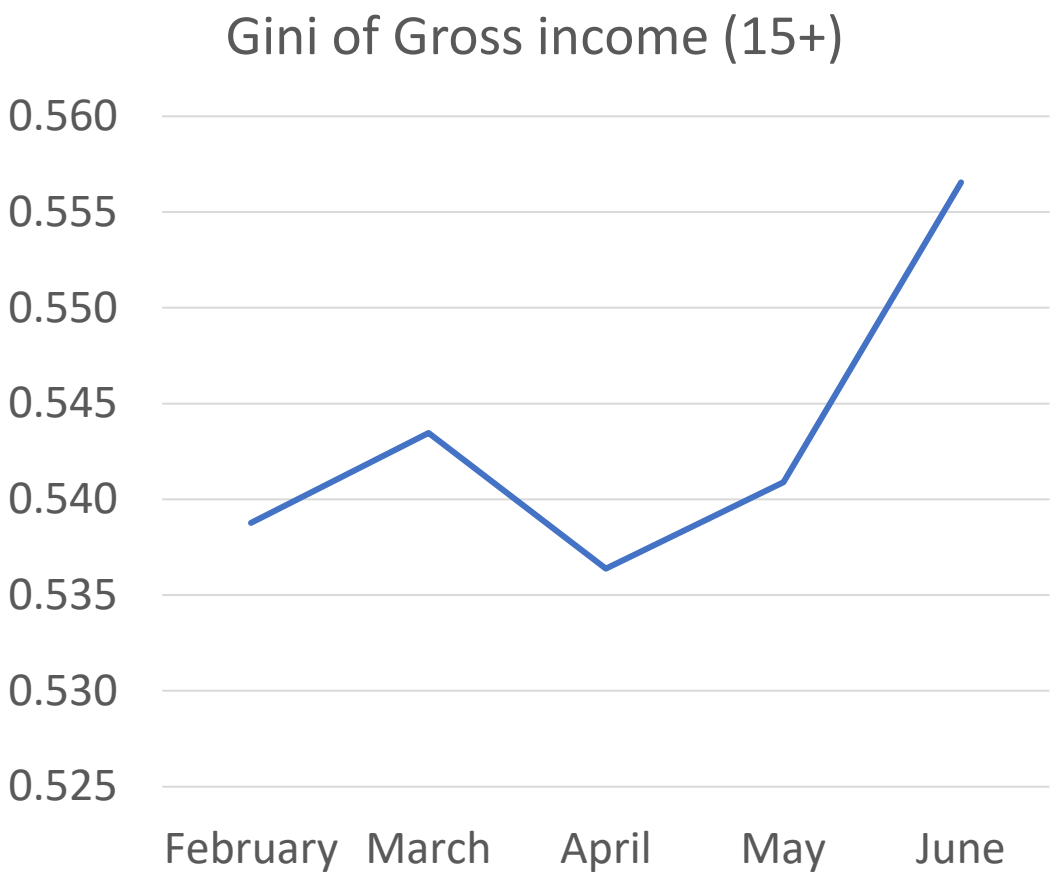

Source: Li, J., La, H.A. and Sologon, D.M. (2020), Policy, Demography, and Market Income Volatility: What Shaped Income Distribution and Inequality in Australia Between 2002 and 2016?. Review of Income and Wealth. doi:10.1111/roiw.12467

# Result – Market Income Inequality

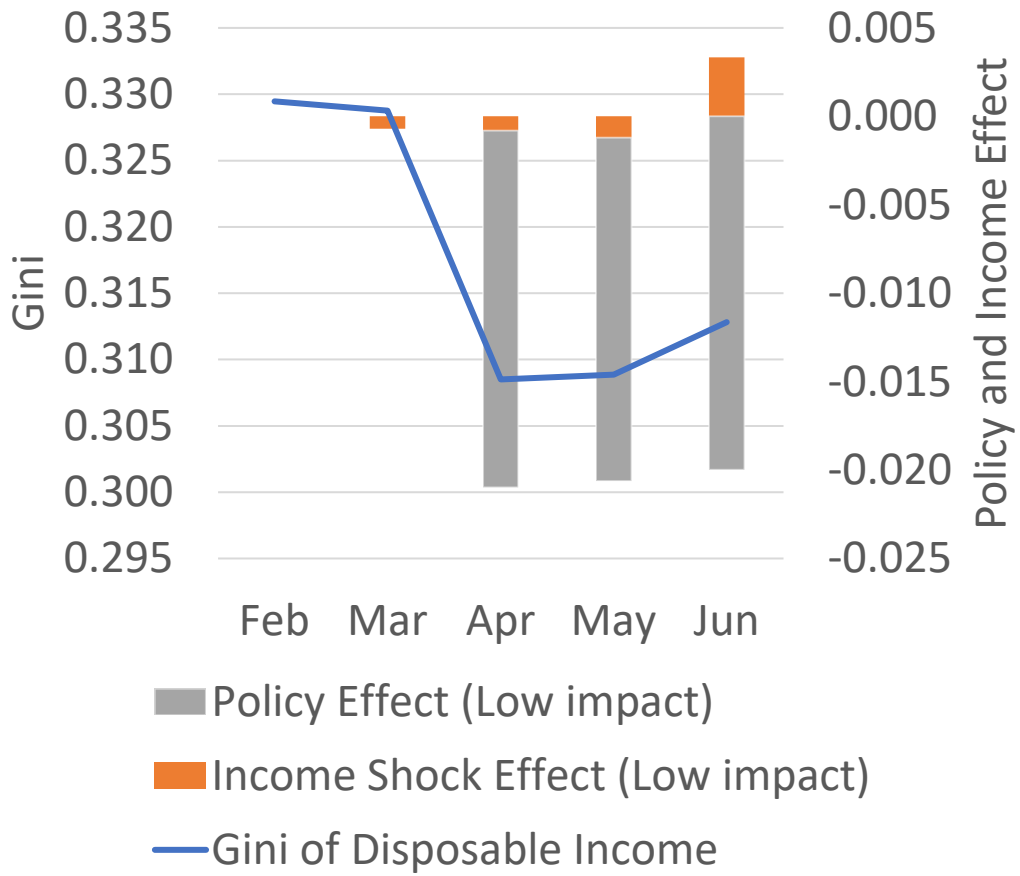
Market Income (Wage, Business and Investment) Gini

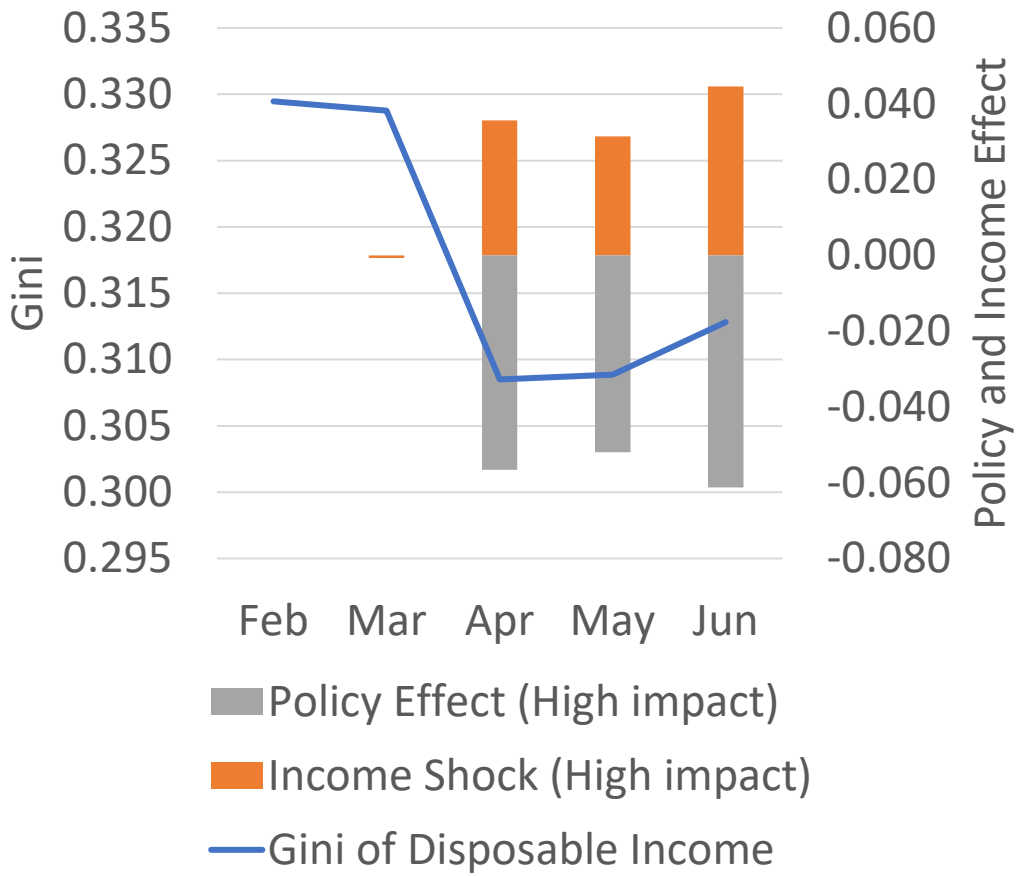
Income Shock Effect ranges from 0.02 to 0.13

Policy Effect ranges from -0.12 to -0.02



# Result – Disposable Income Inequality



# Conclusions

An example in constructing near real-time income distribution in Australia by semi-parametrically combining multiple incomplete data

Market income inequality has increased due to Covid shocks

Policy effects are larger than the Covid income shock effects, reducing the income inequality

Gini in equalised disposable income droped from 0.33 to just above 0.31

# Thank you and Questions

Email: jinjing.li@canberra.edu.au