

Spatial Heterogeneity in Welfare Reform Success: Insights from Combining Regression Discontinuity and Machine Learning Models

— PRELIMINARY —

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Australian Workshop on Public Finance
3-4 August 2023

Aims

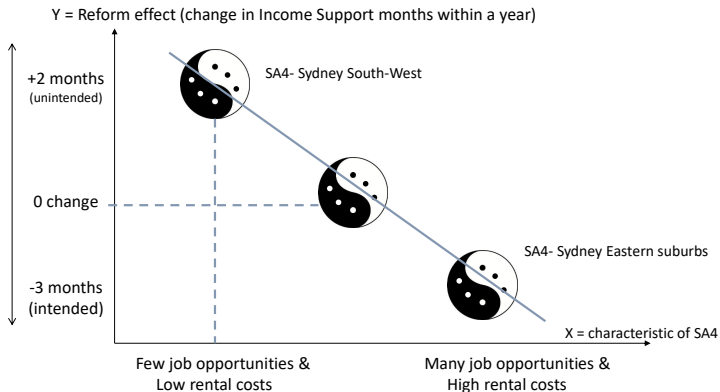
- 1 Measure how the impact of a nation-wide Welfare-to-Work (W2W) reform varied by geography
- 2 Investigate which characteristics of the regions correlates with stronger reform effect sizes
 - Reform: 2006 Welfare-to-Work reform to Parenting Payment Single reduced the potential amount of welfare support and increased participation requirements for a subgroup of single mothers
 - Outcome: 'difference' in the number of months on Income Support (measured 1-5 years after the reform)

Motivation: the Distributional Impacts of Welfare Reform

- Major economic differences between geographic regions in Australia ([Deutscher 2020](#); [Deutscher and Mazumder 2020](#))
- But national reforms (such as to the W2W policy) are often applied uniformly across regions
- If things about a region can act as a resource for - or a barrier to - employment ([Chetty, Hendren, and Katz 2016](#); [Chyn and Katz 2021](#)) then a-priori, we expect mothers' IS behaviour (in response to the reform) to depend on where she lives
- Estimating an average reform effect for AU can mask heterogeneity

Idea of Paper

Link the causal reform effect to geographic characteristics



Challenges with Analysis

- balance within and across regions
 - focus on mothers in public housing
 - estimate Regression Discontinuity Design (RDD) regressions within each region
- no readily available single dataset: need to combine various datasets for geospatial information
- identify key region-based characteristics without overfitting (78 features in total; 79 local labour markets or SA4s)
 - estimate a prediction model with Machine Learning
 - use Leave-One-Out CV to avoid overfitting

Headline results

- New** Overall, the reform reduced welfare receipt among public housing mothers by roughly **0.7 months** in the year (average was 10.6 months, thus a 6% change)
- New** Clear heterogeneity in reform effects by geography
- New** Weaker policy reform responses (or unintended responses) were most pronounced in areas with:
 - less access to public transportation
 - weaker labour markets

DATA

Administrative (DOMINO) data for estimating the causal impact of reform: dependent variable

- Benefits
 - Universe of mothers receiving 'any' Centrelink (welfare agency) payments - nearly 100% of families with children captured
 - Unit record files: longitudinal, event-time data, covering 2 decades
- Sample
 - In public housing before and at the time of separation
 - Low-income and disadvantaged sub-group: in a 12-month window, mothers were on welfare for an average of 10.6 months

DATA

Five different datasets for describing the region characteristics: independent variables

- Local labour market variables e.g. 79 regions with public housing
- Defined using broader group of residents - not just mothers in public housing
- Mixture of administrative and survey-based data from 2005-2006
- Wide range of covariates (78 in total) including:

Push factors cost-of-living pressures: rent, cost of childcare (ABS, HILDA)

Opportunity post-secondary educational institutions, potential partners (NCVER, ABS)

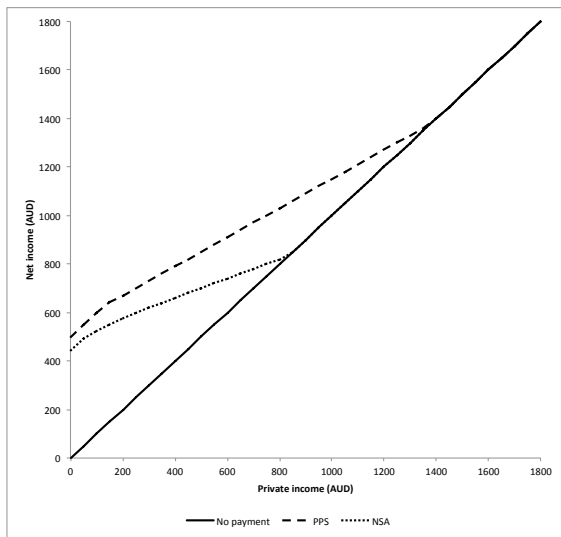
Local economy local labour market indicators: share not-in-the-labour-force, unemployed, part-time, full-time; SEIFA, share in poverty, share on IS benefits (ABS, DOMINO)

Service access childcare, public transport, health care (ACECQA, ABS, HILDA)

Cultural profile diversity in ancestry, language, country-of-birth, values towards women working, age distribution (ABS, HILDA)

The Parenting Payment Reform - Singles

- On 1 July 2006, a subset of mothers lost eligibility to Parenting Payment Single (PPS) and moved onto an unemployment benefit (NSA)



Part 1: Causal Effect of the Reform

Regression Discontinuity

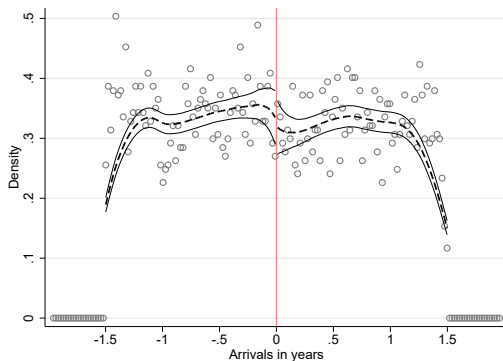
Which mothers are in the Treated and Control groups?

- mothers who separated before and after 1 July 2006
- running variable is the date of separation
 - **Assumption: only difference between those separating before and after 1 July 2006 'within each SA4' is due to the reform**
 - automatic selection of bandwidth - Local Linear Regression (Calonico, Cattaneo and Titiunik 2014)
 - no selective sorting - separation dates are not manipulated and randomly allocated to region - all have balanced density at cutoff

Identification

Density test

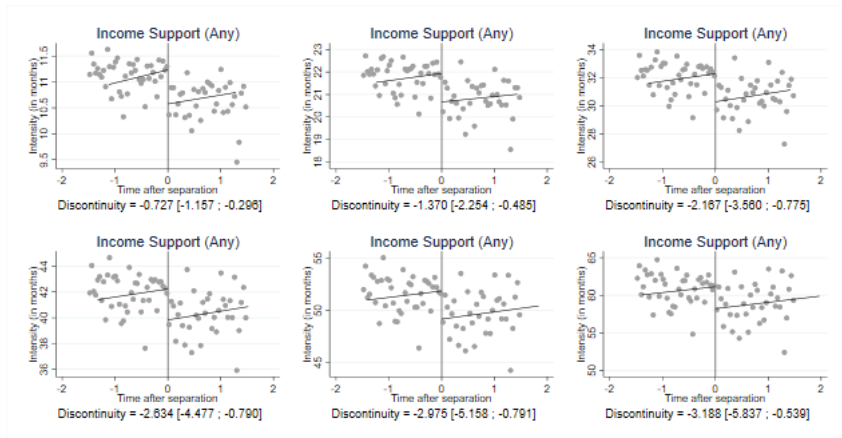
No change in the separation timing



Notes: Own graphs

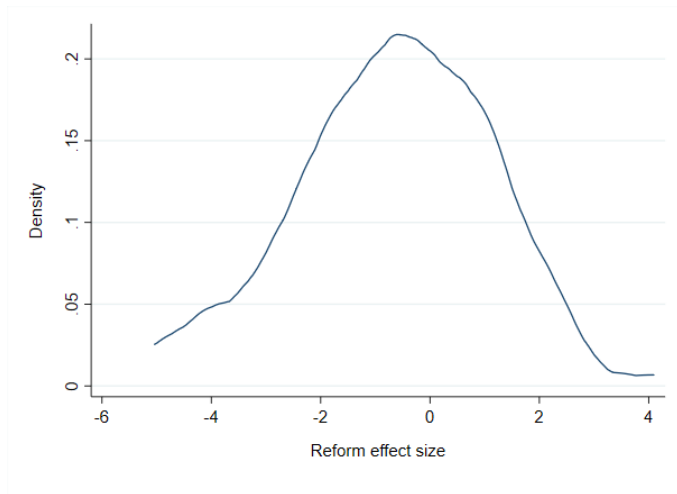
Average Effects Over Time (1 - 6 years after the reform) - National Level

RDD results



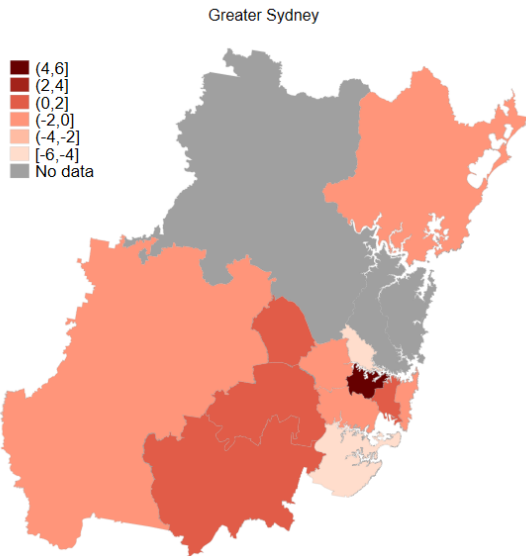
Notes: Own graphs

Findings: Density of Reform Effects across Local Labour Markets



Notes: DOMINO; 79 local labour market (SA4) regions; the intended effect was a fall in welfare receipt: larger negative values thus means a stronger intended response.

Reform Effects across SA4s in Sydney



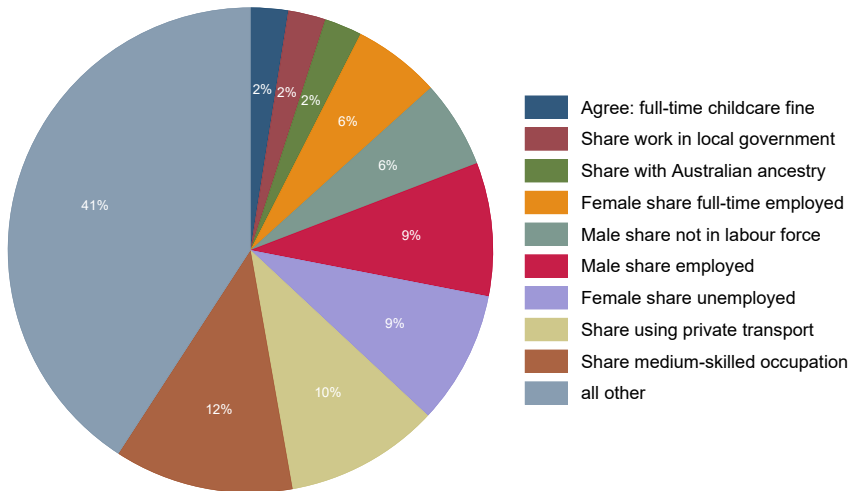
Notes: DOMINO; the intended effect was a fall in welfare receipt: larger negative values thus means a stronger intended response.

Part 2: Identifying Key Region-Based Predictors

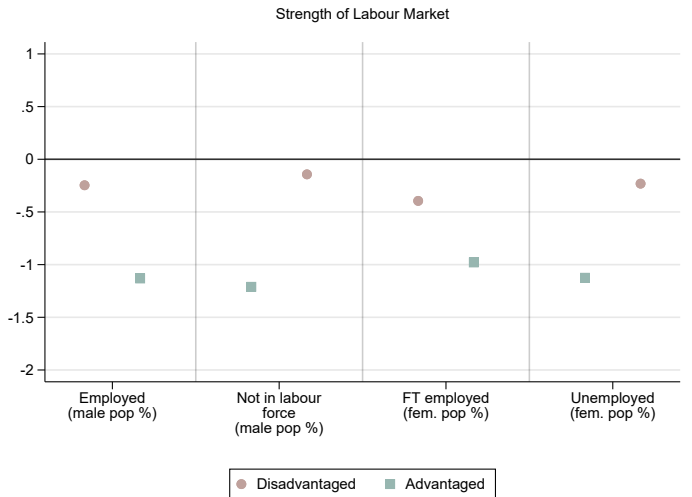
Machine Learning

- **Aim: Identify 'key' SA4 characteristics**
- Outcomes are the 79 estimated RDD causal effects; from 78 variables included
- ML models balance bias and variance goals
- Gradient Boosting Regression and Cross-Validation
- Permutation analysis to identify top 10 region-based predictors

Features Chosen - Year 1

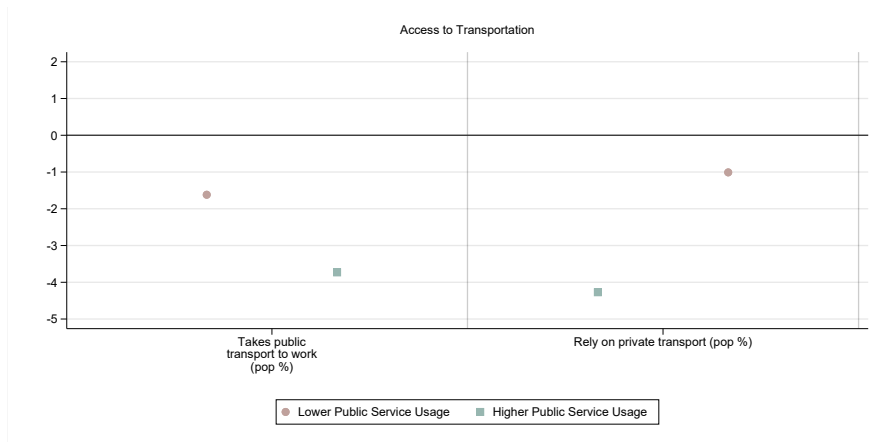


Findings: Heterogeneity Analysis



Notes: DOMINO and other data sources (HILDA, NCVET, ACECQA, ABS); weighted averages shown. The intended effect was a fall in welfare receipt: larger negative values thus means a stronger intended response.

Findings: Heterogeneity Analysis



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Notes on Interpretation

- correlations between local response effects and the characteristics of the region could reflect:
 - causal effect of that variable
 - another effect that happens to be correlated to the variable

Summary Findings

- Reform effects differed across geographic regions
- Region characteristics that consistently correlate with greater intended reform response include:
 - greater access to services (transportation)
 - areas with stronger labour markets

Conclusions

- Welfare policy levers could be adjusted depending on the economic context in which the policy is implemented
 - Welfare-to-Work policy was first implemented in 2006 when economic conditions were strong [and the reform was considered effective]
 - Based on this study, we may expect mothers' ability to respond to be lower in weaker labour markets
 - Effective place-based policies could target areas with more entrenched disadvantage

Next Steps and Question for the Audience

- Other outcomes such as employment response or earnings response
- Additional section that looks at the causal effect of e.g. stronger economic activity in the SA4 on reform effect size?
 - using potential instruments: plant closures or historical industry shares

Mixed public housing conditions

