



**NEW ZEALAND POLICY
RESEARCH INSTITUTE**
TE KĀHUI RANGAHAU MANA TAURITE

AUT

COVID vaccine mandates

The effect on vaccination uptake
and healthcare workers' labour
market outcomes

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Disclaimer

These results are not official statistics. They have been created for research purposes from the Integrated Data Infrastructure (IDI) which is carefully managed by Stats NZ. For more information about the IDI please visit <https://www.stats.govt.nz/integrated-data/>.

These results are based in part on tax data supplied by Inland Revenue to Stats NZ under the Tax Administration Act 1994 for statistical purposes. Any discussion of data limitations or weaknesses is in the context of using the IDI for statistical purposes, and is not related to the data's ability to support Inland Revenue's core operational requirements.

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Preview

- NZ government implemented COVID-19 vaccine mandates for certain workers
- What was the effect? Could they be a useful tool in future pandemics?
- Uses population-wide COVID-19 vaccine records linked to tax records from Stats NZ's IDI to examine the effect
- Results:
 - Vaccine mandates did little to increase vaccine uptake among mandated workforces given already high vaccination rates
 - Negative impact on the labour market outcomes of unvaccinated healthcare workers

Existing evidence: Vaccine uptake

- Most evidence on vaccine mandates relate to childhood immunisation as a condition of ECE or school entry in the US
 - Mandates increase vaccination uptake (e.g. Carpenter & Lawler, 2019; Abrevaya & Mulligan, 2011; Lawler, 2017)
- Limited evidence on adults
 - Healthcare facility-level employment mandates increase flu vaccination uptake (Lindley et al., 2019; Carrera, Lawler & White, 2021)
- Even less evidence relating to COVID-19
 - Vaccine passes (not workforce mandates)(Karaivanov et al., 2022)
 - US nursing home staff vaccine mandates (Syme, 2022; McGarry et al., 2022; Plummer & Wempe, 2023)

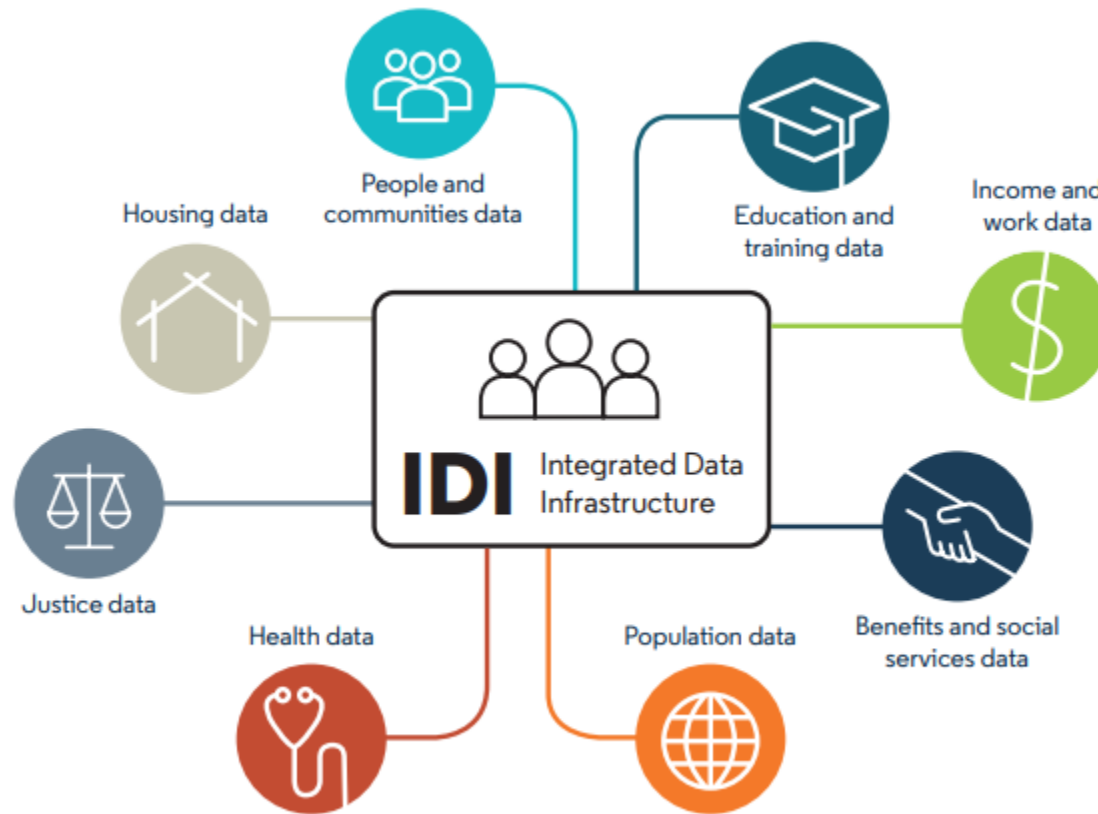
Existing evidence: Health worker supply

- Very little evidence
 - Mandates did not have a material impact on US nursing home staffing shortages
(McGarry et al., 2022; Plummer & Wempe, 2023)

Our contribution: Analysis

- NZ offers a natural experiment facilitated by individual-level administrative data
 - Population-wide vaccination database
 - Linked to individuals' characteristics via administrative data, including employment records via tax data

Stats NZ's Integrated Data Infrastructure



Source: Stats NZ. <https://www.stats.govt.nz/integrated-data/integrated-data-infrastructure>.

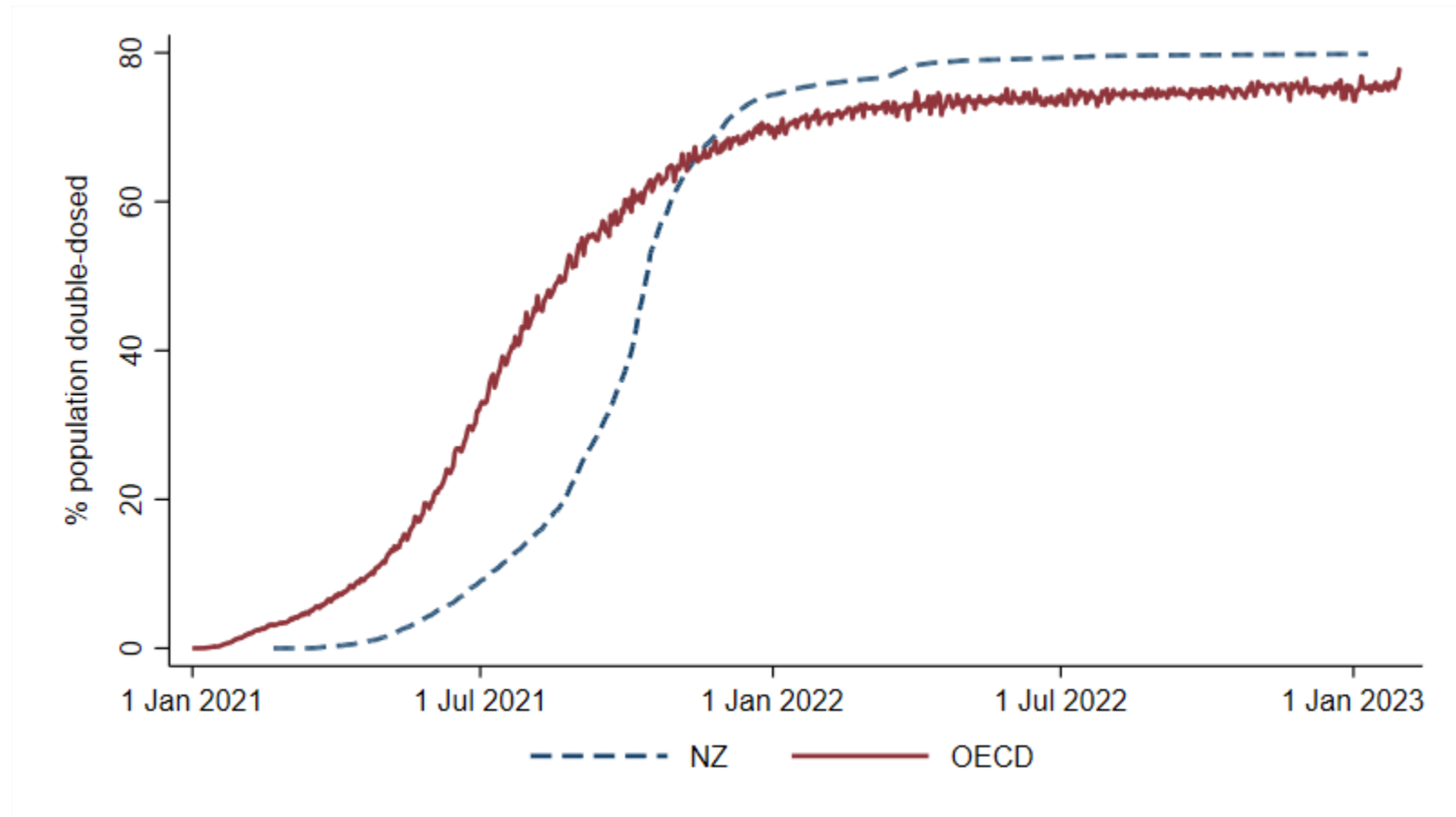
Our contribution: Policy

- Context matters: Most evidence is from US
- Mandates controversial
 - Only 18% of UK healthcare workers favoured mandatory COVID-19 vaccinations (Woolfe et al., 2022)
 - German survey found few opposed to being vaccinated if it was voluntary, but a much higher share opposed if vaccination mandatory (Schmelz & Bowles, 2022)
 - Mandates abandoned (e.g. UK) and/or faced legal challenges (e.g. US, NZ)

NZ's COVID-19 policy context



NZ's vaccination roll-out



Source: Our World in Data COVID-19 database. <https://github.com/owid/covid-19-data/>

Vaccine workforce mandates

- Workforce mandates: Vaccinate by deadline to continue employment
- MIQ workers (May 2021 announced) and port/airport workers (July 2021)
- Healthcare workers, teachers, corrections workers, frontline fire and emergency service workers, police, defence force personnel (Oct 2021 announced)
- COVID-19 response minister had previously ruled out vaccine mandates
- No media mention of mandates beyond MIQ and port/airport workers until Oct 2021 announcement
- Mandates removed from April 2022, with the last mandates, including for HCWs, ending in Sept 2022.

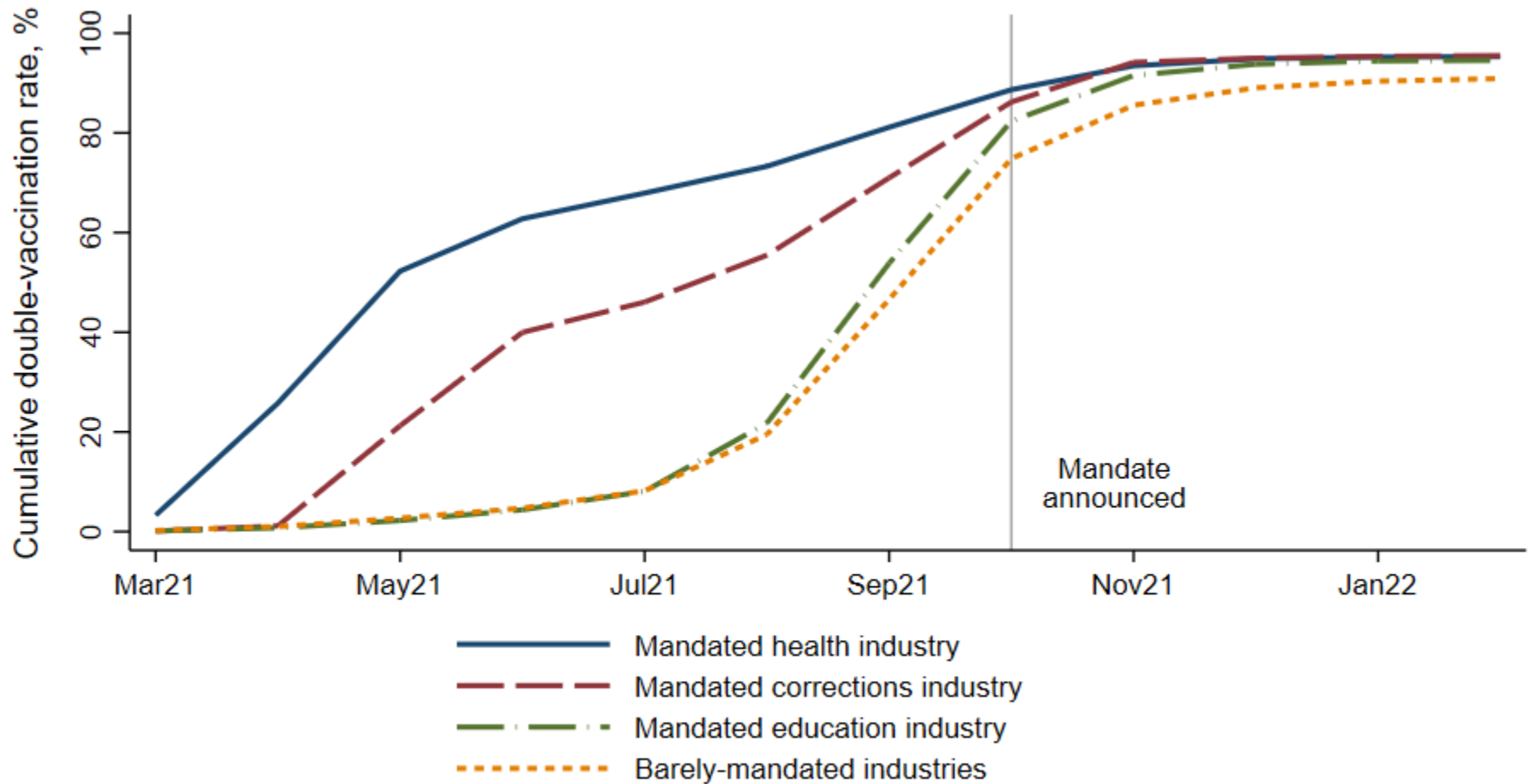
RQ1: Did mandates increase
vaccine uptake?



Population of interest

- Individuals with positive wage/salary earnings in March 2021 (1,941,942 individuals)
- Treatment: Identify workers subject to the mandates
 - Know industry of employment only, not occupation/role
 - Healthcare (171,486 individuals), corrections (8,931) and education (122,397) workers:
- Comparison: Identify barely-mandated workers (1,289,007 individuals)
- Method – two period difference-in-differences

Vaccine uptake over time



DiD results

(1) Treatment Group	(2) Comparison Group	(3) Treatment Indicator	(4) Post-period Indicator	(5) Treatment * Post
HCWs	Barely mandated workers	0.345*** (0.001)	0.419*** (0.001)	-0.283*** (0.001)
Corrections Workers	Barely mandated workers	0.170*** (0.004)	0.284*** (0.000)	-0.125*** (0.006)
Education Workers	Barely mandated workers	0.073*** (0.001)	0.419*** (0.001)	-0.023*** (0.002)

- Mandates have negative effect
- But parallel trends assumption violated due to vaccine roll-out design

RQ2: Did mandates effect
healthcare worker labour market
outcomes?



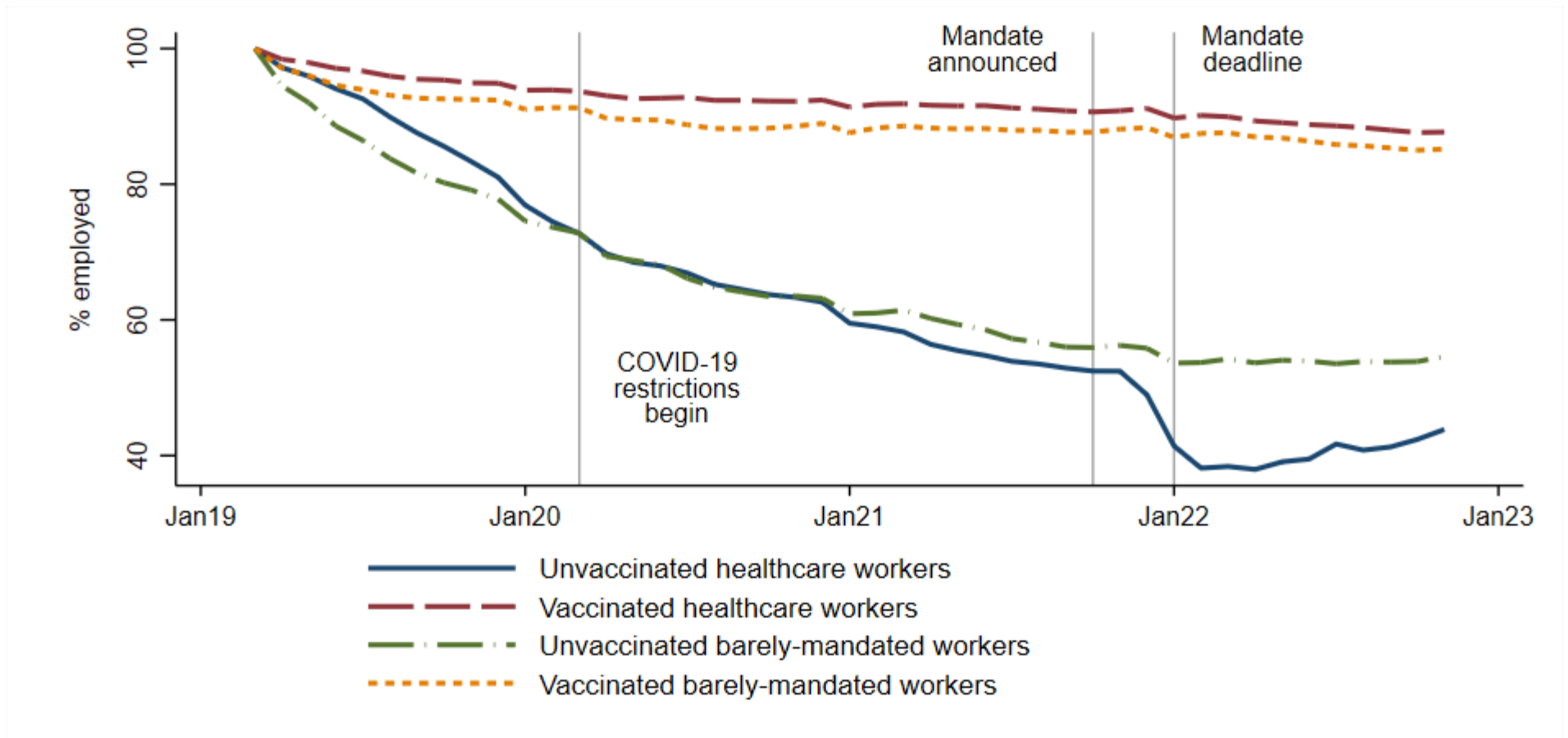
Labour market outcomes

- **Employment:** 1 if positive wages/salary; 0 otherwise
- **Same-industry employment:** 1 if employed in same industry; 0 otherwise
- **Earnings:** \$ wages/salary

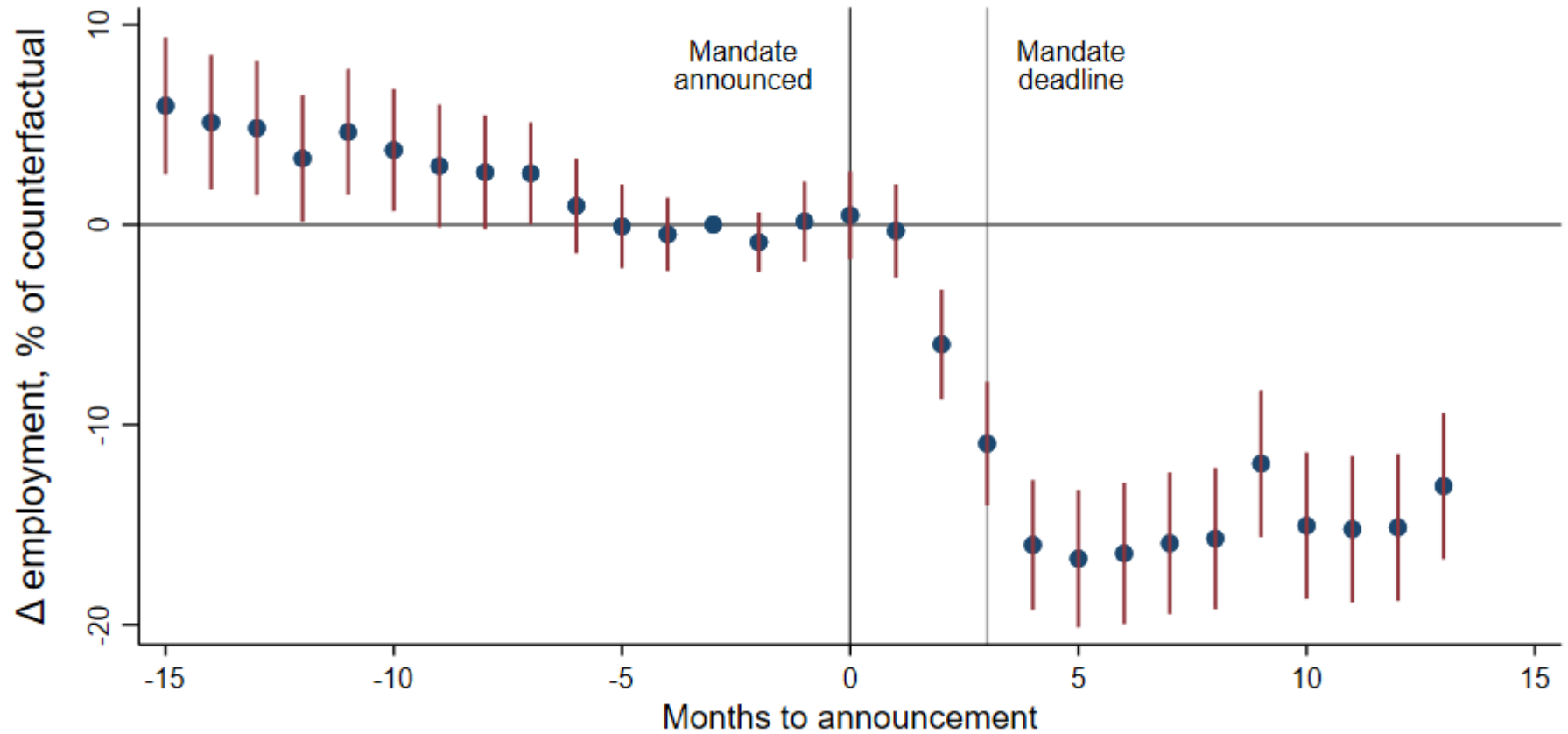
Method = dynamic triple difference

- Vaccinated HCWs vs. unvaccinated HCWs:
 - Same industry conditions
 - But potential spillover effects
- Unvaccinated HCWs vs. unvaccinated barely-mandated workers:
 - Different industry conditions
 - Possibly more similar pre-mandate-announcement labour market outcomes

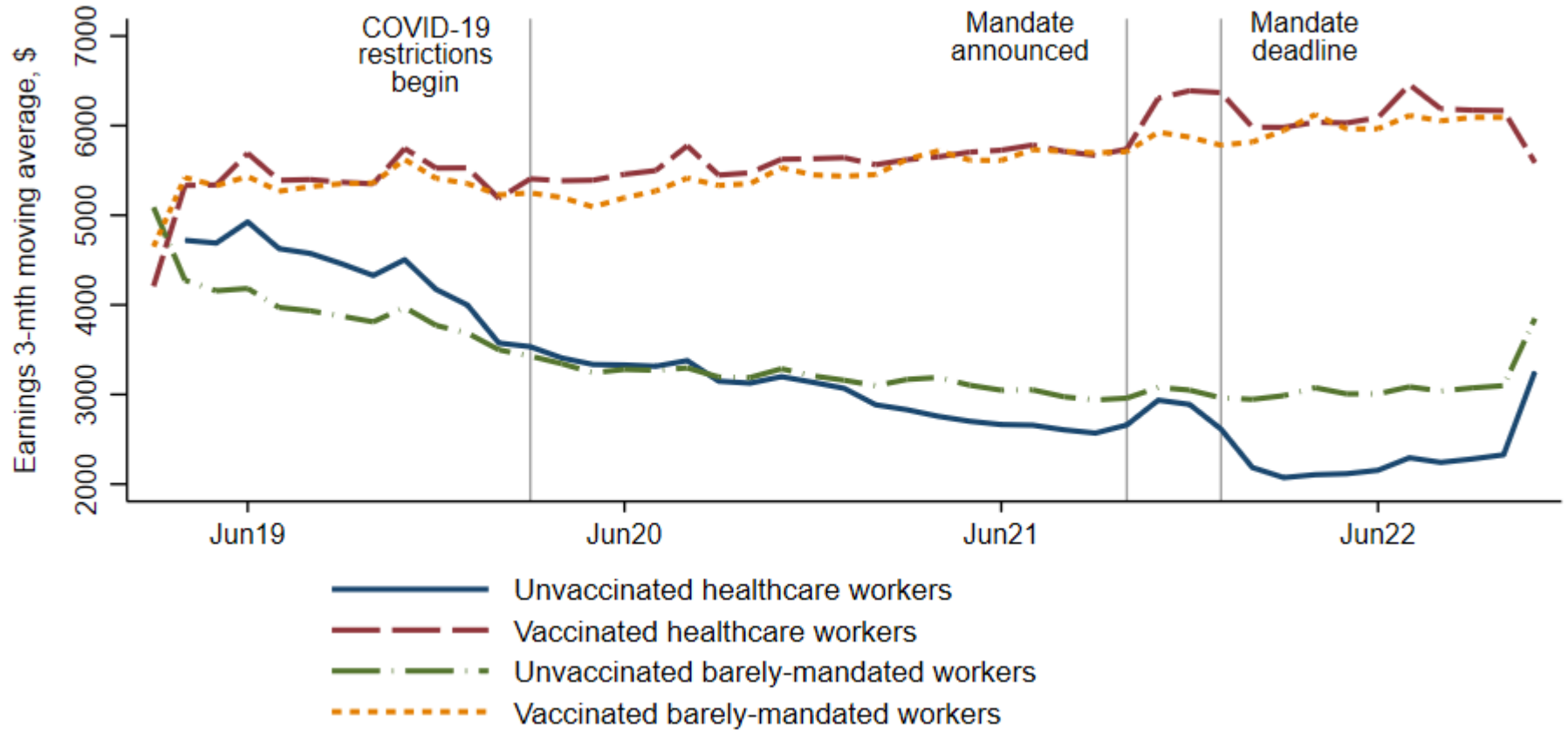
Employment over time



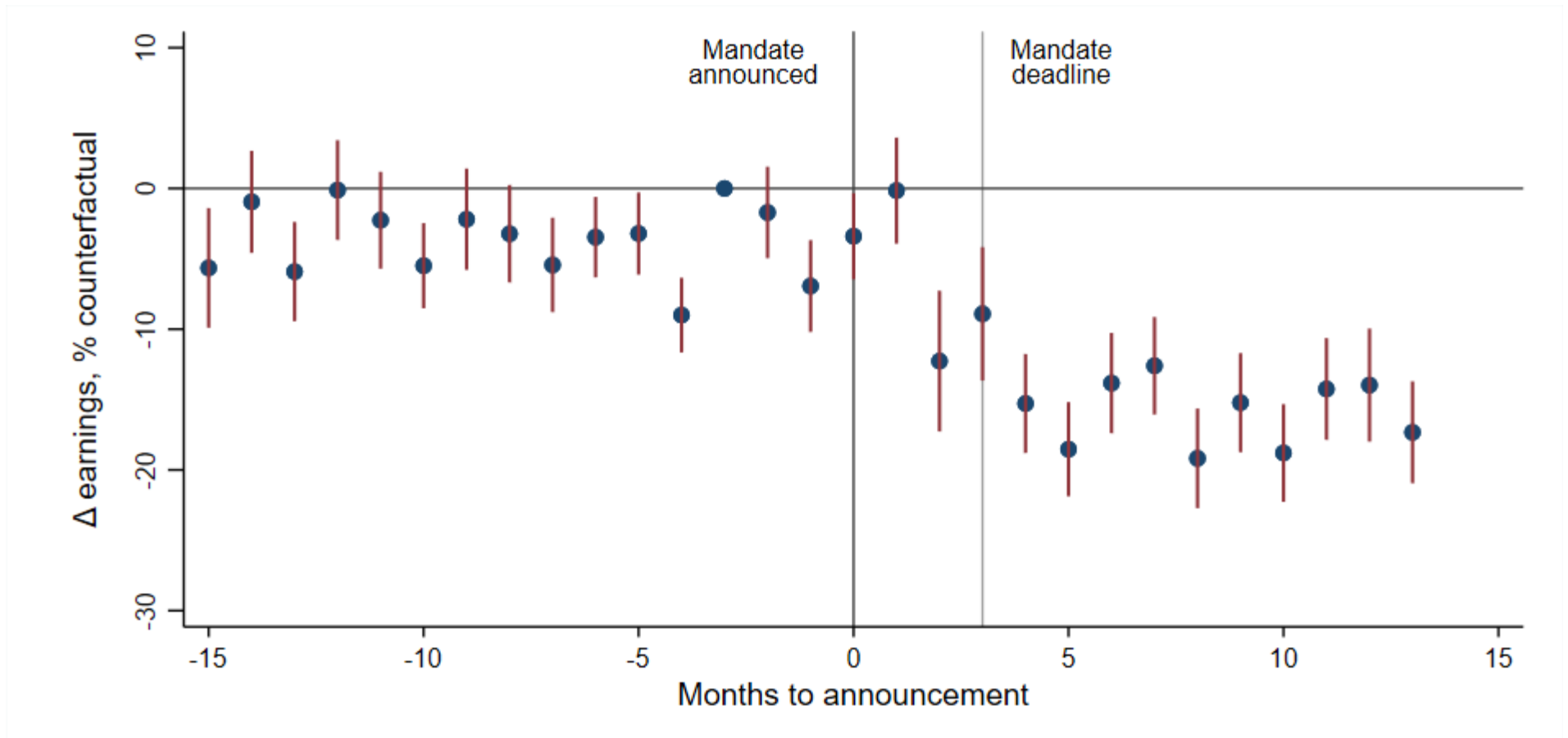
DDD results: Employment



Earnings over time



DDD results: Earnings



Additionally

- Robustness test – two-period triple difference
- Heterogeneity analysis
 - gender, age, ethnicity, born in NZ, deprivation index
- Also undertook qualitative analysis.
 - Caused extreme emotional and financial distress
 - Deterioration in overall morale
 - Many had legitimate reasons for not completing the schedule

Summary

- NZ govt implemented vaccine mandates for certain workers
- Used population-wide vaccine records linked to tax data to examine the effect
- Descriptively, no discontinuous jump in vaccine uptake following mandate announcement. Continuation of ongoing trajectory
- Vaccine access seems to be more important than vaccine mandates to uptake patterns
- Negative impact on labour market outcomes of unvaccinated workers and likely contributed to ongoing labour shortages in health
- Unintended consequence of crowding out vaccine willingness?

Thank you

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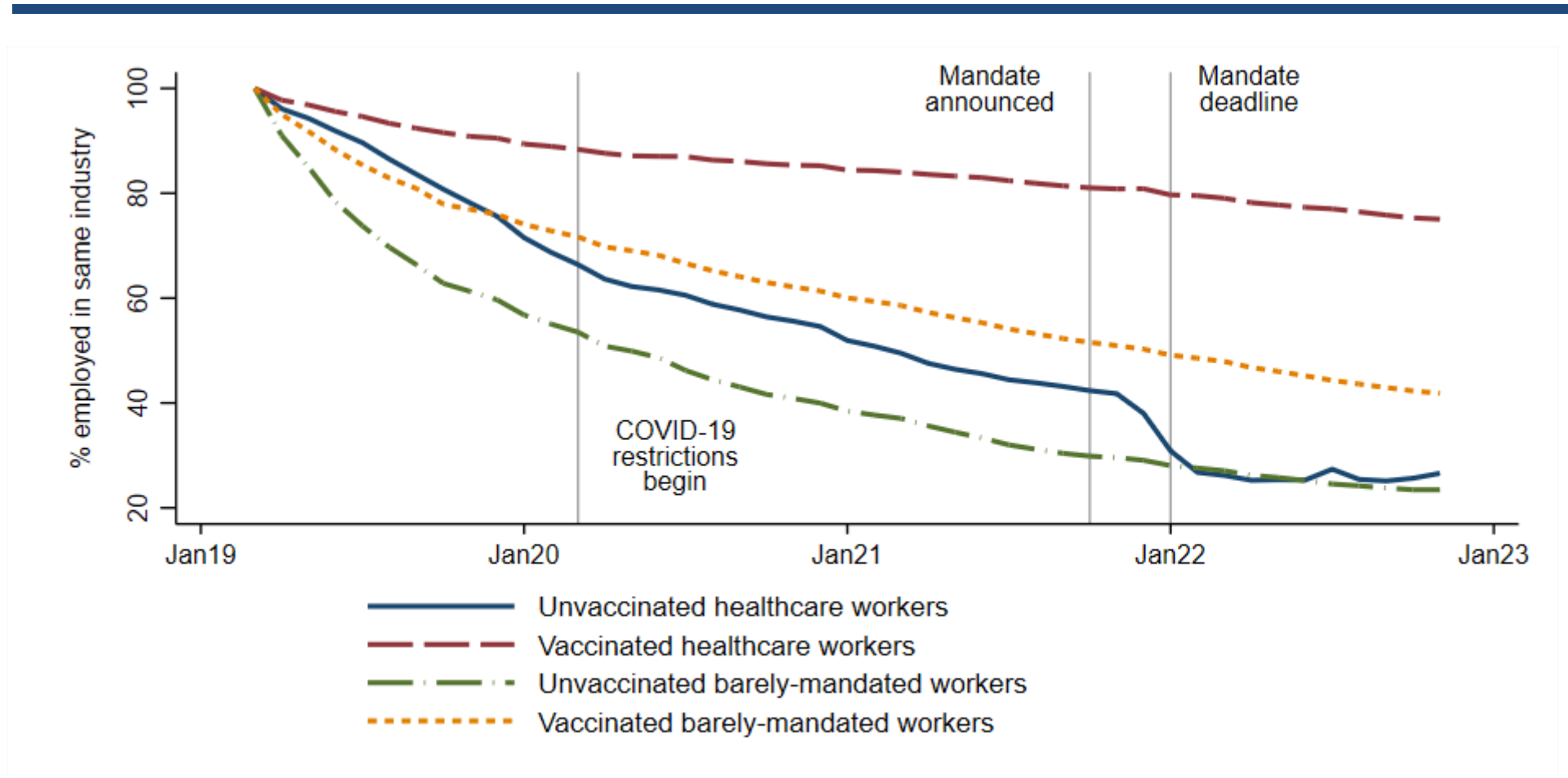
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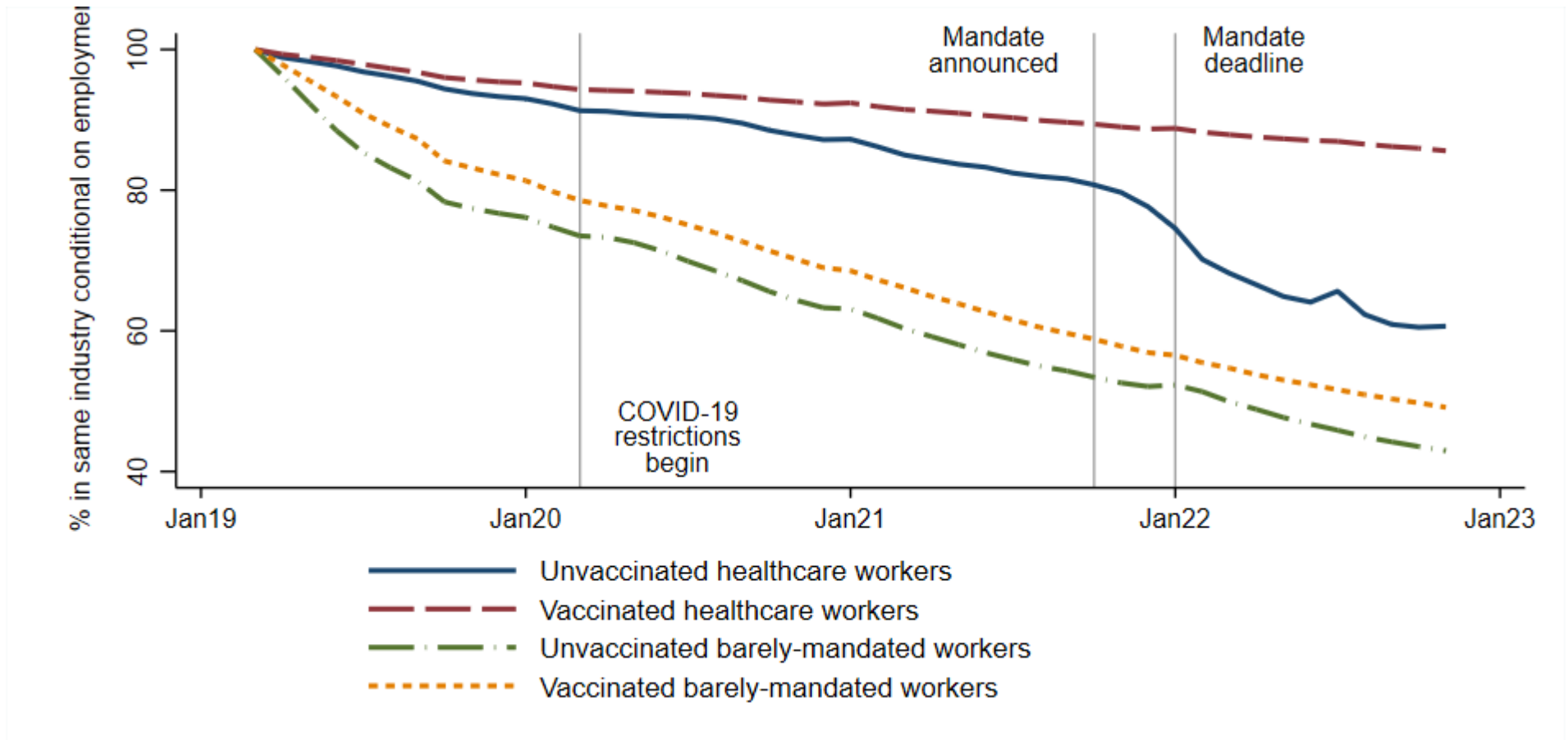
Extras



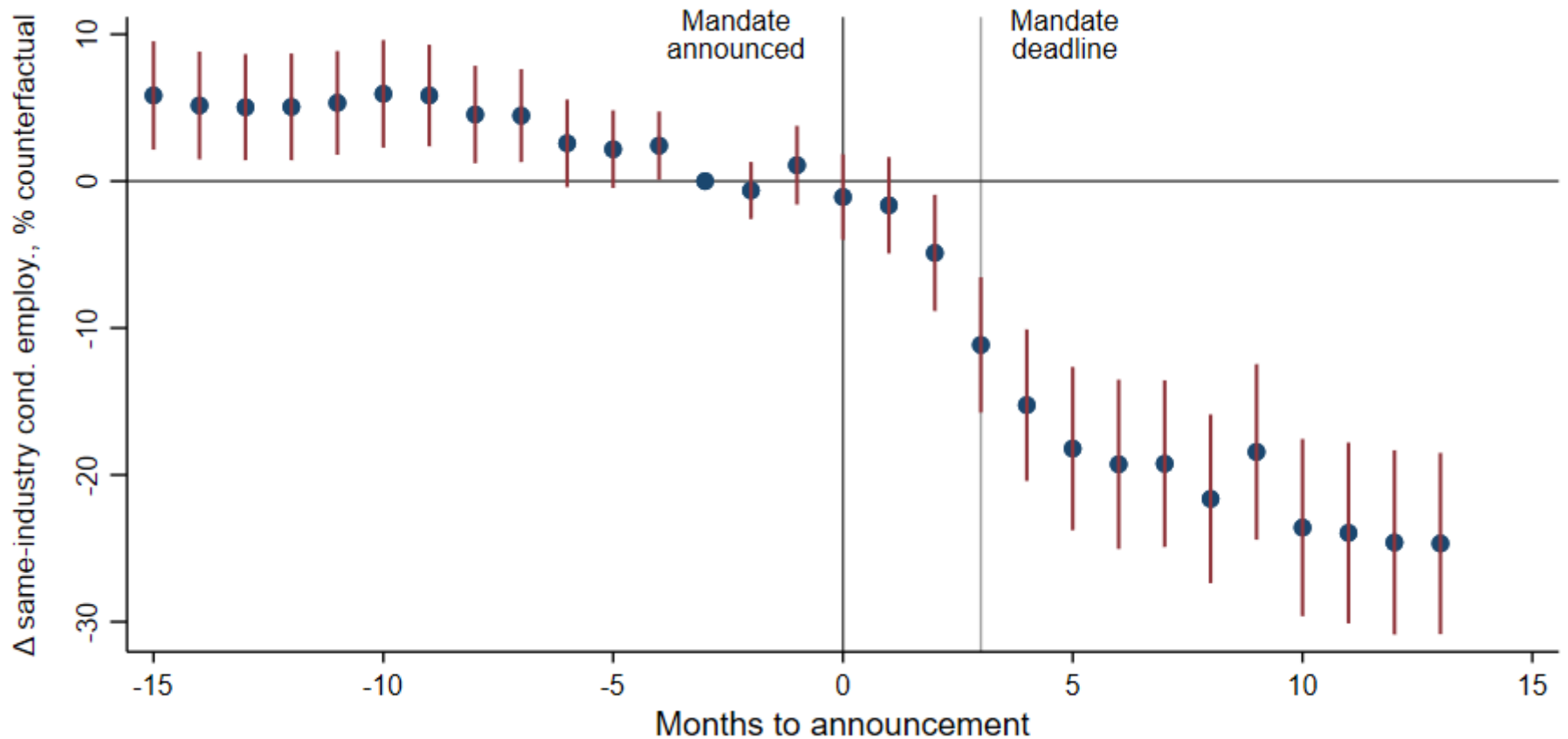
Same-industry employment over time



Same-industry employment conditional on employment over time



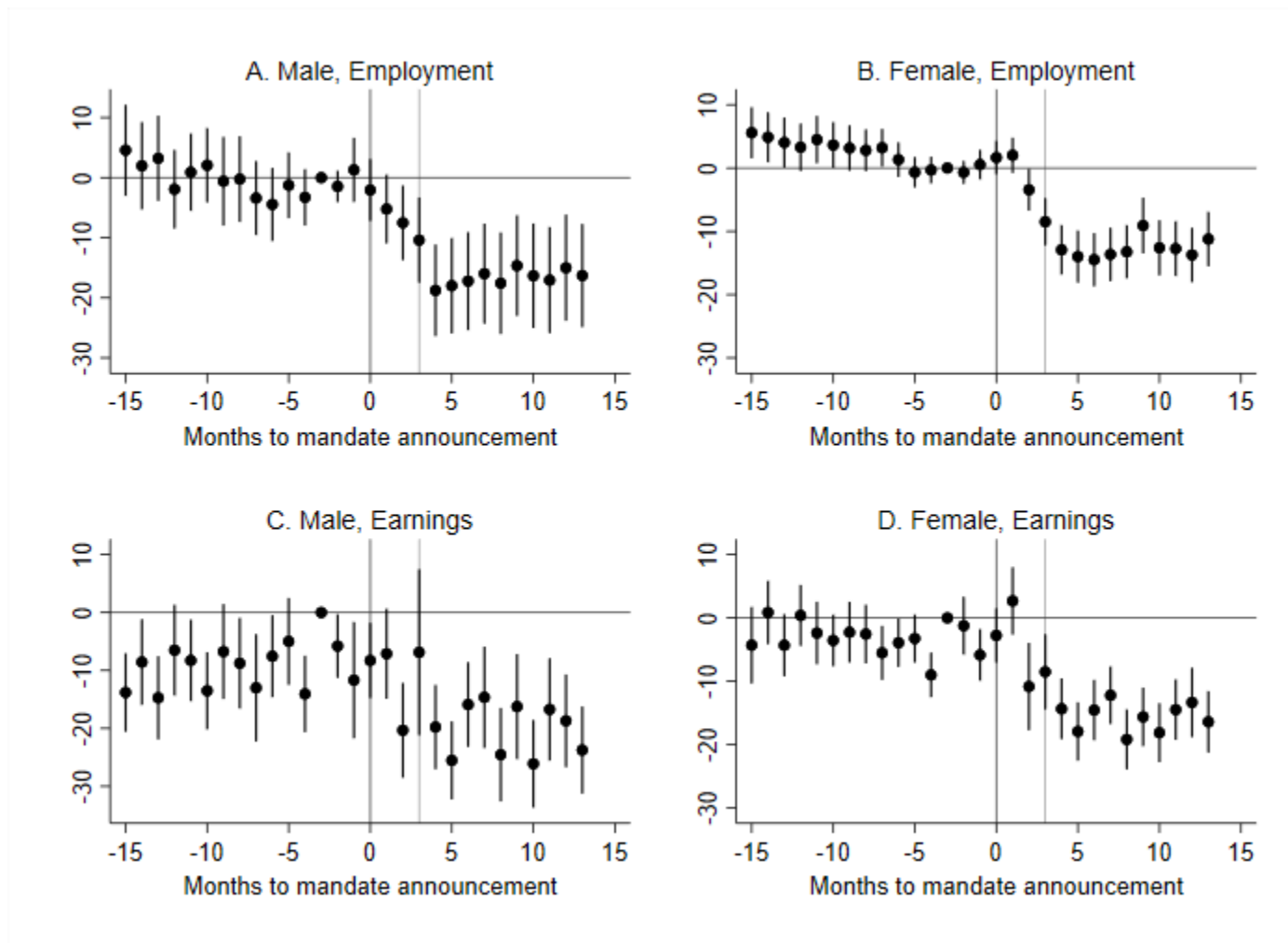
DDD results: Same-industry conditional on employment



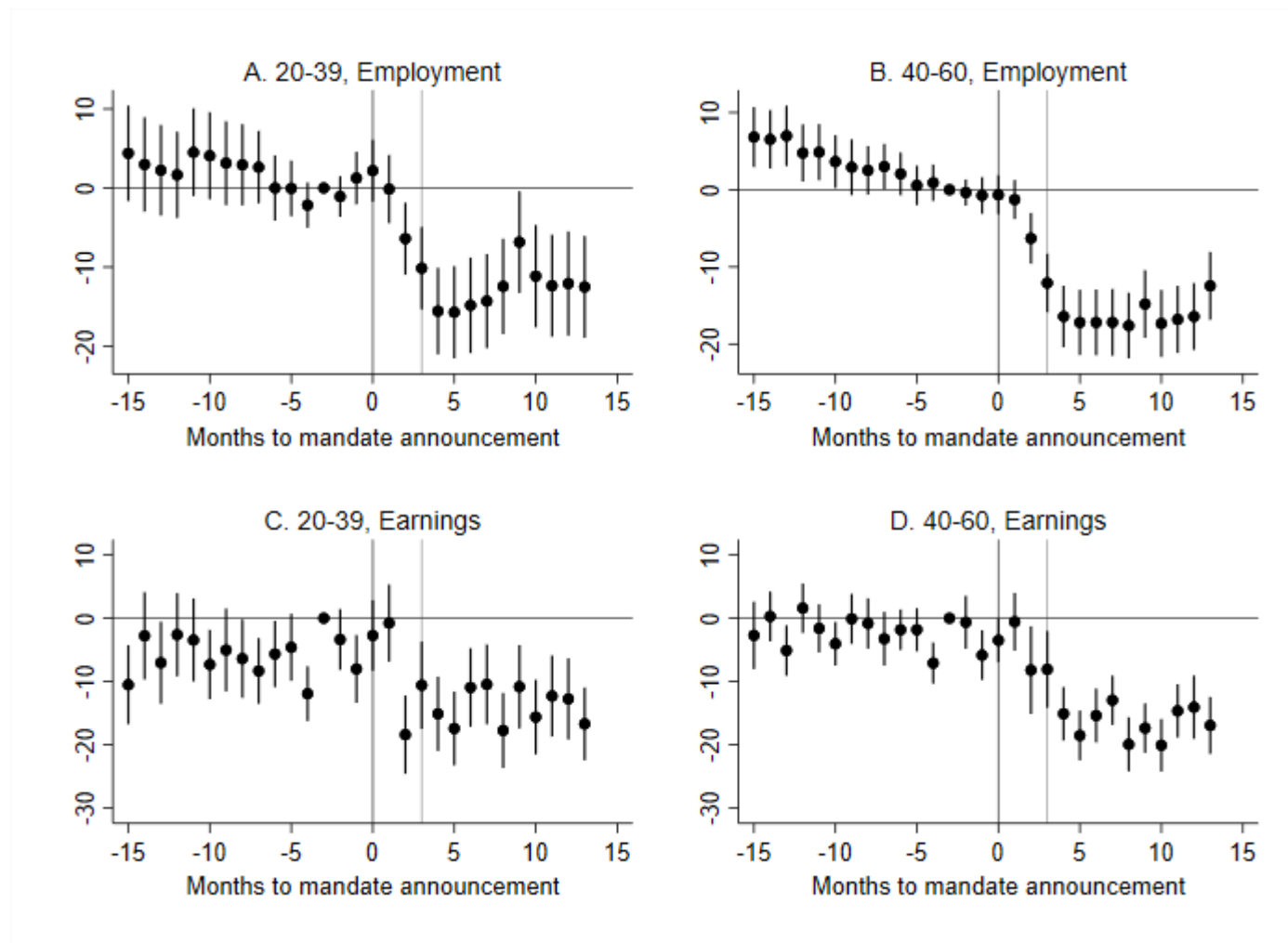
2-period triple difference regressions

	(1) Employment (Δ employ. rate)	(2) Same-industry employment (Δ employ. rate)	(3) Same-industry employment conditional on employment (Δ employ. rate)	(4) Earnings (Δ \$)
Unvaccinated	-0.112*** (0.003)	-0.083*** (0.004)	-0.023*** (0.005)	-830.45*** (25.71)
HCW	0.041*** (0.002)	0.231*** (0.003)	0.221*** (0.003)	612.62*** (33.73)
Unvaccinated * HCW	-0.024* (0.013)	-0.073*** (0.015)	-0.019 (0.013)	-369.90*** (97.29)
Post-period	-0.012*** (0.001)	-0.126*** (0.001)	-0.133*** (0.001)	453.10*** (6.30)
Unvaccinated * Post	-0.039*** (0.003)	0.004 (0.003)	0.003 (0.003)	-382.02*** (16.71)
HCW * Post-period	-0.011*** (0.002)	0.068*** (0.002)	0.093*** (0.002)	29.32* (17.25)
Unvaccinated * HCW * Post-period	-0.140*** (0.012)	-0.210*** (0.013)	-0.130*** (0.014)	-700.32*** (73.58)
Socioeconomic controls	Yes	Yes	Yes	Yes
Individual-month observations	3,891,945	3,891,945	3,891,945	3,891,945

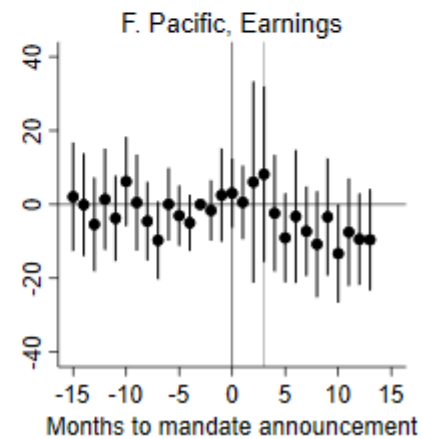
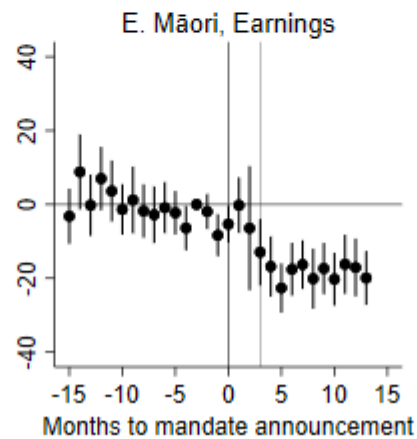
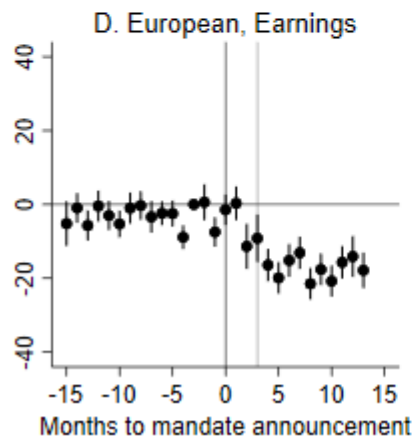
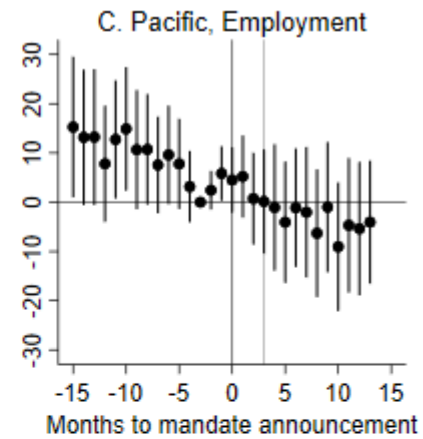
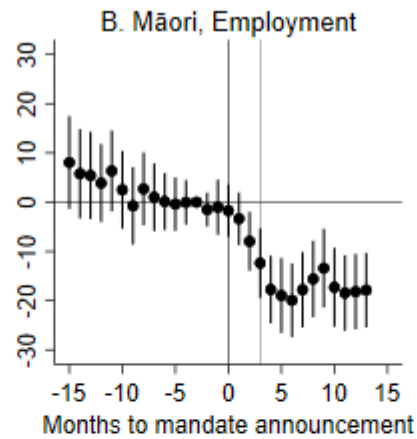
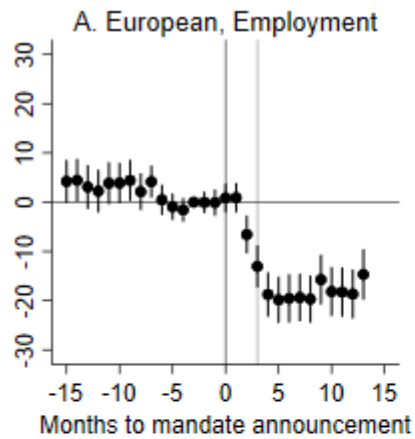
DDD heterogeneity: Male/Female



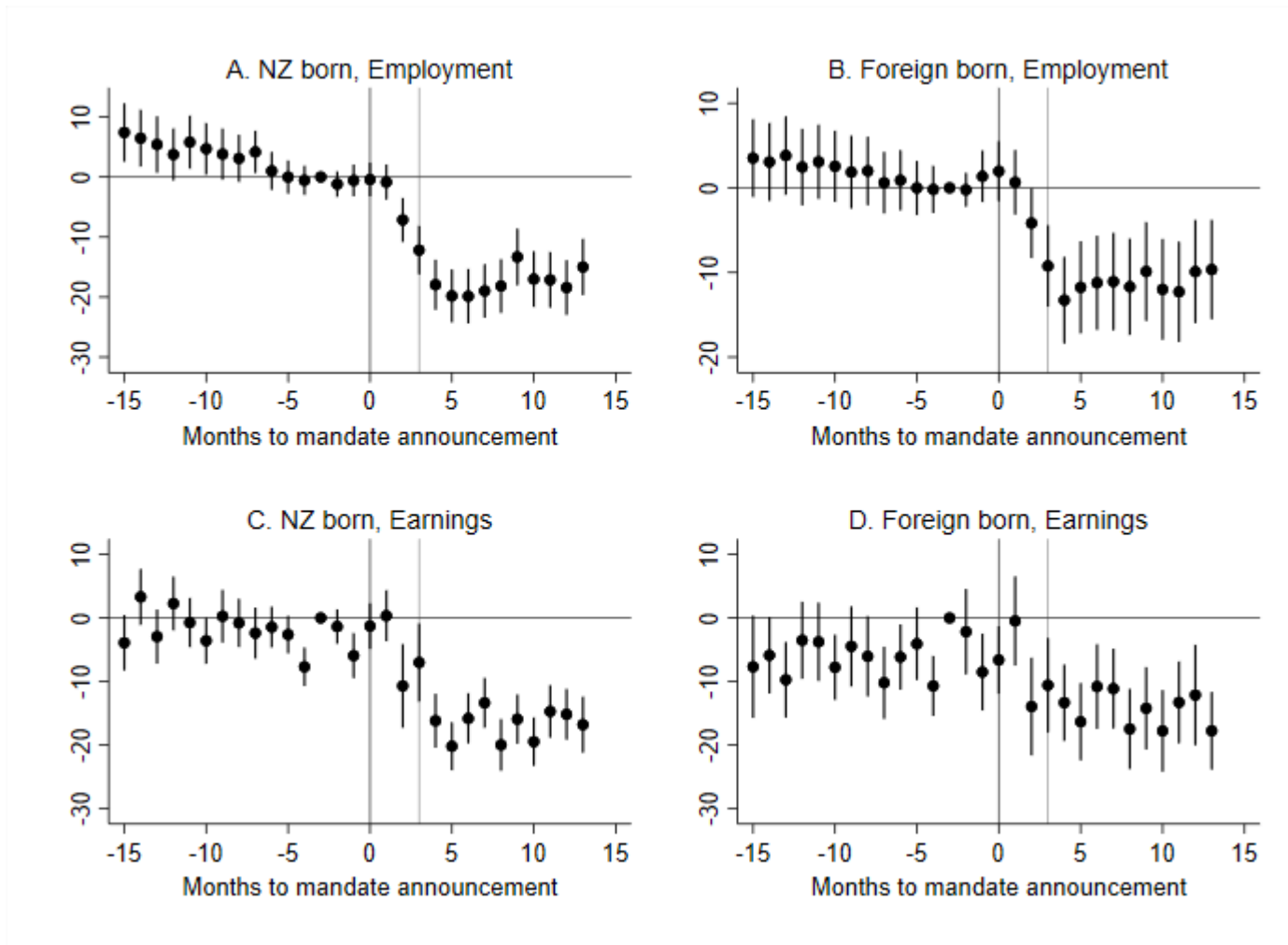
DDD heterogeneity: Age



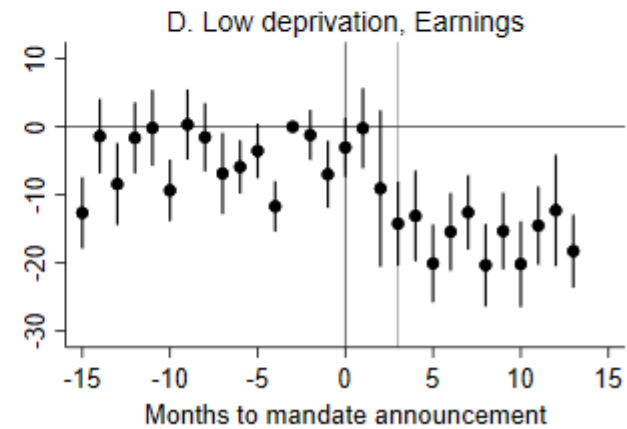
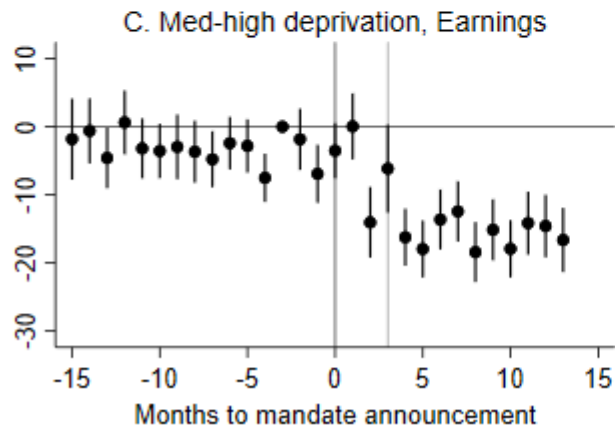
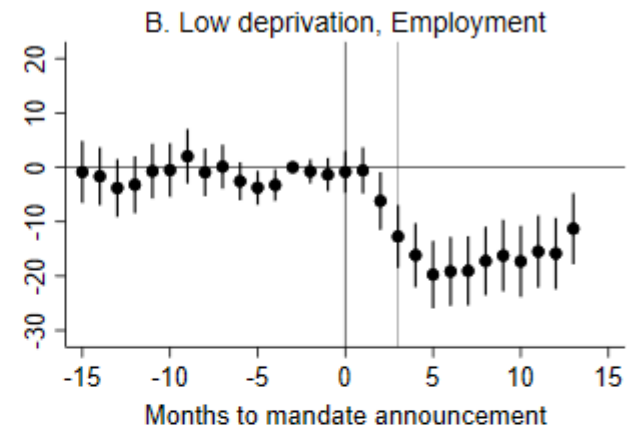
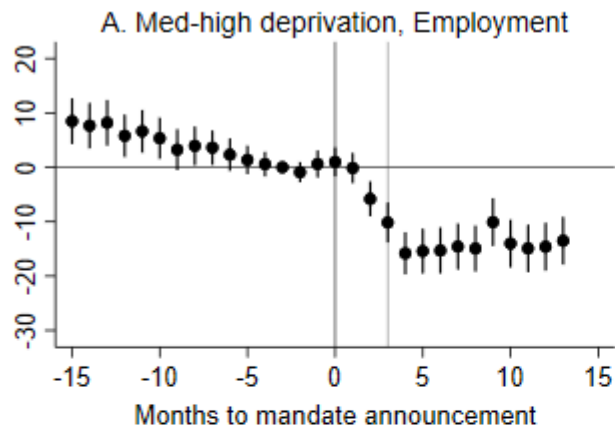
DDD heterogeneity: Ethnicity



DDD heterogeneity: NZ/Foreign-born

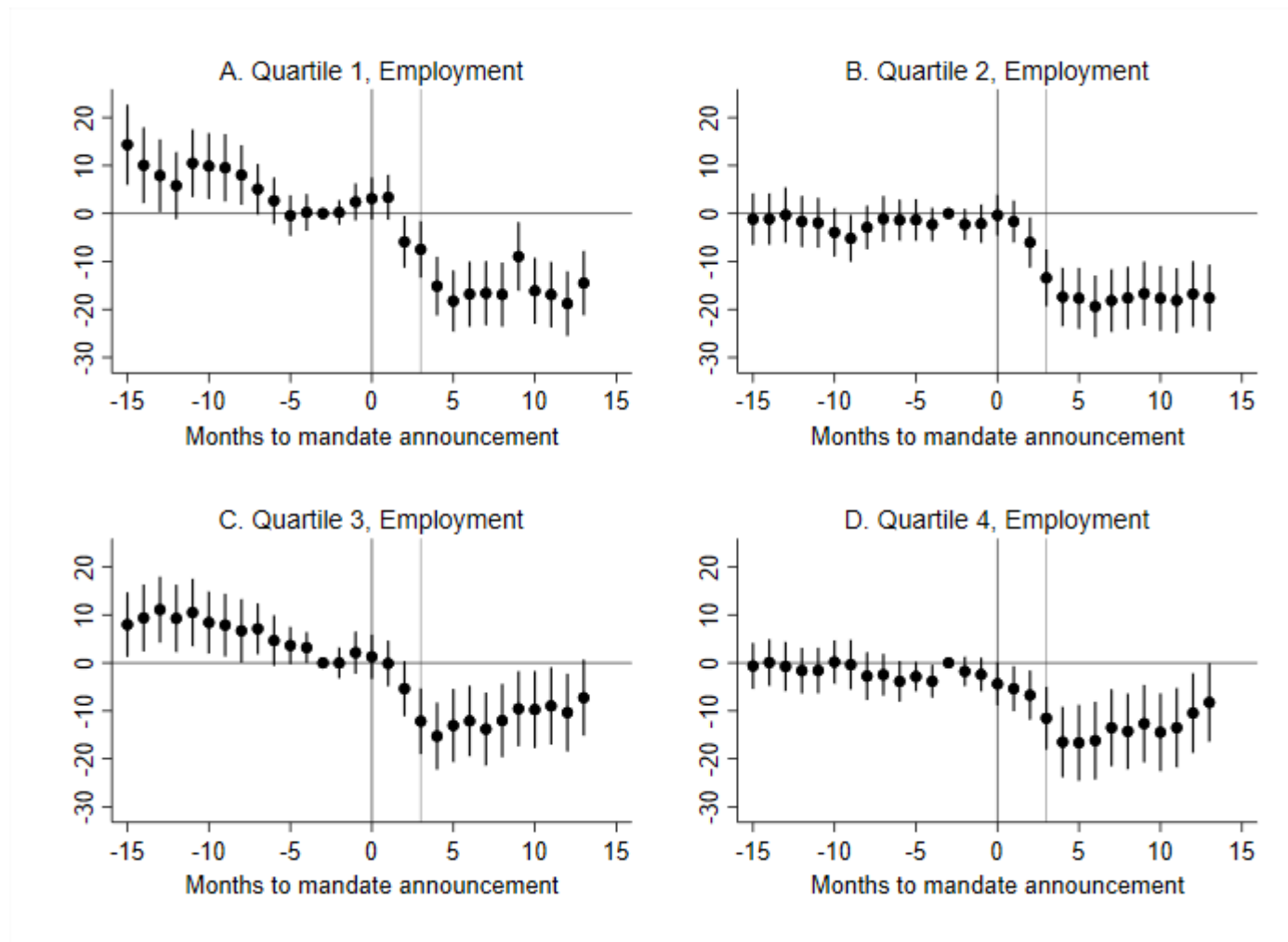


DDD heterogeneity: Deprivation



DDD heterogeneity: Income quartiles

Employment



DDD heterogeneity: Income quartiles

Earnings

