

Motivation

Research Question: How does mobile internet access affect fertility decisions and women's empowerment in high-fertility contexts?

Why Nigeria?

- One of the world's highest fertility rates (5.5 births per woman)
- Rapid 3G network expansion (2012–2018)
- Large youth population with increasing mobile phone penetration
- Limited access to formal employment and family planning services

Key Context:

- Mobile internet provides access to information, economic opportunities, and social networks
- May affect fertility through multiple channels: delayed marriage, employment, contraceptive knowledge, and bargaining power
- Critical period for demographic transition in Sub-Saharan Africa

Identification Strategy & Data

Empirical Specification

We exploit staggered 3G network rollout using a two-way fixed effects (TWFE) model:

$$Y_{ict} = \beta \cdot 3G \text{ Coverage}_{ct} + \gamma_c + \delta_t + X'_{ict}\theta + \epsilon_{ict}$$

where:

- Y_{ict} = outcome for woman i in cluster c at time t
- $3G \text{ Coverage}_{ct}$ = proportion of area with 3G coverage (0-1)
- γ_c = cluster fixed effects, δ_t = year fixed effects
- X_{ict} = individual and household controls

Data Sources

- Demographic & Health Surveys (DHS):** 2013, 2018 waves
- 3G Coverage Data:** Georeferenced mobile network coverage from Collins Bartholomew
- Sample:** 82,657 women aged 12–49 across 2,271 clusters

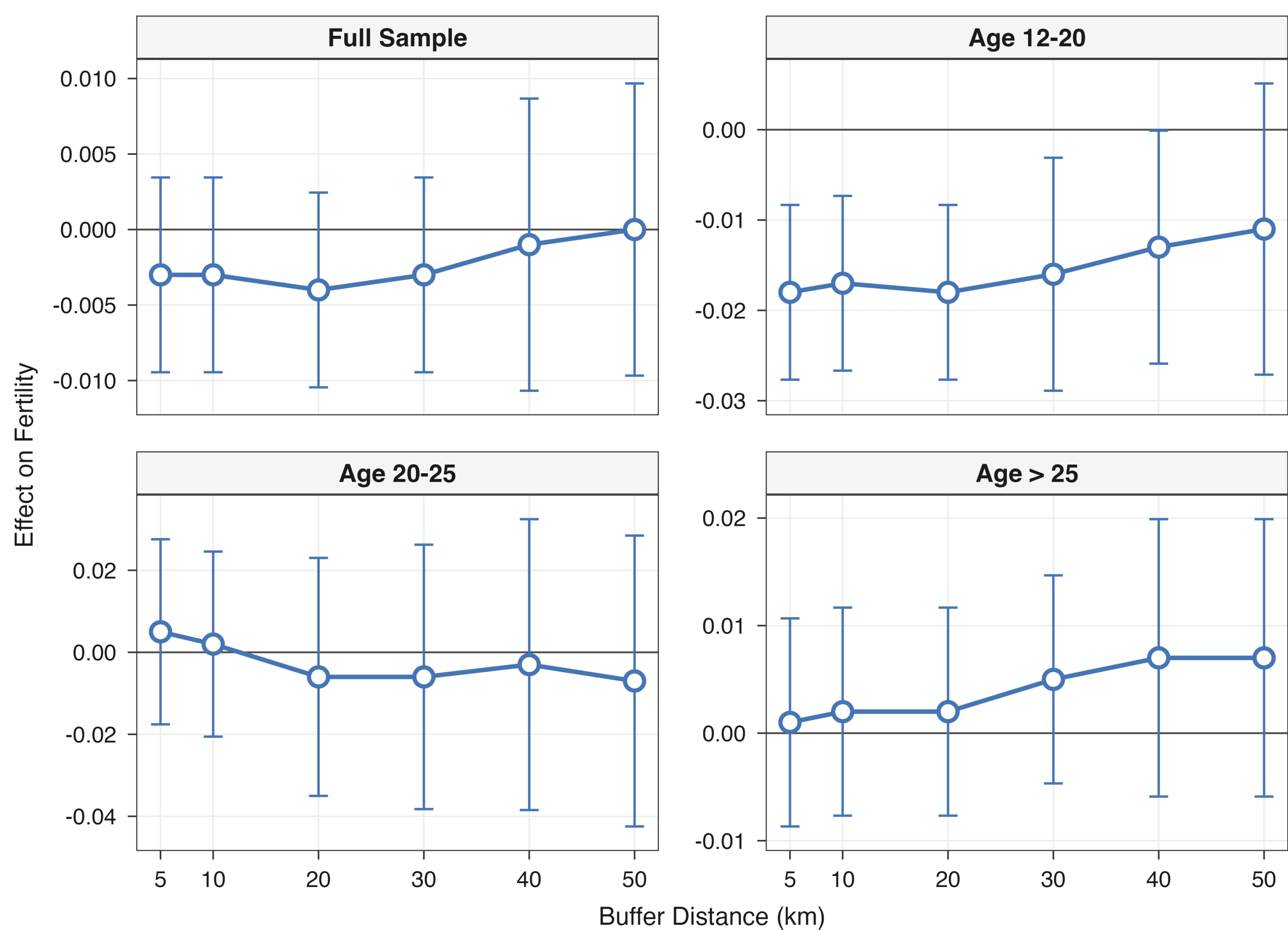
Geographic Variation in Nigeria (2012–2018)



Left: 3G coverage expansion across Nigeria. Right: Spatial variation in birth rates. Darker colors indicate higher coverage/rates.

Two-Way Fixed Effects Results

Main Effects on Fertility at Different Buffer Distance

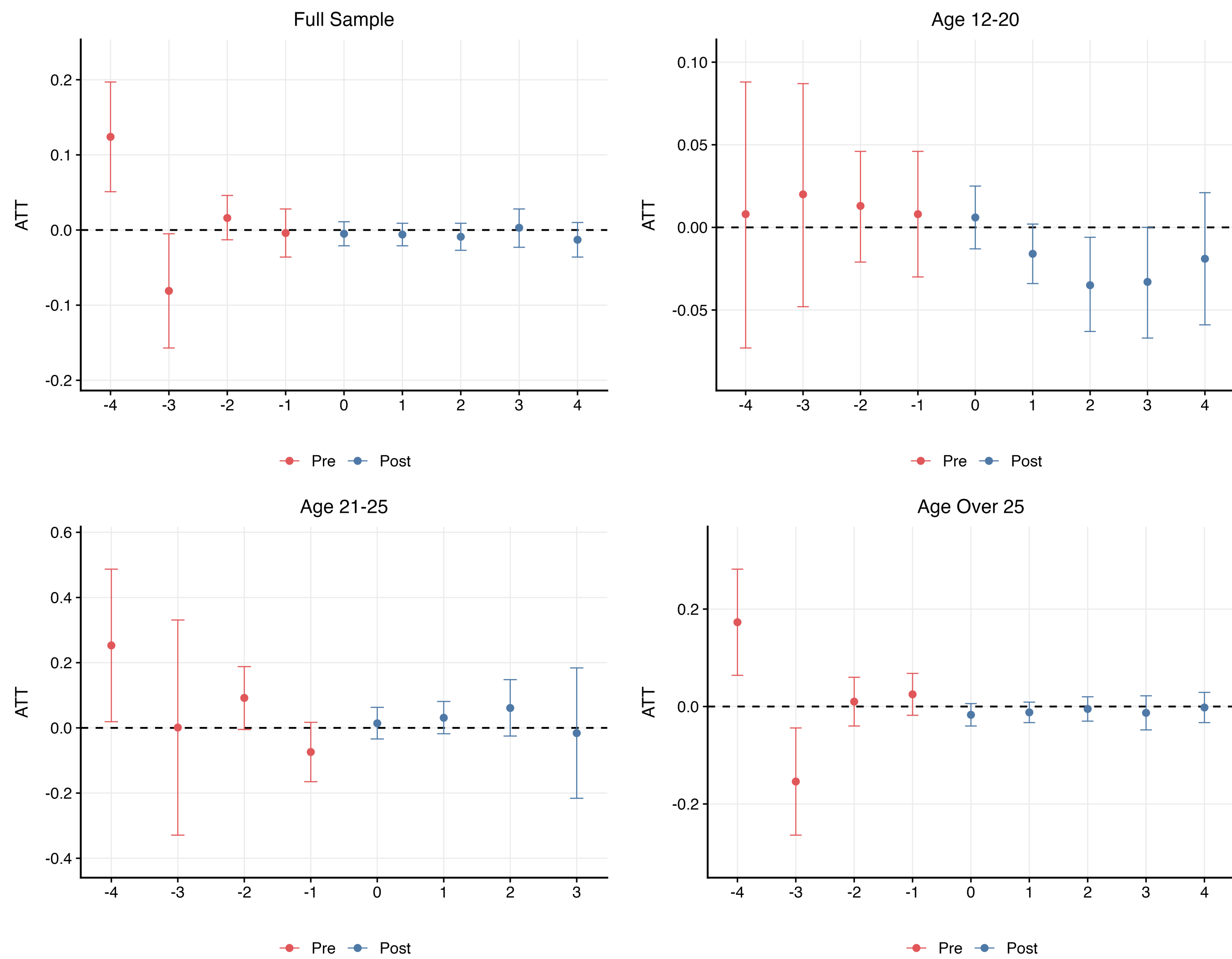


Coefficient estimates from TWFE models. A one standard deviation increase in 3G coverage reduces birth probability by 1.3–1.8 pp among adolescents (ages 12–20) at 20 km buffer distance, equivalent to an 11.4–15.7% decline. Error bars show 95% confidence intervals.

Key Findings: Largest effects for adolescents (12–20) with consistent results across buffer distances

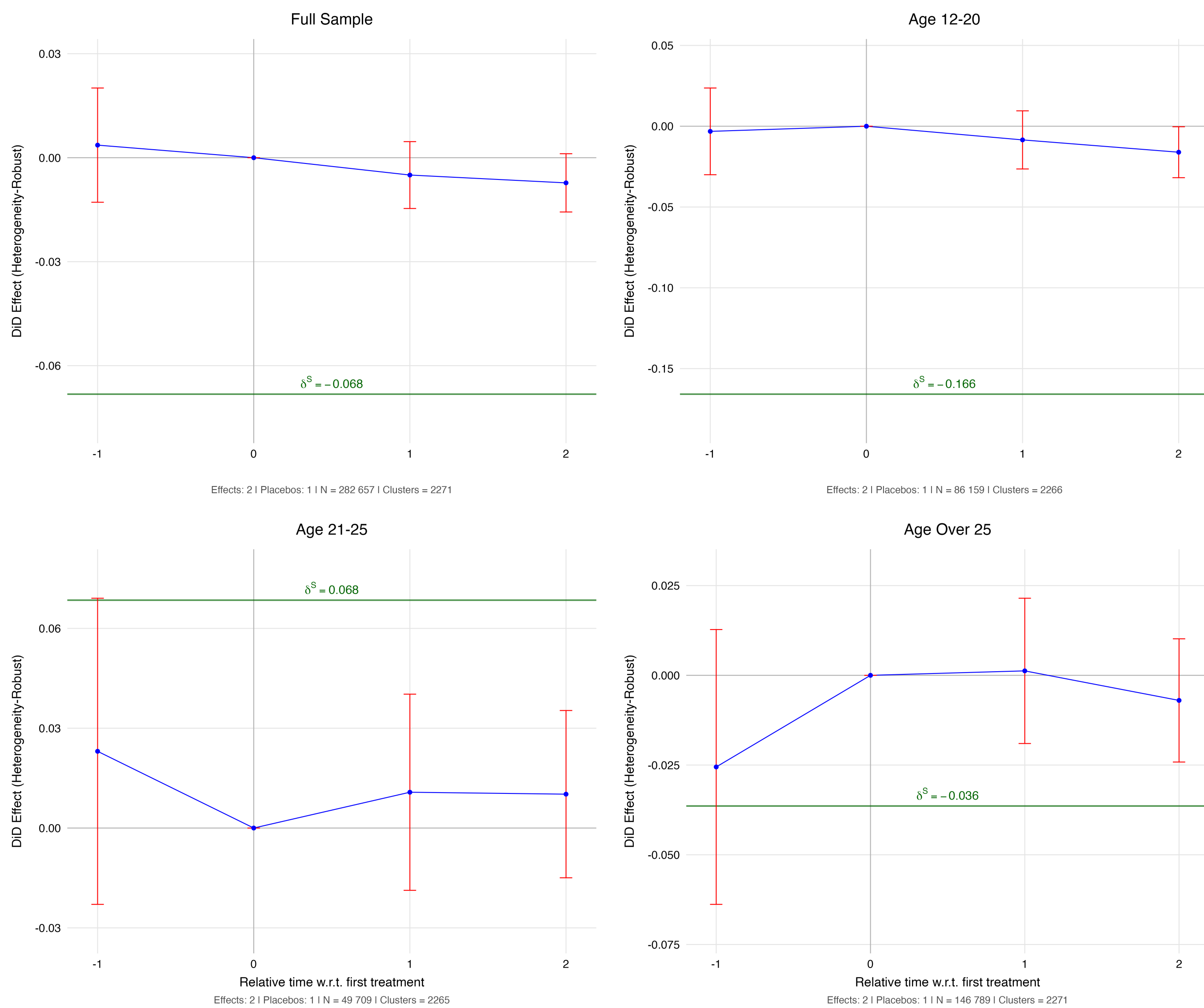
Event Study Analysis: Heterogeneous Treatment Effects

Callaway-Sant'Anna (2021) Difference-in-Differences



Dynamic treatment effects by age group using a 20-km buffer. Effects are strongest for adolescents (12–20) and emerge primarily in post-treatment periods. Period 0 represents the year of 3G introduction.

de Chaisemartin-D'Haultfoeulle (2020) Estimator



Robust DiD estimates with heterogeneous treatment effects using a 20-km buffer. Green lines denote average total effects (δ^δ). Results show fertility declines concentrated among younger women and no evidence of pre-trends.

Robustness:

- No pre-treatment trends across age groups
- Results robust to alternative estimators (CS-DiD, de Chaisemartin-D'Haultfoeulle)
- Heterogeneous effects: strongest for adolescents, null for women over 25

Mechanisms & Pathways

How does mobile internet reduce adolescent fertility?

- Delayed Life Course Transitions:** Later age at cohabitation and first birth; Increased years of education (though modest)
- Economic Opportunity:** Transition from unpaid family work to wage employment; Movement into moderate-skill occupations; Access to formal labor market information
- Enhanced Bargaining Power:** Greater autonomy in healthcare and household spending, but only when women earn their own income

Notably NOT through: Increased contraceptive adoption; Changes in overall employment rates; Financial decision-making power remains limited for non-earners

Conclusion

- Mobile internet accelerates demographic transition** in high-fertility settings by delaying early childbearing among adolescents
- Economic opportunity** is the primary channel – not family planning or contraceptive access
- Empowerment is multidimensional:** gains in health autonomy but limited financial decision-making power
- Age heterogeneity matters:** strongest effects for adolescents (12–20), diminishing for older women