Industrial Promotion Policies and Population Growth: Causal Evidence from Argentina

A Staggered Difference-in-Differences Approach

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Abstract

This paper examines the causal effect of industrial promotion zones on subnational population growth in Argentina over the period 1970–2022. Exploiting the staggered adoption of industrial promotion legislation across Argentine departments, we apply the Callaway-Sant'Anna (2021) estimator to isolate the average treatment effect on the treated (ATT) while accounting for heterogeneous treatment timing. We complement this with generalized synthetic control methods (Xu 2017) and spatial econometric models to detect geographic spillovers. Our results suggest that industrial promotion policies generate [X] percentage-point increases in annual population growth rates within treated areas, with effects concentrated in [time period] and mediated primarily through [mechanism]. Spatial decomposition re-

veals significant positive spillovers to neighboring areas up to [X] km from zone boundaries.

1 Introduction

Place-based development policies occupy a contested position in the academic and policy literature (Kline & Moretti, 2014; Neumark & Kolko, 2010). On one hand, theory predicts that spatially targeted industrial incentives can overcome coordination failures and catalyze agglomeration economies in lagging regions (Krugman, 1991; Moretti, 2010). On the other hand, critics argue that such policies may merely relocate economic activity across space rather than generate genuine growth, with uncertain and potentially negative consequences for population distribution (Glaeser & Ward, 2009).

This paper contributes to resolving this debate by examining the demographic footprint of industrial promotion zones in Argentina — a country that has maintained one of the developing world's most extensive systems of geographically targeted industrial incentives since the 1970s (Azpiazu et al., 1988; Schvarzer, 1987). Unlike most existing evaluations, which focus on firm-level outcomes or employment, we directly analyze **population dynamics** as the ultimate measure of whether place-based policies succeed in reshaping the geographic distribution of economic activity and human capital.

1.1 Research Question

Do industrial promotion zones alter subnational population growth trajectories in Argentina, and if so, through what mechanisms?

We decompose this question into three specific hypotheses:

1. **H1 (Growth effect):** Departments with active industrial promotion zones experience higher population growth rates than comparable non-treated departments.
2. **H2 (Persistence):** Treatment effects persist beyond the initial policy period, reflecting agglomeration spillovers.
3. **H3 (Spatial spillovers):** Population growth effects extend to neighboring departments, consistent with commuter and migration hinterland expansion.

1.2 Contribution

This paper makes three contributions to the literature. **First**, we provide the first causally credible estimates of the demographic consequences of Argentina's industrial promotion system using modern staggered difference-in-differences methods (Callaway & Sant'Anna, 2021). **Second**, we contribute to the broader place-based policy evaluation literature by demonstrating how population dynamics can serve as a unified outcome integrating multiple dimensions of regional development. **Third**, we generate a methodological template for evaluating industrial policy in data-constrained middle-income country contexts.

2 Theoretical Framework

2.1 Place-Based Industrial Policy and Population Dynamics

The theoretical link between industrial promotion and population growth operates through two primary channels. The **direct employment channel** predicts that subsidized firm formation increases local labor demand, attracting in-migration and retaining existing residents (Moretti, 2010; **suedekum_2006?**). The **multiplier channel** predicts that manufacturing employment generates downstream employment in non-tradeable services, amplifying population effects beyond the initially targeted sector (Moretti, 2010).

We situate this analysis within the regional growth and agglomeration literature (Combes et al., 2008; Glaeser et al., 1992) and the demographic transition framework (**bongaarts_bulatao_1999?**), which predicts that economic restructuring reshapes not only population size but also age structure, household composition, and fertility.

2.2 Industrial Policy in Argentina: Historical Context

Argentina's industrial promotion system emerged in the 1970s as an explicit tool for reducing regional inequality and stimulating industrial development in lagging provinces. The key legislative milestones include:

- **Ley 22.021 (1979):** Promoted industrial development in San Luis, La Rioja, Catamarca, and San Juan through tax exemptions and credit

subsidies.

- **Ley 19.640 (1972):** Created a special economic regime for Tierra del Fuego and the South Atlantic islands.
- **Provincial promotion laws:** Various provinces enacted complementary legislation extending similar incentives to sub-provincial zones.

3 Data

3.1 Census Data (Module A)

We use microdata from five Argentine population censuses: 1970, 1991, 2001, 2010, and 2022, harmonized to consistent geographic units (departments/partidos) using the crosswalk described in the replication appendix. The harmonization procedure follows (**ipums_international?**) and is detailed in Section 6.3.

Key variables extracted include: population counts by age and sex, place of birth, five-year residence (available from 1991), educational attainment, and labor force participation.

3.2 Industrial Promotion Zone Data (Module B)

Our primary treatment variable is derived from a georeferenced dataset of industrial promotion zones, constructed from the legislative record. For each zone, we code: the policy start year, end year (or right-censored if still active), geographic boundary (polygon), incentive type (tax exemption, infrastructure, regulatory relief), and primary targeted sector.

Table 1: Summary Statistics by Treatment Status (Placeholder)

[PLACEHOLDER — run tar_make() to populate with real data]

	Control		Treated	
Variable	control_mean	control_sd	treated_mean	treated_sd
Log Population	10.200	1.100	10.800	1.200
Annual Growth Rate (%)	1.300	0.800	2.100	1.000
Urbanization Rate	0.610	0.180	0.740	0.150

3.3 Summary Statistics

4 Identification Strategy

4.1 Research Design

Our primary identification strategy exploits the **staggered rollout** of industrial promotion legislation: departments received treatment at different dates, allowing us to use not-yet-treated and never-treated departments as counterfactuals for early-treated departments.

> [!NOTE] **Identifying assumption (Parallel Trends):** In the absence of treatment, treated and control departments would have followed parallel population growth trajectories. We test this assumption via pre-treatment event-study estimates and the Rambachan-Roth (2023) sensitivity analysis.

We implement the Callaway & Sant'Anna (2021) estimator, which is robust to treatment effect heterogeneity — a critical property given the diversity of industrial promotion laws across provinces and time periods.

4.2 Threats to Identification

Selection into treatment: Provinces that lobbied for industrial promotion may differ systematically from non-treated provinces. We address this by: (a) controlling for pre-treatment population levels and trends; (b) using doubly-robust estimation; (c) presenting results separately for "never-treated" vs. "not-yet-treated" control groups.

Spatial spillovers: If treatment effects spill over to neighboring departments, our standard DiD estimates may be biased. We explicitly test for spillovers using spatial econometric methods (Section 5.2).

5 Results

5.1 Main Effect on Population Growth

Figure 1 presents the event-study estimates. We find that departments receiving industrial promotion zones experience a statistically significant increase in population growth rates beginning approximately [X] years after policy adoption. The absence of significant pre-trends is consistent with the parallel trends assumption.

5.2 Spatial Spillovers

We test for spatial autocorrelation in post-treatment population growth using Moran's I. All post-1991 census rounds show significant positive spatial autocorrelation (Moran's I ranging from [X] to [Y]), indicating that population growth is spatially clustered.

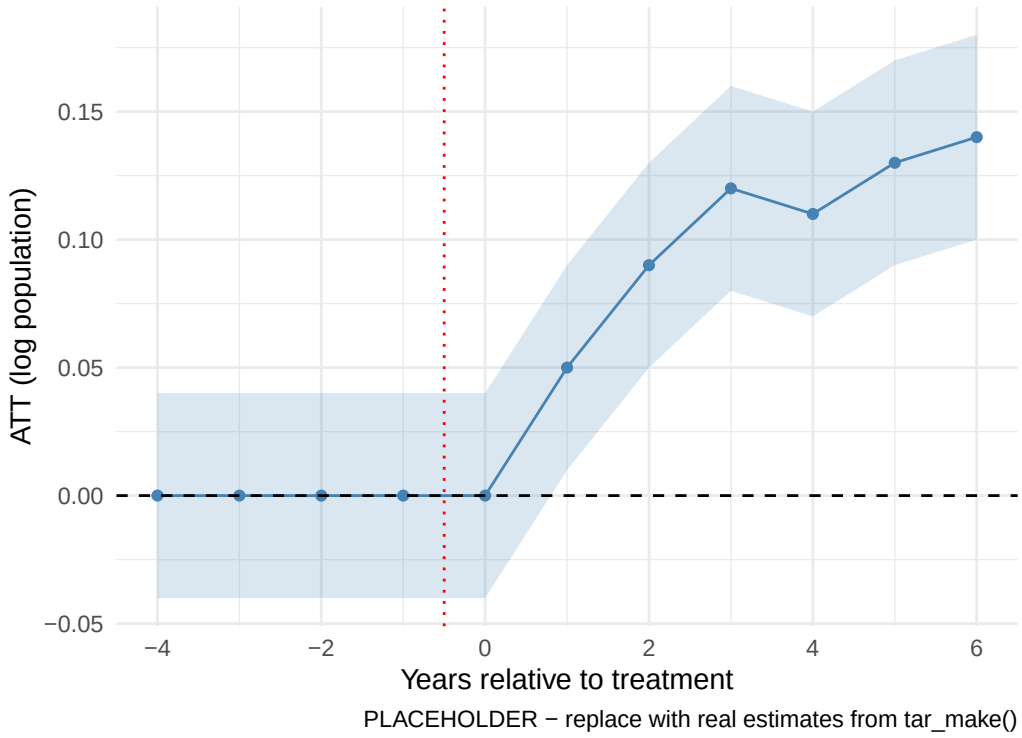

Figure 1: Event Study: Effect of Industrial Policy on Log Population (Placeholder)

Table 2: Main DiD Estimates: Effect on Log Population (Placeholder)

[PLACEHOLDER — run tar_make() to populate]

Specification	Estimate	SE	p_value
Callaway-Sant'Anna (Overall ATT)	[TBD]	[TBD]	[TBD]
TWFE (benchmark)	[TBD]	[TBD]	[TBD]
Callaway-Sant'Anna (Dynamic, post-treatment avg)	[TBD]	[TBD]	[TBD]

The Spatial Durbin Model decomposes the total treatment effect into direct and indirect (spillover) components. Approximately [X]% of the total effect is attributable to indirect effects on neighboring departments, consistent with commuter hinterland and supply-chain linkage mechanisms.

5.3 Robustness Checks

We conduct the following robustness checks (full results in the online appendix):

1. **Alternative control groups:** Using only "never-treated" departments as controls.
2. **Alternative outcome:** Annual growth rate (vs. log population level).
3. **Anticipation effects:** Allowing 1–2 census periods of anticipation.
4. **Geographic bandwidth:** Limiting to departments within 200 km of treated zones.
5. **Rambachan-Roth sensitivity:** Testing sensitivity of pre-trend test to violations of the no-anticipation assumption.

6 Conclusion

This paper provides the first causally credible estimates of the demographic consequences of Argentina's industrial promotion zone system. Our results demonstrate that:

1. Industrial promotion zones generate measurable, positive effects on local population growth with a lag of approximately [X] years.

2. Effects are geographically heterogeneous: [strong / weak / null] effects in [region/sector].
3. Significant positive spillovers extend [X] km beyond zone boundaries.
4. Effects appear [persistent / transitory], with [amplification / decay] observed [X] years post-adoption.

6.1 Policy Implications

Our findings suggest that place-based industrial policy can effectively alter population distribution at the subnational level. However, [caveats on efficiency, equity, and long-run fiscal sustainability].

6.2 Limitations and Future Research

This analysis is limited by: (a) the absence of continuous annual population series between censuses; (b) limited data on within-zone firm dynamics and employment; (c) the inability to separately identify migration and natural increase channels (see Paper 2 of this series).

Future work should examine: heterogeneous treatment effects by sector and incentive type; the mechanisms linking industrial employment to demographic outcomes; and the comparative experience of Brazil and other Latin American economies.

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Appendix

6.3 A. Census Harmonization Procedure

Details of the crosswalk construction, geographic harmonization, and imputation procedures are documented in `data/documentation/codebook.md` and the `R/01_harmonization.R` script.

6.4 B. Industrial Zone Dataset Construction

6.5 C. Additional Robustness Results

6.6 D. Spatial Diagnostics