Was the Arsenal of Democracy an Engine of Mobility? Public Investment and the Roots of Mid-century Manufacturing Opportunity

Andrew Garin and Jonathan Rothbaum[1]

UIUC, US Census Bureau

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[1]Any views expressed on statistical, methodological, technical, or operational issues are those of the author and not necessarily those of the US Census Bureau. Results disclosed under DRBs #CBDRB-FY20-037 and #CBDRB-FY20-131.

Was Manufacturing Opportunity a Legacy of WWII?

- **Context:** Rising inequality / declining wage growth, upward mobility, and manufacturing towns since 1950
  - But "great compression" and industrial expansion during WWII decade 1940-1950 (Goldin and Margo, 1992)

- **Broad question:** Did government intervention into economy during WWII create manufacturing opportunity + upward mobility?

- **This paper:** Study government-financed construction of large new manufacturing plants built for the War
  - How did siting affect long-run regional development?
  - Were plants boons to individuals living in region before war?

- **Related literature:** **Effects of WWII on postwar economy** (Fishback and Cullen, 2013; Jaworski, 2017; Brunet, 2018; Bianchi and Giorcelli, 2019; Gross and Sampat, 2020); **agglomeration, path dependence, and persistence** (Davis and Weinstein, 2002; Greenstone et al., 2010; Ellison et al., 2010; Bleakley and Lin, 2012; Nunn, 2014; Hanlon, 2017; Feigenbaum et al., 2018); **place-based and industrial policy** (Murphy et al., 1989; Kline and Moretti, 2014a,b; Fan and Zou, 2018; Lu et al., 2019; Bartik, 2019; Lane, 2020)**; place and intergenerational mobility** (Wilson, 1997; Black and Devereux, 2011; Chetty et al., 2016; Chetty and Hendren, 2018a,b)

Government-Financed Plant Construction in World War II

- Manufacturing output *triples* 1939 - 1942, existing facilities could not meet output goals
  - Expansion required new plants beyond expansions private companies were willing to finance
- Military required large new facilities to be
  1. Proximate to basic resources (labor, water, electricity)
  2. Built extremely rapidly (required large parcel)
  3. Secure*:* outside of major manufacturing hubs (vulnerable to blackout, attack, and congestion), ideally inland
- **Problem:** firms only wanted to invest their money in hubs: "[I]ndustrialists' reluctance to invest in dispersed plant facilities was at odds with the government's hope that private capital could finance new inland construction*; Hence, the War Department could carry out its policy only to the extent that the government was willing to put up the money*" - US Air Force Historical Division (1955)
- **Result: Government-funded plants built in locations where no such plant would have been built if not for war**
  - Built and operated by private firms, auctioned off after war

Data

- Digitize War Production Board (1945) plant-level investment data
  - All public *and* private investments in structures and equipment certified as necessary for war production

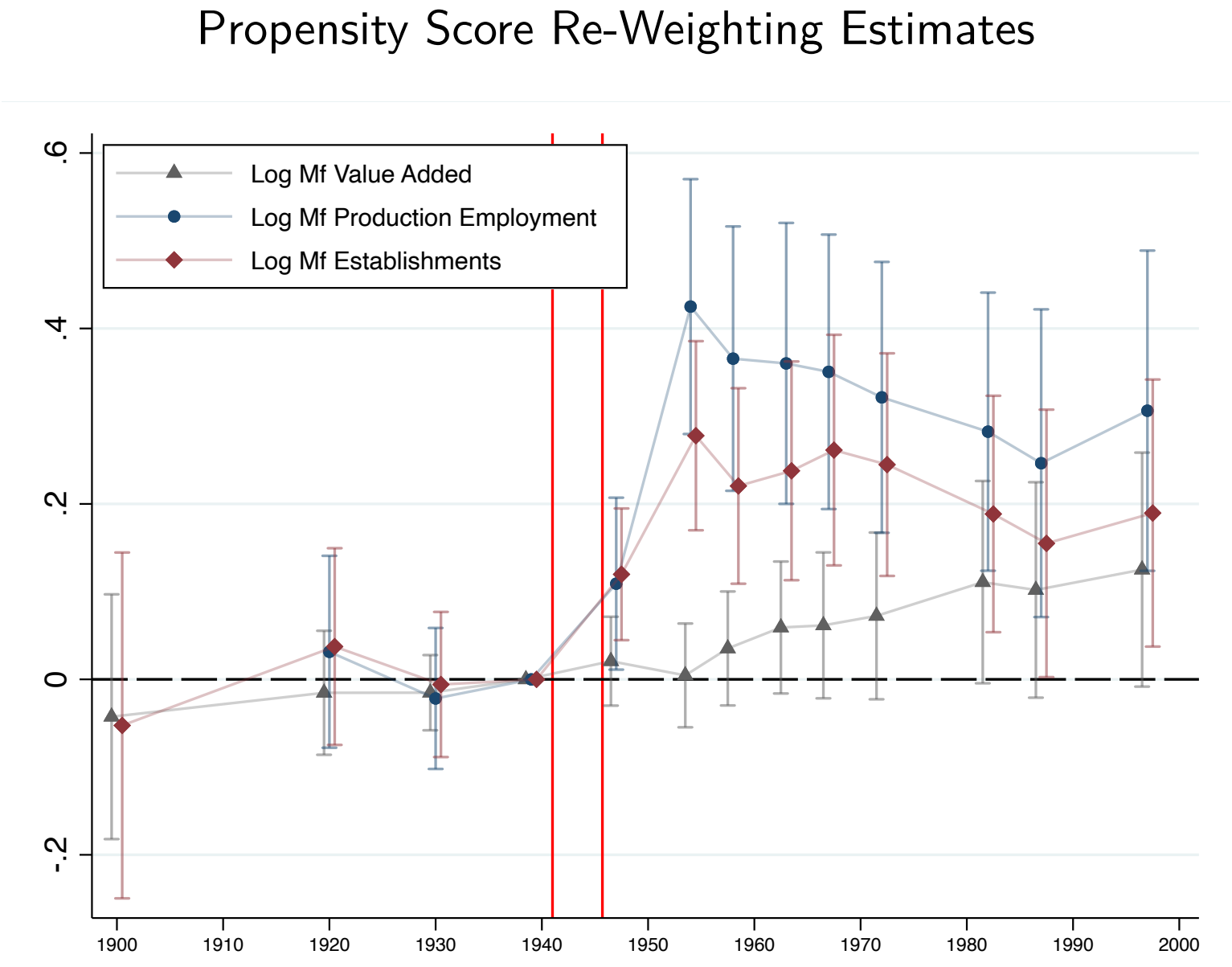
- County-level 1900-2000 panel data from Haines ICPSR series, County Data Books, NHGIS compilations of county-level Census variables
  - In county panel, examine difference-in-differences to relax identification assumptions

- Tabulations of 1970s tax-unit income ranks, by parents' 1940 county and earnings rank in 1940 Census, from Massey and Rothbaum (2020), analogous to regional data from Chetty et al. (2014)
  - Look at more outcomes using post-1978 Social Security earnings histories and NUMIDENT place of birth for all individuals in CPS samples in '91, '94, '96-'16
  - Focus on people born before war, but too young to serve/work during war itself

Research Design

- Siting of government-funded plants were driven by short-run war concerns
  - In the absence of the war, **neither** counties where plants were built, **nor** similar counties plants would have received plants
  - Counterfactual: similar plants would have built in major locations where private sector was willing to invest
- Use plant-level investment data to identify plants that were new with structures that were **at least 99% government financed**
  - Only 202 counties have any such plants
  - In baseline , Treat $= 1$ if top 101 spending per capita (exclude next 101)
  - Also use full variation in spending per capita
- **Approach:** Estimate propensity score for siting using 1940 characteristics relevant to wartime siting concerns (access to electricity, water, labor, basic infrastructure; geography relevant to security)
  - Re-weight comparison counties to look like treatment (ATET weights), focus on overlap sample
  - Find covariates not in p-score (income, housing value, other sectors) are well balanced

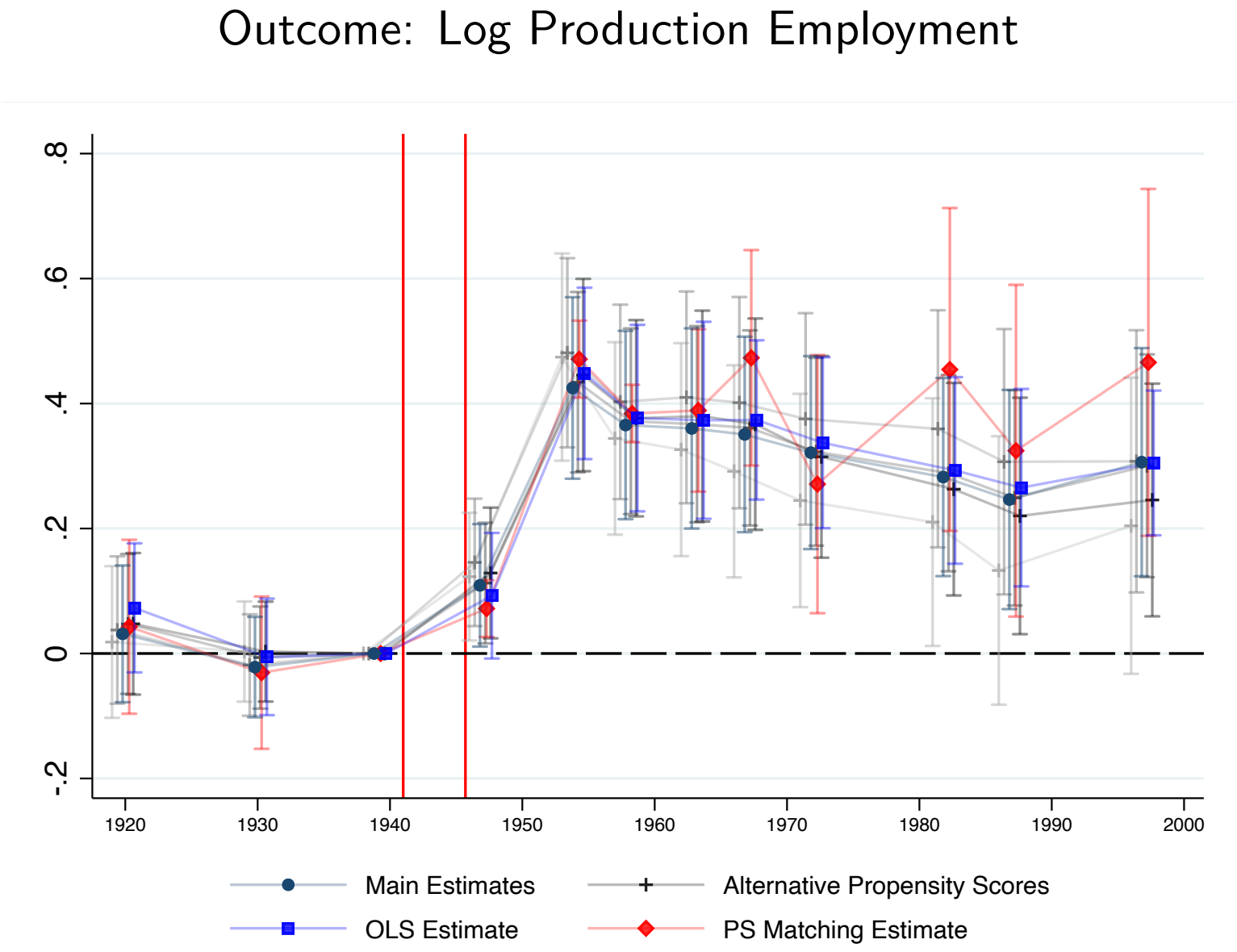
Effects on Manufacturing Activity in County



Mfg Productivity and Pay

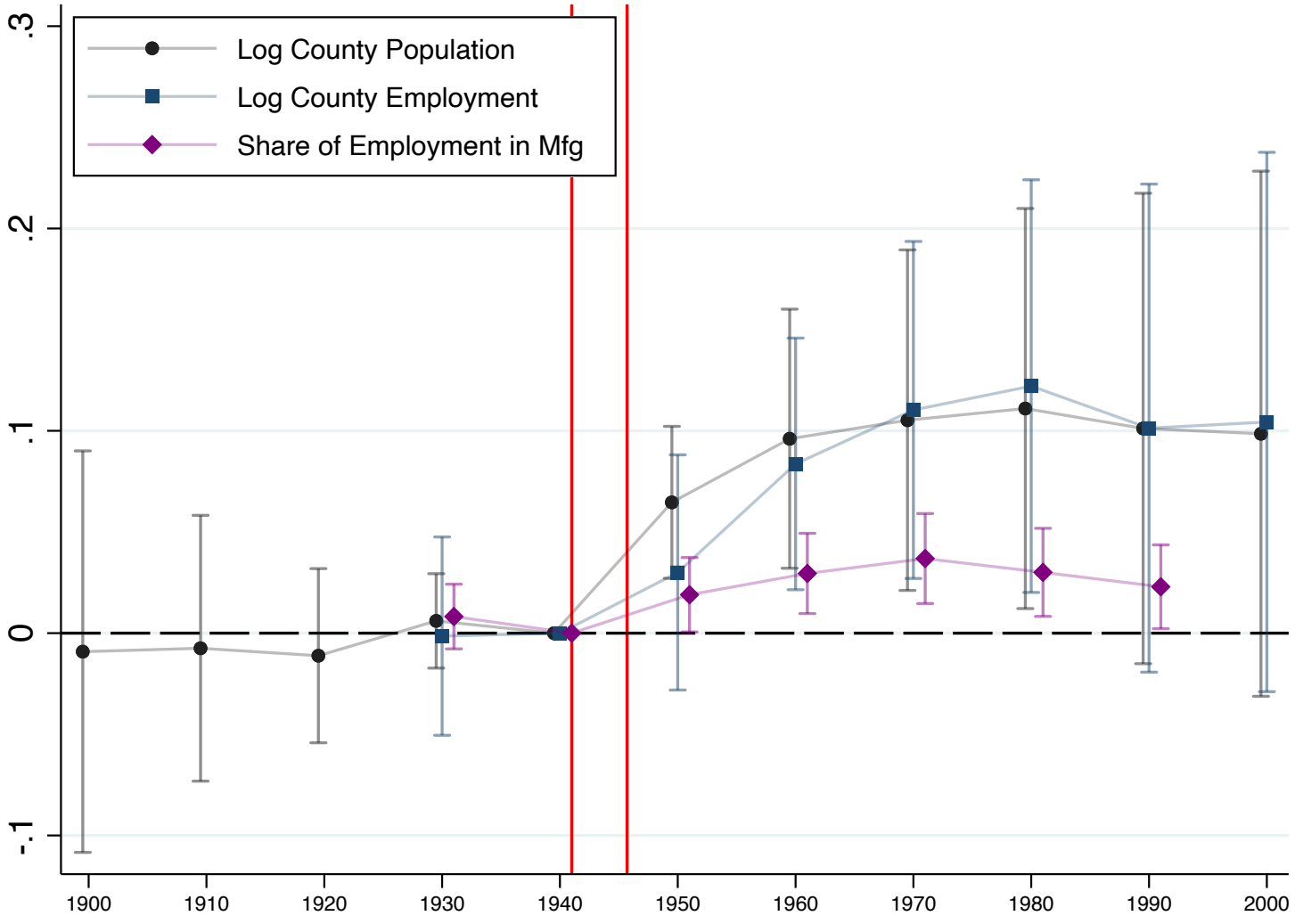


Robustness of Results



Broader Development

Propensity Score Re-Weighting Estimates

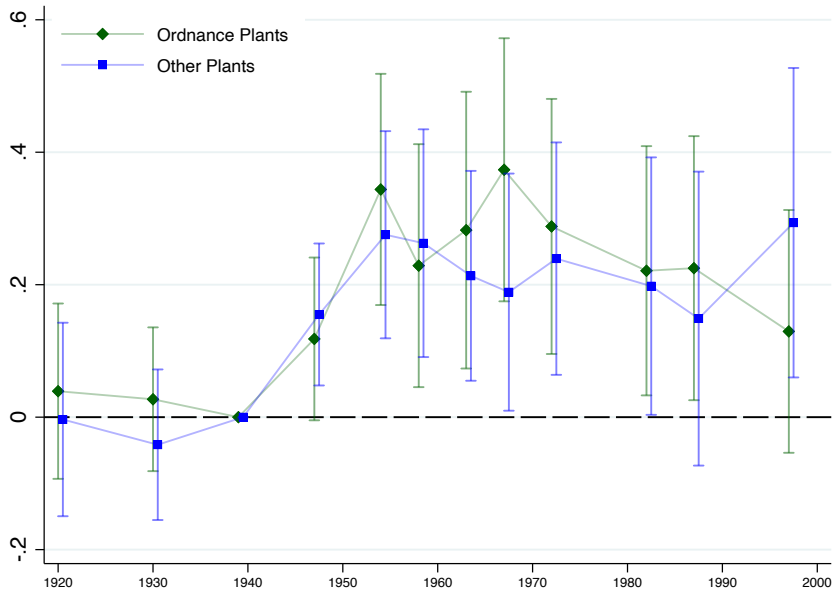


Post War Spending and Persistence

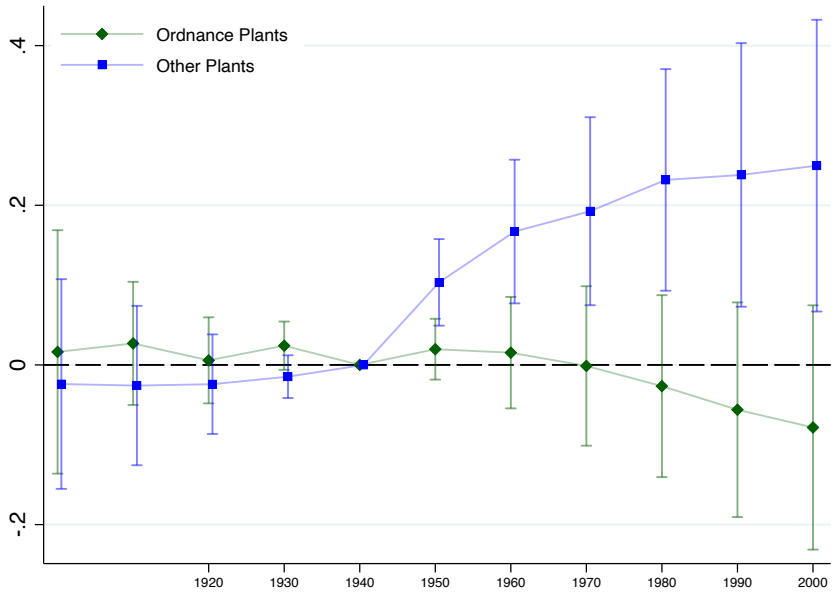
- What is the role of post-war military spending?
- Compare **ordnance** plants (almost always produced for military during cold war) to **convertible** plants
- Does plant siting lead to more defense contracts?
  - Examine Vietnam-era Defense Department Prime Contracts file (DD350)
  - Find **ordnance** factory locales skewed towards defense production during Cold War
  - *Not true* in **convertible** plants
- Manufacturing results similar for both types of plants
- Broader development only occurs near **convertible** plants: path dependence

Broader Development

Propensity Score Re-Weighting Estimates



Log Mfg Production Employment

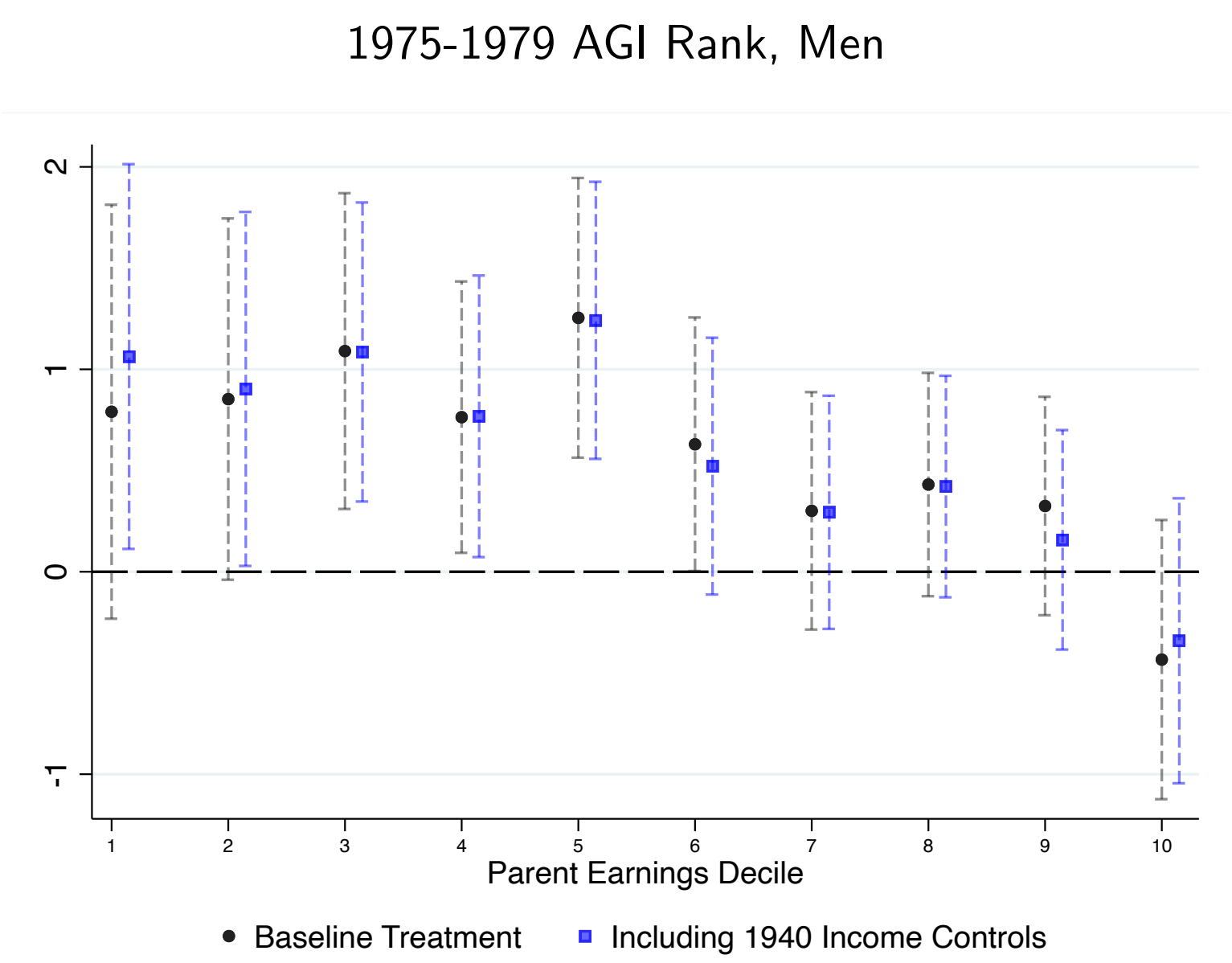


Log Population

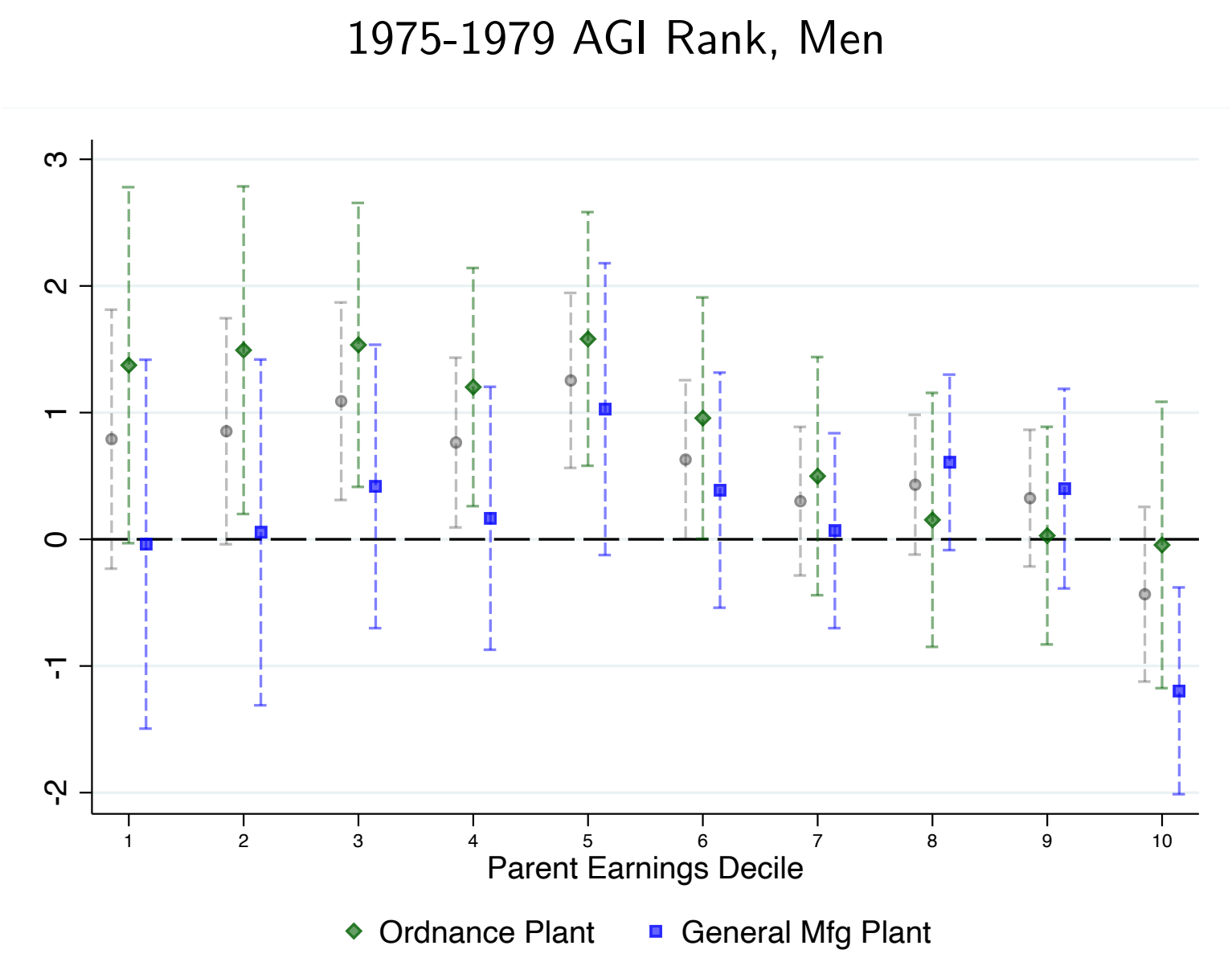
Individual Earnings Effects

- Find median incomes and median male wages were ~4% higher in 1980 in counties with plants
  - Do effect on places $\iff$ effects on individuals?
  - Could be sorting
- Test: look at post-war outcomes of *pre-war* residents
- For individual-level analysis, cannot apply difference-in differences design
- Rely on validity of propensity score approach
  - In practice, county-level diff-in-diff results same as post-war treat-control differences
  - Residual covariates are well balanced
  - Results stable to specification (different covariates, PS matching or OLS estimators)

Effects on Prewar Residents



Effects by Plant Type



Individual Outcomes: Takeaways

- Plant sitings raised adult earning ranks of pre-war residents
  - Only for those born lower in income distribution

- Baseline effect on incomes similar in CPS-SSA data: 3-4% average increase in 1978 earnings
  - Only find individual earnings effects for white men
  - Small increase in educational attainment

- **Only find mobility effects near ordnance plants that continued to produce for military**
  - These were places that did **not** experience broader development (population/employment growth, retail growth, change in housing values)
  - In these cases, higher share of population in high-paying manufacturing jobs

- **Implication**: Interventions that were best for *regional development* were different than interventions best for *incumbent residents*

Thanks!

- I Hope this was riveting!



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