

Environmental Shocks and Female Employment

Evidence from the Dust Bowl

1. Motivation

- Climate change is increasing both the frequency and severity of natural disasters (IPCC 2023), with significant impacts for local economies (see Boustan et al. 2020).
 - Environmental shocks and female labor market outcomes are underexplored, especially outside developing countries.
 - Natural disasters can
 - increase female workforce participation, especially when men migrate in search of alternative income opportunities.
 - reduce female employment by restricting access to workplaces, diminishing job opportunities, and increasing unpaid care responsibilities at home.
- Does exposure to prolonged drought affect the labor force participation of women?

2. Background

- Extended drought period in the U.S. Great Plains lasted from 1931 to 1940 (Schubert et al. 2004).
- Approximately one million individuals migrated from the Great Plains before 1935, followed by 2.5 million additional migrants between 1935 and 1940.
- 1930s: Still at an early stage in the shift of women's work towards paid employment outside the home/farm
- Labor force participation of U.S. women at around 24% in 1930

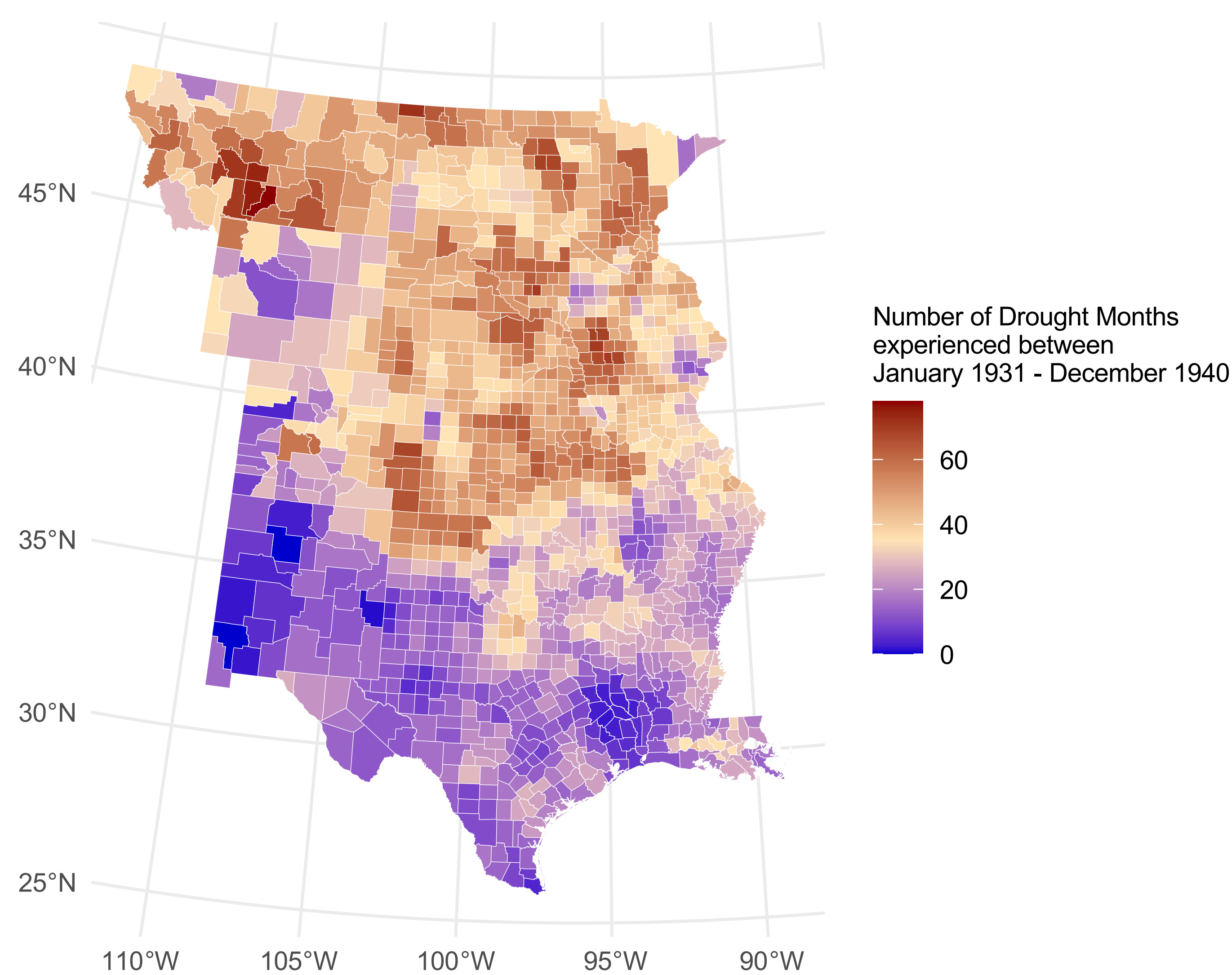
3. Data

Individual-Level Data: U.S. full census data for the years 1930 and 1940

- 15,595,427 individuals residing in Great Plains and adjacent states at the time of the census in 1930 and traceable to a census record in 1940
- Linking of individuals across census waves based on the Census Tree Project (Buckles et al. 2025).

Drought Data: SPEI (Standardized Precipitation Evapotranspiration Index)

- Developed by Begueria et al. (2014), available at a spatial resolution of 0.5° lat/lon
- Drought month = SPEI < -1



	Drought Months
Min	0
25%	21
Median	34
75%	47
Max	78
Mean	34.1

4. Identification and Methodology

$$Y_{ics} = \beta_0 + \beta_1 \text{Drought}_c + \mathbf{X}'_c \boldsymbol{\gamma} + \mathbf{Z}'_i \boldsymbol{\delta} + \alpha_s + \varepsilon_{ics}$$

- Y_{ics} : Dummy for being in the labor force in year 1940 for individual i residing in county c of state s in 1930
- Drought_c : Number of drought months experienced in county c between 1931 and 1940
- \mathbf{X}'_c and \mathbf{Z}'_i : Vector of county and individual controls, respectively

Identification Assumption

- Drought exposure is quasi-random at the county level.
- Tested by regressing predetermined variables on our drought measure:
 - No structural differences between more and less drought-exposed individuals before exposure.

5. Results

	Women				Men
	(1)	(2)	(3)	(4)	(5)
	Overall	White	Black	Native American	Overall
Drought months	0.0002*** (0.0001)	0.0002*** (0.0001)	0.0003 (0.0006)	0.0003 (0.0006)	-0.0000 (0.0000)
Observations	4,053,977	3,866,047	169,993	17,251	4,863,592
R-squared	0.1528	0.1518	0.1386	0.0879	0.0252
Mean dep. var.	0.2210	0.2162	0.3374	0.1554	0.9406
State FE	Yes	Yes	Yes	Yes	Yes
Baseline controls	Yes	Yes	Yes	Yes	Yes

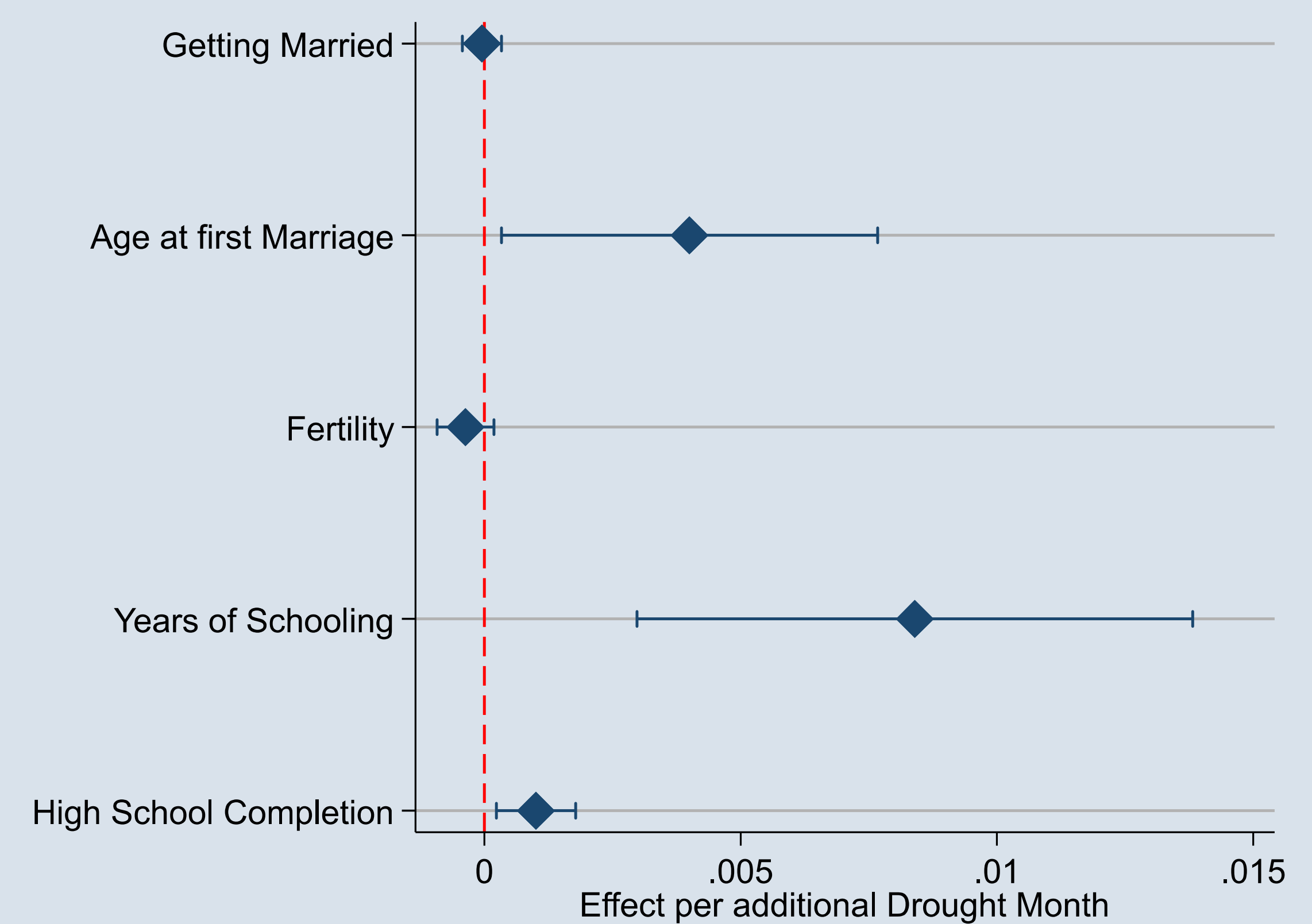
Note: Sample restricted to individuals aged 20–54 in 1940. Baseline controls include county-level (farm share, urban share, population size, employment rate, age at first marriage) and individual-level (urban residence, farm residence, age, age squared, marriage status) characteristics measured in 1930. Column (1) and Column (5) additionally control for race fixed effects. All specifications include state fixed effects. Standard errors clustered at the 1930 county level in parentheses.

Significance codes: * p < 0.1, ** p < 0.05, *** p < 0.01

Estimator is robust to:

- The inclusion of extended county controls, extended individual controls, and industry fixed effects
- A sample restriction to women married by 1930

6. Mechanisms



County Level:

- Drought exposure increased the female population share

7. Conclusions

- The 1930s Dust Bowl drought induced a higher LFP among White women.
- Effect is not driven by lower marriage rates or a change in fertility.
- Instead, women delayed marriage, increased their human capital investment, and entered paid employment to offset declining agricultural household income and in response to male out-migration.
- Ecological disruption can shape women's economic roles and empowerment.

References

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