Introduction

Historically, places with higher female labor force participation have had lower fertility rates (Hazan and Zoabi 2015). As female employment became more common in the 1970s and 1980s, this relationship has flipped and is now negative for most developed countries (Doepke et al. 2023). Most studies approach this issue from a cross-country perspective and only establish descriptive evidence (Oshio 2019). We take a subnational approach and use regional variation in US industry composition to determine whether places where female-dominated industries constituted a higher proportion of the local labor market experienced lower fertility rates when exogenous national demand shocks to female-dominated industries caused them to expand. We also determine relative importance of male versus female dominated employment growth on county-level fertility rates. We do this using proprietary county-level employment data with information about 4-digit North American Industry Classification System (NAICS) industry employment in combination with restricted birth data from the National Centers for Health Statistics (NCHS) to establish causal evidence of the relationship between local female job growth and fertility. Finally, we test for heterogeneity between 2001-2010 and 2011-2020 to determine whether this relationship is weakening across time.

Data

We use individual-level data on all births in the United States from the NCHS and aggregate births to the county level to construct our dependent variable of county births per 1000 women. We construct annual county birth rates for all women ages 15-44 and for various subpopulations delineated by mother's age, race, marital status, parity, and education level for the years 2001-2020.

Our key explanatory variable is a measure of local employment growth in female dominated sectors in the U.S. (e.g. teachers, social workers, nurses) which are created from county-level counts of male and female employment in each of 298 4-digit industries classified by the North American Industry Classification system. This level of industry disaggregation provides much finer detail about the gender composition of specific industries so that we can determine which industries women constitute the majority of the industry workforce. Publicly available 2-digit NAICS industries aggregate employment into 20 much broader categories (e.g Utilities, Construction, Manufacturing, Information) whose sectors may contain subsectors with a high concentration of women that are diluted by other male-dominated subsectors in the broader 2-digit NAICS category. To our knowledge this is the first time data of this granularity have been employed to investigate the link between female employment and education.

Our empirical models also include a set of annual county-level control demographic variables such as age structure, racial composition, educational structure that come from the American Community Survey. We also include economic controls for county-level median household income, poverty rate, and employment growth.

The table below provides the top 5 and bottom 5 female-dominated industries nationally for 2009 and 2018

TOP AND BOTTOM INDUSTRIES BY FEMALE CONCENTRATION

2009

Bottom 5 Industries

Industry	**NAICS**	**% Female**
Rail Transportation	482	8%
Construction	230	9%
Coal Mining	212	11%
Machine Equip. & Repair	811	12%
Paper Mills	321	14%

Top 5 Industries

Industry	**NAICS**	**% Female**
Physician/Dentist offices	621	77%
Hospitals	622	78%
Nursing	623	79%
Family Services	624	87%
Private Household Service	814	91%

2018

Bottom 5 Industries

Industry	**NAICS**	**% Female**
Coal Mining	212	4%
Pipeline Transportation	486	8%
Rail Transportation	482	8%
Metal Industries	330	8%
Construction	230	9%

Top 5 Industries

Industry	**NAICS**	**% Female**
Hospitals	622	75%
Physician/Dentist offices	621	79%
Nursing	623	81%
Family Services	624	85%
Private Household Service	814	91%

Methods

We estimate the following model

$$y_{it} = \delta_0 + \beta_1 FIgr_{it} + \beta_2 Emp\_gr_{it} + \beta_3 Controls_{it} + \sigma_i + \delta_t + \epsilon_{it}$$

where y_{it} is the birth rate in county i in year t (by 5-year age group, race, parity), Emp_gr_{it} is the overall employment growth in county i in year t, and $Controls_{it}$ is a vector of county-level controls that include county median household income, poverty rate, total population, prime-age population, percent of the population with a bachelors degree or higher, percent of the population black, and percent of the population identifying as Hispanic. We also include county (σ_i) and year fixed effects (δ_t) to control or any time-invariant county characteristics and any year-specific shocks.

County-level female dominated industry growth is likely endogenously related to other unobservable characteristics of the local economy and other local contextual factors and using its measure directly would likely bias our results. To mitigate these potential sources of bias, we use $FIgr_{it}$, a measure of female dominated employment demand growth at the national level interacted with the county-industry structure in the vein of Bartik-style exogenous demand shocks. The logic is that national demand shocks in female dominated industries should be independent of any given local county context and provide exogenous variation predicting local demand growth in female dominated industries.

We estimate the model using short (annual) and long-term (10-year) changes in birth rates to determine whether fertility decisions are dependent on recent changes in the labor market or based on employment prospects over a longer time horizon.

Results

Tables 2 and 3 show the short- and long-term impact of exogenous female employment growth on county birth rates for women ages 15-44 (all), 15-19, 20-24, 25-29, 30-34, age 35 plus, white and black mothers, respectively. In brief the findings suggest short-term (annual) female employment growth reduces fertility rates overall and is driven by women 25-29, as women who are trying to establish themselves at the beginning of their careers potentially delaying childbearing to take advantage of a hot labor market. In this way women may view periods of weak labor market growth as opportune times to have a child.

In the long term (10-years), we find less evidence that growth in female-dominated industries is influencing long-term changes in county birth rates. The female employment growth variable is only significant for the 25-29 age group and is smaller in magnitude compared to the coefficient in the annual model. We estimate additional models for employment growth in male dominated industries and for birth rates of additional subpopulations not shown below to add context to our results.

TABLE 2. GROWTH OF FEMALE INDUSTRIES ON COUNTY FERTILITY RATES (ANNUAL CHANGES)

	All Births	Age 15-19	Age 20-24	Age 25-29	Age 30-34	Age 35+	White	Black
Fem. Ind. Empl. Growth	-.0093*	-.01	.022	-.038**	-.0092	-.011	-.005**	.0015
	(-2.28)	(-1.66)	(1.52)	(-2.70)	(-0.91)	(-1.55)	(-3.22)	(0.14)
Empl. Growth	.17	.45**	-.3	.35	.069	.18	-.07	.4
	(1.32)	(2.65)	(-0.68)	(0.58)	(0.24)	(0.80)	(-1.33)	(1.38)
Controls	Y	Y	Y	Y	Y	Y	Y	Y
County Year FE	Y	Y	Y	Y	Y	Y	Y	Y
N	37,472	37,472	37,472	37,472	37,472	37,472	37,472	37,472
R-squared	0.750	0.759	0.741	0.607	0.578	0.532	0.794	0.249

*Robust standard errors in parenthesis

TABLE 3. GROWTH OF FEMALE INDUSTRIES ON COUNTY FERTILITY RATES (LONG CHANGE)

	All Births	Age 15-19	Age 20-24	Age 25-29	Age 30-34	Age 35+	White	Black
Fem. Ind. Empl. Growth	-.073	-.042	.017	-.029**	-.018	-.056	-.002	0.15
	(-1.47)	(-0.56)	(0.26)	(-2.93)	(-1.53)	(-0.19)	(-0.00)	(0.71)
Empl. Growth	.17	.45**	-.3	.35	.069	.18	-.07	.4
	(1.32)	(2.65)	(-0.68)	(0.58)	(0.24)	(0.80)	(-1.33)	(1.38)
Controls	Y	Y	Y	Y	Y	Y	Y	Y
County Year FE	Y	Y	Y	Y	Y	Y	Y	Y
N	3,111	3,061	3,108	3,109	3,105	3,063	3,111	2,480
R-squared	0.083	0.059	0.088	0.089	0.056	0.048	0.794	0.249

*Robust standard errors in parenthesis