Mingpei Li
ECON 613 Reading notes
Apr 25, 2021
Children and Gender Inequality: Evidence from Denmark

1. Introduction.

Gender inequality in earnings and wages has been diminishing, but the speed of convergence appears to slow down. Observing the fact that gender difference in education has disappeared and the implementation of anti-discrimination policies, the authors find the current gender inequality can be caused by children.

The authors use the administrative data for the full population in Denmark between 1980-2013. They also used administrative data for the full population from 1964-1979 to find intergenerational transmission. The data contains information on children, earnings, labor supply, occupation, firms, education, and many other variables. Moreover, the data also contains information to link family members, generation, and workers with firms. The authors focus on the 15-year time period of each individual: 5 years before the first childbirth and 10 years after.

The authors use three linear models with fixed effects. Define the "child penalty" as the percentage by which women's outcome of interest (e.g., earnings) is lower than men's. First, they estimate the impact of having children. They conduct an event study around the birth of the first child. They found that, for a range of labor market outcomes, women diverge sharply after the birth of the first child compared with men. Moreover, they identify the mechanism behind such an effect, which is women have difficulty in promotion after childbirth, and women are likely to switch jobs to more family-friendly companies at the expense of earnings. Second, the authors decompose aggregate gender inequality over time into child-related inequality and residual inequality. The result shows that the fraction of child-related inequality has increased from around 40 percent in 1980 to 80 percent in 2013. Third, the authors investigate whether child inequality is transmitted through generations. They find that maternal parents' history of labor supply is correlated to child inequality, while paternal parents' history of labor supply has no such correlation.

In general, this paper estimates the effect of childbirth and decomposes gender inequality into child-related inequality and residual inequality. Furthermore, this paper provides evidence of environmental influences, which are the history of labor supply of maternal parents, on gender inequality.

2. Impacts of Children

The authors use a linear model with fixed effects of event time, year, and individual age. For each parent, denote the year of first childbirth by $t = 0$ and index all years relative to that year. For baseline specification, they focus on t=-5 to t=10 for each parent with the first childbirth during 1985-2003. To analyze the long-run effect, they focus on t=-5 to t=20 for each parent with the first childbirth during 1970-2013. Denote the outcome of interest for individual i of gender g in year s and event time t (e.g., earnings) by Y_{ist}^{g}. For men and women, the authors run the following regression respectively:

$$Y_{ist}^{g} = \sum_{j \neq -1} \alpha_j^g \cdot \mathbf{I}[j = t] + \sum_k \beta_k^g \cdot \mathbf{I}[k = age_{is}] + \sum_y \gamma_y^g \cdot \mathbf{I}[y = s] + \nu_{ist}^{g}$$

The first term is a full set of event time dummies. They omit the time dummy at $t = -1$ to set it as a reference. The second term is a full set of age dummies. The third term is a full set of year dummies.

After getting the estimates, we calculate $P_t^g \equiv \tilde{\alpha}_t^g / E[\tilde{Y}_{ist}^g | t]$, where $\tilde{Y}_{ist}^g$ is the prediction attained by omitting event dummies:

$$\tilde{Y}_{ist}^{g} \equiv \sum_k \hat{\beta}_k^g \cdot \mathbf{I}[k = \text{age}_{is}] + \sum_y \hat{\gamma}_y^g \cdot \mathbf{I}[y = s]$$

P_t^g is the effect of event time dummy at t as a percentage of the counterfactual outcome absent children. Apply these steps both to males and females. Then, we can calculate child penalty:

$$P_t \equiv \frac{\hat{\alpha}_t^m - \hat{\alpha}_t^w}{E\left[\tilde{Y}_{ist}^w | t\right]}.$$

The results from basic specification show that the earnings, hours worked, participation rates, and wage rates of women decrease significantly after the first childbirth, while men experience no visible changes in these outcomes. Besides, those women's and men's outcomes never converge after the first childbirth in a 10-year period. The authors also analyze the long-run effects by including data to t=20. The only qualitative difference is that hours worked converge in the long run. Furthermore, under the basic specification, the authors show that women's and men's occupational rank, probability of being a manager, probability of public sector job, and probability of having a female manage with children diverge after the first childbirth. These results imply that women tend to change jobs to more family-friendly companies after the first childbirth.

3. Decomposing Gender Inequality over Time

The authors use a standard Oaxaca-Blinder decomposition approach, modified by adding the effects of children. While the traditional approach focuses on whether women and men are paid the same for the same work, this paper focuses on the inequality caused by childbirth.

The authors use the data from 1980 to 2013 and include as many years after the first childbirth of each parent as possible (i.e., there is no upper bound on t). The model is given by:

$$Y_{ist}^g = \sum_y \sum_{j \neq -1} \alpha_{yj}^g \cdot \mathbf{I}[j = t] \cdot \mathbf{I}[y = s] + \sum_k \beta_k^g X_{kis}^g + \nu_{ist}^g$$

The first term includes a full set of interactions between event time and year. The second term includes covariates may vary across individual and year. The authors run two regressions respectively: the first regression without controlling education level, the second regression controlling the education level. Define the mean gender gap in year s as:

$$\Delta_s \equiv \left\{E\left[Y_{ist}^m | s\right] - E\left[Y_{ist}^w | s\right]\right\} / E\left[Y_{ist}^m | s\right]$$

Rearrange it, we can get:

$$\hat{\Delta}_s = \underbrace{\frac{E\left[P_{st}\tilde{Y}_{ist}^w | s\right]}{E\left[\hat{Y}_{ist}^m | s\right]}}_{\text{child penalties}} + \underbrace{\frac{\sum_k \left(\hat{\beta}_k^m - \hat{\beta}_k^w\right) E\left[X_{kis}^m | s\right]}{E\left[\hat{Y}_{ist}^m | s\right]}}_{\text{different returns to Xs}} + \underbrace{\frac{\sum_k \hat{\beta}_k^w \left\{E\left[X_{kis}^m | s\right] - E\left[X_{kis}^w | s\right]\right\}}{E\left[\hat{Y}_{ist}^m | s\right]}}_{\text{differences in Xs}}$$

In both models with and without education level, the results show that the gender inequality that remains today is all about children.

4. Intergenerational Transmission of Child Penalties

The authors use data with childbirth from 1985 to 2013 with a 15-year window around childbirth and data from 1985 -2013 about labor supply of grandparents (which are grandparents of the child born between 1985 and 2013) during 1964-1979. Define the cumulated labor supplies between 1964-1979 of maternal grandmother and grandfather by h_i^{mm} and h_i^{mf}, and rank parents by quantiles of the distribution of $h_i^{mm} - h_i^{mf}$. Then do the same to paternal grandparents, we get $h_i^{pm} - h_i^{pf}$. The authors replace $t = -5, \ldots, 10$ by setting $t = 1$ for all $t \geq 0$. The specification is given by:

$$(5)\quad Y_{ist}^{g} = \sum_{q} \alpha_{q}^{g} \cdot \mathbf{I}[after_t] \cdot \mathbf{I}[grand_{iq}^{m}] + \sum_{k} \beta_{k}^{g} \cdot \mathbf{I}[k = age_{is}] + \sum_{y} \gamma_{y}^{g} \cdot \mathbf{I}[y = s]$$

$$+ \sum_{q} \zeta_{q}^{g} \cdot \mathbf{I}[grand_{iq}^{m}] + \delta^{g} \cdot X_{i}^{m} + \eta^{g} \cdot \mathbf{I}[after_t] \cdot X_{i}^{m} + \nu_{ist}^{g},$$

X_i^m is a vector of controls for the maternal grandparents. Then, the authors do the same to paternal grandparents. The authors run regressions both with and without controlling the education level and wealth level of grandparents.

In both models, the results show that the child penalty in earnings is correlated with the relative labor supply of maternal grandparents, while there is no correlation between the child penalty in earnings and the relative labor supply of paternal grandparents. These results imply that women incur smaller child penalty in earnings if they themselves grow up in a family where the mother worked more relative to the father, and women's child penalty in earnings are not significantly affected by their spouse's family background with respect to labor distribution.

5. Conclusion and Limitations.

In conclusion, this paper estimates the effect of childbirth and decomposes gender inequality into child-related inequality and residual inequality. Furthermore, this paper provides evidence of environmental influences, which are the history of labor supply of maternal parents, on gender inequality.

There are some limitations of this paper. First, the paper only considers the first childbirth. The authors have pointed out that the number of children will have a visible effect on child penalty in the short run only when the number of children is large. Besides what is mentioned by the authors, the omission of the number of children may lead to bias in estimation in the long run since the number of children is likely to be correlated with covariates, like education. Consequently, there can be an omitted variable bias.

Moreover, when discovering the intergenerational transmission, the authors do not control the characteristics of parents in their model (equation 5). There can also be an omitted variable bias. For example, the education of parents is likely to be correlated with grandmothers' labor supply.