The Child Penalty:
A Literature Review and Ideas for Future Research

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Gender Pay Gap

- There is an extensive literature describing the gender pay gap (e.g, Blau and Kahn (2017), Bertrand (2020)).
- This literature generally estimates the difference between men's and women's salaries for the same job, i.e. controlling for job characteristics and hours worked.
- They find that the women to men fulltime earnings ratio increased from 60% in 1980 to over 80% in the 2010s. Controlling for additional job characteristics reduces the gap to below 10 percent.
- An important part of this remaining gap is the 'motherhood penalty' (Goldin (2014); Bertrand et al. (2010)).

Child Penalty

- New insights from the effect of motherhood on a woman's earnings are gained from the child penalty literature.
- Kleven et al. (2019b) study the earnings of mothers and fathers (to be) in the years around childbirth using Danish administrative data.
- This dynamic decomposition deviates in important ways from the standard gender-gap decomposition.
    - Previously: unequal pay for **equal work** using **cross-sectional** variation.
    - Now: impact of children **not controlling** for labor market characteristics using **within-person** variation.

Research Question

How does the arrival of the first child impact the unconditional annual earnings of fathers and mothers.

Methods

The event-study specification is defined as:

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

Y_{ist}^g level of annual labor earnings for parent i, in year s, at event time t. The impact of children on earnings in each event time for each gender is measured by α_j^g.

The child penalty is then written as:

$$P_t = \frac{\hat{\alpha}_t^m - \hat{\alpha}_t^w}{E[\tilde{Y}_{ist}^w | t]}. \tag{2}$$

Where the numerator measures the difference in impact of children between fathers and mothers and the denominator scales it with the counterfactual income of women without the contribution of the event dummies.
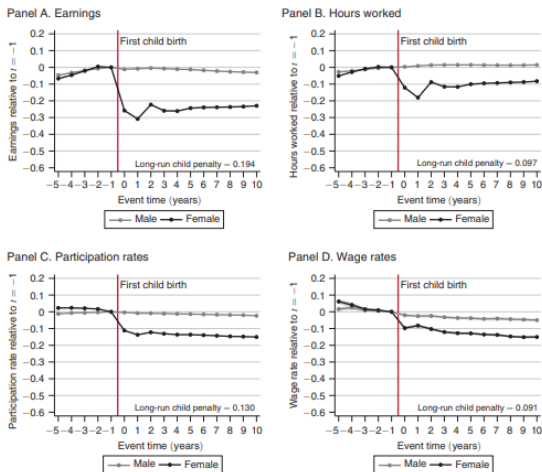
Main Findings

Figure: Child Penalty in Denmark from Kleven et al. (2019b)

Further Results

- Even considering the period until 20 years after birth, the earnings gap does not close. Only the working hours seem to recover somewhat.
- Women are relatively more likely to decrease the skill level of their job and opt for family-friendly jobs, e.g. in the public sector.
- Child penalties seem to be transmitted over generations, women face smaller child penalties if their mother worked.
- Child penalties seem to account for most of the observed gender pay differences nowadays.
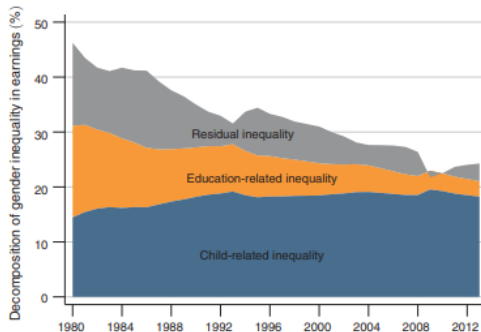
▶ Mechanisms

Gender Gap Decomposition

Figure: Oaxaca-Blinder Inequality Decomposition from Kleven et al. (2019b)

Underlying Mechanisms

The literature has identified five explanations for the Child Penalty:

1. **Biology:** Giving birth has short-term and sometimes long-term shocks to the mother's health but not the father's.
2. **Household Specialization:** Men may have a comparative advantage in the labor market compared to women.
3. **Preferences:** Women may enjoy spending time with their children more than men.
4. **Gender norms:** Couples may default to traditional norms when making decisions regarding child-rearing.
5. **Discrimination:** Employers may discriminate against mothers.

Biology - Andresen and Nix (2022)
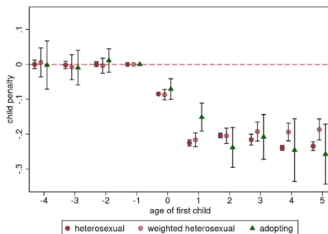
(a) Biological vs adoptive parents
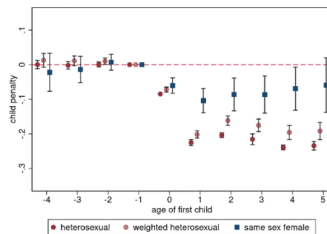
(b) Opposite-sex vs same-sex parents

Figure: Two-way comparisons between biological opposite-sex parents to adoptive parents and same-sex parents from Andresen and Nix (2022)
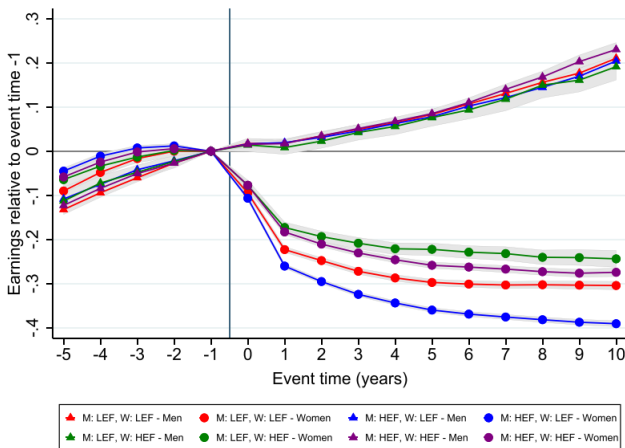
Household Specialization - Artmann et al. (2022)

Figure: Child Penalty by education category pair from Artmann et al. (2022)

Gender Norms Kleven et al. (2023)

- The first contribution of the paper is methodological by proposing a method to create a pseudo-panel from cross-sectional data
  - For individuals with children, the age of the oldest child determines the event time t.
  - Parents i, in year y, with age a and characteristics X_i observed at time 0 are matched to a childless individual j in year $y - n$, at age $a - n$, and characteristics $x_i = X_j$.
  - The set of X's chosen by Kleven (2022) are gender, education, race, marital status, and state of residence.
- They find the following results in the U.S. context:
  - The magnitude of the child penalty exhibits a strong **negative correlation** with each state's score on a **progressivity** index.
  - Movers born in high-penalty states still exhibit much larger child penalties than those from low-penalty states.
  - Also for foreign-born immigrants there is a strong relationship between child penalties in their home countries and their own child penalties.

Gender Norms - others

- Kleven et al. (2019a) estimate the child penalties for six OECD-countries, these are their results:
    - ◆ **Scandinavian**: Denmark (21%) and Sweden (26%); **Anglosaxon:** U.S. (31%) and U.K. (44%); **Germanic:** Austria (51%) and Germany (61%).
    - ◆ Again, they find that this correlates with elicited gender norms from the ISSP.
- Rabaté and Rellstab (2022) examine the correlation between the height of the child penalty and religiosity in the Netherlands. They find that a 10pp increase in religiosity in a municipality increases the child penalty by 4.3pp.

Child Care Expansion - Methods (Kleven et al., 2020)

To estimate the effect of the childcare expansion in Austria, Kleven et al. (2020) modify eq. 1 to a DiD-form
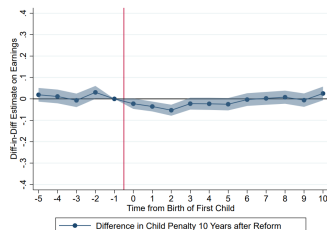
$$Y_{ist} = \sum_j \alpha_j \cdot 1\{j = t\} + \sum_{\mathbf{j}} \alpha_{\mathbf{j}}^{\mathbf{T}} \cdot \mathbf{1}\{\mathbf{j} = \mathbf{t}\} \cdot \mathbf{T_i} + \sum_k \beta_k^g$$
$$\cdot 1\{k = age_{is}\} + \sum_y \gamma_y^g \cdot 1\{y = s\} + \nu_{ist}^g. \qquad (3)$$

This specification is estimated only on the sample of mothers, the coefficient of interest, α_j^T, measures the percentage point difference in the child penalty for the treated mothers.

Childcare Expansion - Results (Kleven et al., 2020)
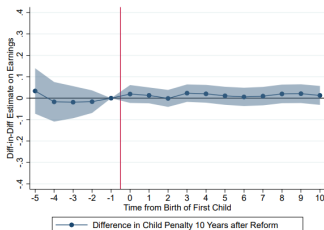

(a) Nursery (age 1-2) expansion

(b) Pre-school (age 3-5) expansion

Figure: The Effect of the Childcare Reform from Kleven et al. (2020)

Childcare Expansion - Further Results

- Using similar methods, Lim and Duletzki (2023) find a reduction in the child penalty following childcare reforms in Germany.
    - ◆ A 10pp coverage rate reduces the child penalty by 1.4pp in the five years following childbirth.
    - ◆ This is due to higher participation and wages.
- Rabaté and Rellstab (2022) find that for the Netherlands the effects are very small (about 250€/year) and insignificant.
- Childcare policies may, however, have long-term effects as they may contribute to changing gender norms.

Maternity Leave Expansion - Results (Kleven et al., 2020)
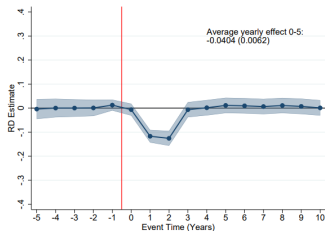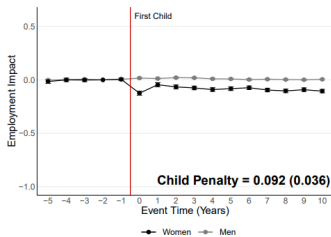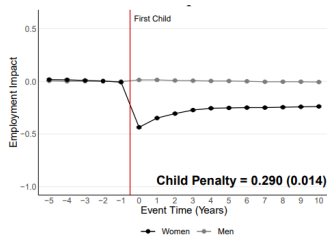

(a) RD-estimates reform
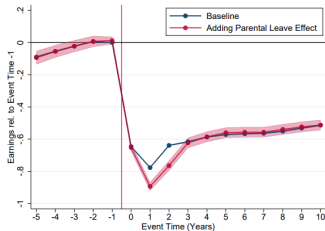
(b) Child penalties

Figure: The Effect of the Maternity Leave Expansion in 1961 from Kleven et al. (2020)

Child Penalty by Continent (Kleven et al., 2023)
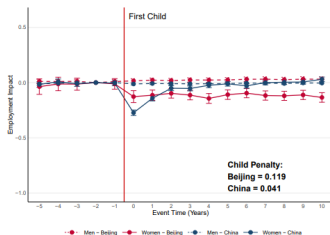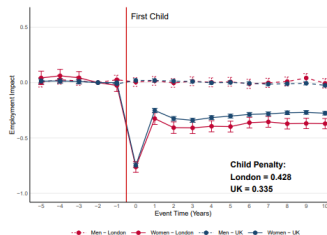

(a) Continent 1   (b) Continent 2

Figure: Child Penalty in Employment for two Continents (Kleven et al., 2023)

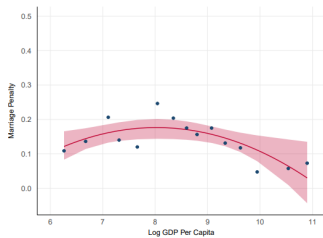## Child Penalty Capital versus Country (Kleven et al., 2023)
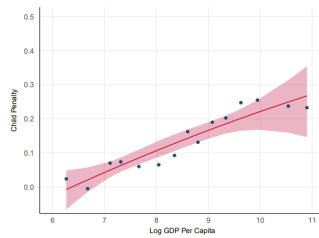

(a) Beijing vs China

(b) London vs UK

Figure: Child Penalty in Employment for two Capitals/Countries (Kleven et al., 2023)

Child Penalty by Continent (Kleven et al., 2023)

(a) Marriage Penalty

(b) Child Penalty

Figure: Family Penalties against Log GDP (Kleven et al., 2023)
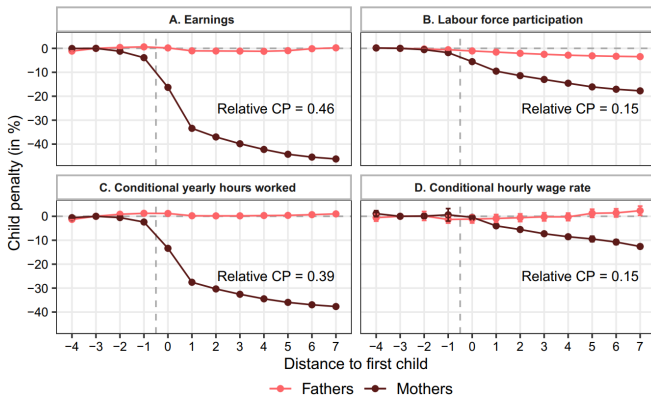
Child Penalty in the Netherlands

Figure: Child Penalty in the Netherlands (Rabaté and Rellstab, 2022)

Part-time Work Penalty

- It is clear that the the choice to work fewer hours for mothers explains a large part of the reduction in annual earnings.
- There is an extensive literature about the part-time pay penalty (e.g. Manning and Petrongolo (2008)).
- This gives rise to the question whether mothers who work full-time, for instance, perhaps face no child penalty, or a much reduced one.

Research Question

How does the child penalty compare between the group of mothers who work full-time after birth and mothers who start working part-time, also in the long run?

Differences by Industry and Occupation

- Goldin and Katz (2016) find that the gender pay gap is very small in the pharmaceutical industry.
- They argue that this is due to the high degree of substitutability between pharmacists and the (resulting) linear return to hours.
- This gives rise to the question whether mothers who work in occupations or industries with more linear returns to hours face smaller child penalties.

Research Question

How does the child penalty differ between occupations / industries? Does there seem to be evidence for the finding by Goldin and Katz (2016)?

The Grandparent Penalty

- The literature finds a large child penalty for mothers in basically all contexts and no penalty for fathers.
- In the Netherlands there is a lot of anecdotal evidence of grandparents taking care of their grandchildren after school.
- This gives rise to the question whether there exists a so-called grandparent penalty in earnings and/or employment.

Research Question

How do the earnings and labor supply of grandparents respons to the arrival of their first grandchild?

References

Andresen, M. E. and Nix, E. (2022). What causes the child penalty? Evidence from adopting and same-sex couples. *Journal of Labor Economics*, 40(4):971–1004.

Artmann, E., Oosterbeek, H., and van der Klaauw, B. (2022). Household specialization and the child penalty in the Netherlands. *Labour Economics*, 78:102221.

Bertrand, M. (2020). Gender in the twenty-first century. In *AEA Papers and proceedings*, volume 110, pages 1–24. American Economic Association 2014 Broadway, Suite 305, Nashville, TN 37203.

Bertrand, M., Goldin, C., and Katz, L. F. (2010). Dynamics of the gender gap for young professionals in the financial and corporate sectors. *American Economic Journal: Applied Economics*, 2(3):228–255.

Blau, F. D. and Kahn, L. M. (2017). The gender wage gap: Extent, trends, and explanations. *Journal of Economic Literature*, 55(3):789–865.

Goldin, C. (2014). A grand gender convergence: Its last chapter. *American Economic Review*, 104(4):1091–1119.

Goldin, C. and Katz, L. F. (2016). A most egalitarian profession: pharmacy and the evolution of a family-friendly occupation. *Journal of Labor Economics*, 34(3):705–746.

Kleven, H. (2022). The geography of child penalties and gender norms: Evidence from the United States. Technical report, National Bureau of Economic Research.

Kleven, H., Landais, C., and Leite-Mariante, G. (2023). The child penalty atlas. Technical report, National Bureau of Economic Research.

Kleven, H., Landais, C., Posch, J., Steinhauer, A., and Zweimüller, J. (2019a). Child penalties across countries: Evidence and explanations. In *AEA Papers and Proceedings*, volume 109, pages 122–126. American Economic Association 2014 Broadway, Suite 305, Nashville, TN 37203.

Kleven, H., Landais, C., Posch, J., Steinhauer, A., and Zweimüller, J. (2020). Do family policies reduce gender inequality? Evidence from 60 years of policy experimentation. Technical report, National Bureau of Economic Research.

Kleven, H., Landais, C., and Søgaard, J. E. (2019b). Children and gender inequality: Evidence from Denmark. *American Economic Journal: Applied Economics*, 11(4):181–209.

Lim, N. and Duletzki, L.-M. (2023). The effects of public childcare expansion on child penalties-evidence from west germany.

Manning, A. and Petrongolo, B. (2008). The part-time pay penalty for women in britain. *The economic journal*, 118(526):F28–F51.

Rabaté, S. and Rellstab, S. (2022). What determines the child penalty in the Netherlands? The role of policy and norms. *De Economist*, 170(2):195–229.
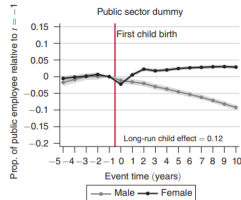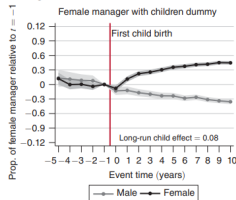
Mechanisms
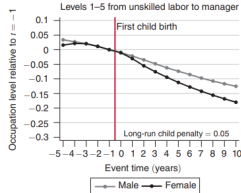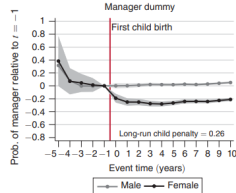
Figure: Mechanisms for the Child Penalty (Kleven et al., 2019b)