Evolution of the Child Penalty

Kristiina Huttunen [a] Claudia Troccoli [b]

[a] Aalto University, Helsinki GSE, VATT and IZA

[b] Åbo Akademi University

How does gender matter in the economy?
Stockholm
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Child penalty

- Motherhood is associated with significant earnings and employment costs- unlike fatherhood:
  - Ejrnæs and Kunze 2013, Angelov et al. 2016, Kleven at al. 2019a, Kleven et al. 2019b, Kleven et al. 2022, Sieppi and Pehkonen 2019, Andresen and Nix 2022a, Adams-Prassl et al. 2024
- Especially large child penalty in countries with more traditional gender roles
  - Kleven et al. 2019b
- How has the child penalty changed over time?
- Can history teach us about the reasons for the child penalty?
  - Kleven et al. 2021: little changes in child penalty in Austria, minor role of family policies
  - Andresen and Nix (2022): linear decrease in child penalty over time in Norway, with availability of childcare playing a larger role than the expansion of paternity leave

This paper

- Estimates the child penalty in Finland from 1970 until today
  - Novel way to estimate child penalty using cross-sectional data
  - Results are similar to the conventional panel approach (Kleven at al. 2019)
    - ⋆ Lighter data requirements: information on year of birth of the first child and earnings in a given year
    - ⋆ Different from matching method of Kleven et al. (2022)
- Shows the "evolution of the child penalty"
  - A period of radical changes for Finland: from almost no parental benefits to one of the most generous family leave policies in the world.
    - ⋆ Only two other papers have documented changes in child penalty over time (Kleven et al. 2022: Austria, Andersen and Nix 2022: Norway)
- What factors contributed to the changes in the child penalty?
  - Family leaves
  - Parental characteristics

Data and Research Design

Data

- Finnish Census and FOLK modules. Data for all residents of Finland in 1971, 1975, 1980, 1985, and annually from 1987:
  - Labour earnings (wages plus entrepreneurial): in level, zero earnings included
  - Employment (positive earnings)
  - Background characteristics: Age, education, occupation, municipality,...
- Population Registry: Parent-children links and birthdates
- Sample:
  - First-time mothers and fathers
  - Excluded: non-Finnish born
- Institutional data:
  - family policy changes
  - number of childcare slots
  - population age structure

Estimating child penalties with event studies

"panel approach" VS "cross-sectional approach"

- Panel data method (Kleven et al 2019):
  - Parents's earnings (including zeros) are followed from 5 years before to 10 years after the birth of the first child
  - Children are born in different years
  - Included years depending on data availability
  - One child penalty estimate for the whole period
- Cross-sectional approach:
  - All first-time parents are observed in a given year
  - Sample includes parents that had a child between 10 years before and 5 years after
  - Several child penalty estimates: one for each year

▸ Method in detail

Estimating child penalties with event studies

"panel approach" VS "cross-sectional approach"

(a) Panel: parents of children born between 1993 and 2007.

(b) Cross-sectional 2003: parents of children born between 1993 and 2008.

▸ Event graphs for other years

Evolution of the average child penalty

Figure: Average child penalty in labour earnings computed using the cross-sectional approach.

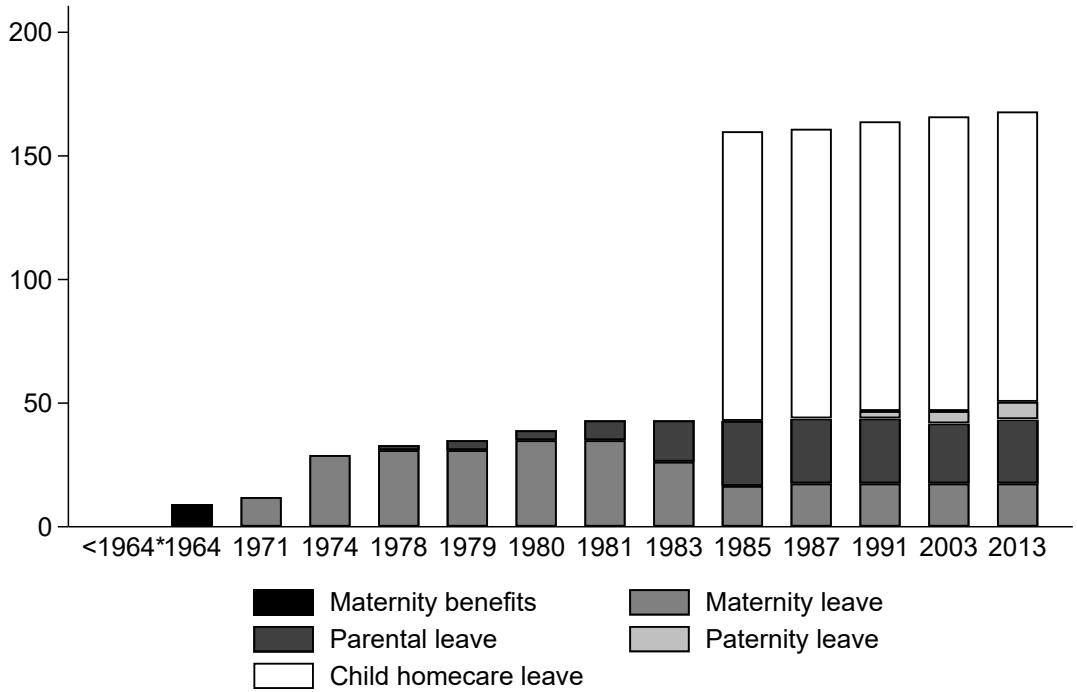
Short, medium, and long term child penalty

Figure: Child penalty for the parents of 1, 3, 5, and 10 year-olds in the cross-sectional sample.

What factors contributed to the changes in the child penalty?

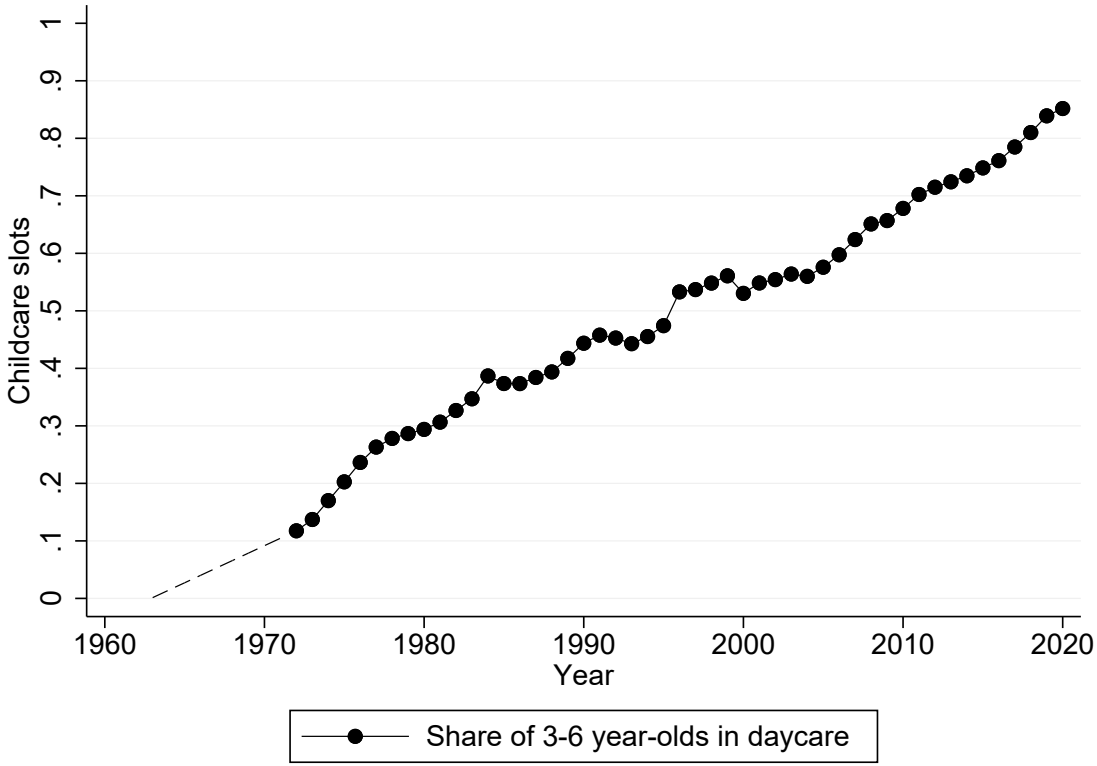
1. Expansions of family leave?
   - Maternity, paternity and parental leave
   - Home care allowance
2. Child care availability?
3. Parental characteristics?

1. Expansions of family leaves: previous studies



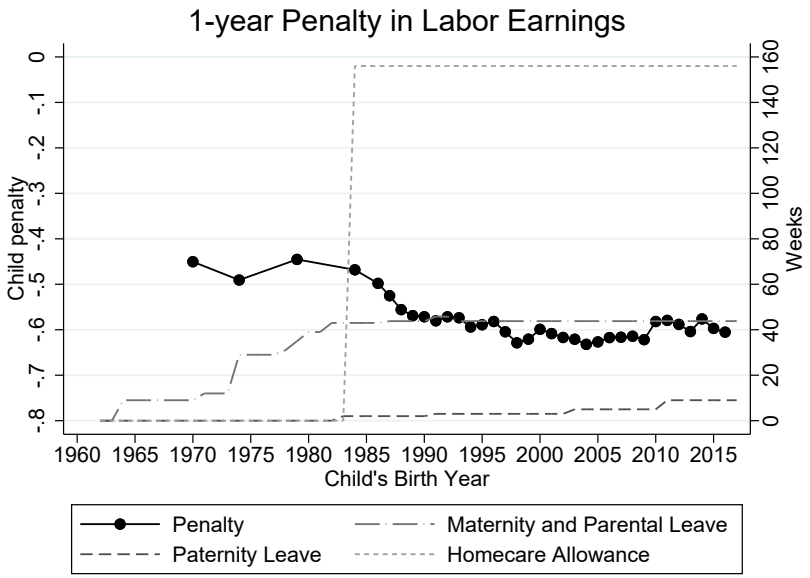
- 1964-1981 maternity and parental leave changes: Little/no impact of the on mother's employment/earnings (Troccoli 2023)
- Paternity leave changes: no effects on parents' labour market outcomes (Carnicelli and Ravaska 2023)
- Child home care allowance: decrease of maternal employment (Kosonen 2014; Gruber, Huttunen and Kosonen 2022; Riukula 2022; Österbacka and Räsänen 2021)

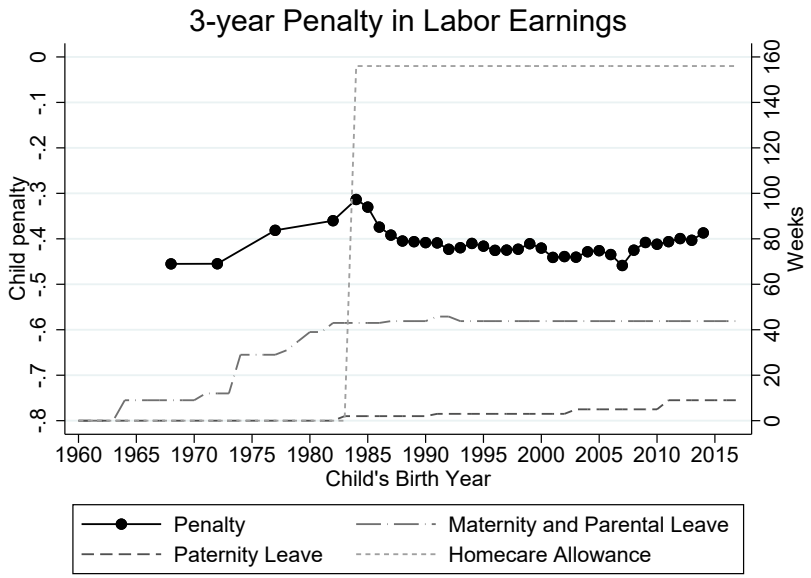
2. Expansion of municipal childcare: previous studies

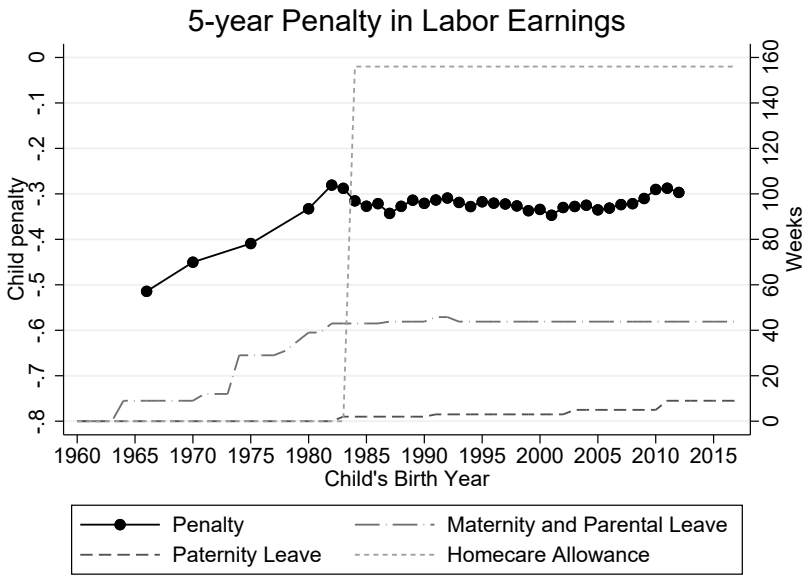


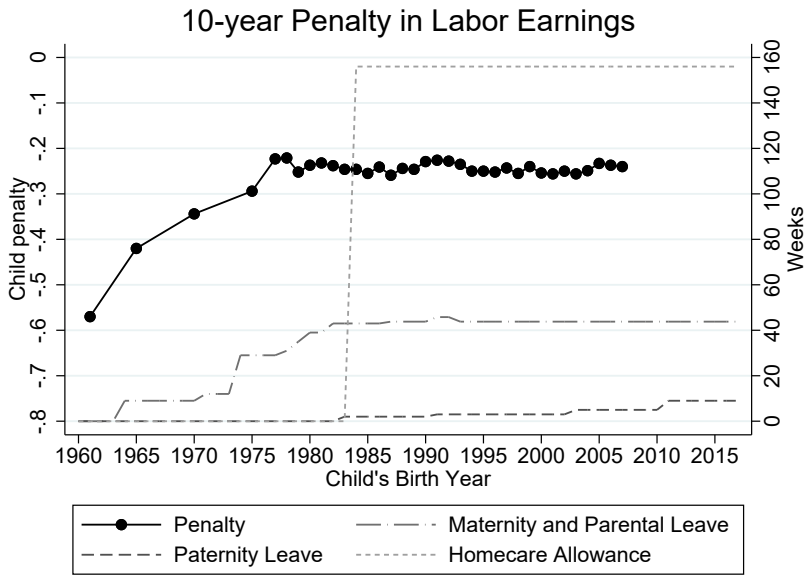
- 1970s-1980s: Large expansions in availability of municipal child care spots significantly increased mothers' labour supply (Mäkinen and Silliman 2022)

How do changes in family policies correspond with changes in the child penalty?


1-year Penalty in Labor Earnings
Child penalty
0
-.1
-.2
-.3
-.4
-.5
-.6
-.7
-.8
Weeks
0
20
40
60
80
100
120
140
160
1960 1965 1970 1975 1980 1985 1990 1995 2000 2005 2010 2015
Child's Birth Year
Penalty
Maternity and Parental Leave
Paternity Leave
Homecare Allowance


3-year Penalty in Labor Earnings
Child penalty
0
-.1
-.2
-.3
-.4
-.5
-.6
-.7
-.8
Weeks
0
20
40
60
80
100
120
140
160
1960 1965 1970 1975 1980 1985 1990 1995 2000 2005 2010 2015
Child's Birth Year
Penalty
Maternity and Parental Leave
Paternity Leave
Homecare Allowance


5-year Penalty in Labor Earnings
Child penalty
0
-.1
-.2
-.3
-.4
-.5
-.6
-.7
-.8
Weeks
0
20
40
60
80
100
120
140
160
1960 1965 1970 1975 1980 1985 1990 1995 2000 2005 2010 2015
Child's Birth Year
Penalty
Maternity and Parental Leave
Paternity Leave
Homecare Allowance


10-year Penalty in Labor Earnings
Child penalty
0
-.1
-.2
-.3
-.4
-.5
-.6
-.7
-.8
Weeks
0
20
40
60
80
100
120
140
160
1960 1965 1970 1975 1980 1985 1990 1995 2000 2005 2010 2015
Child's Birth Year
Penalty
Maternity and Parental Leave
Paternity Leave
Homecare Allowance

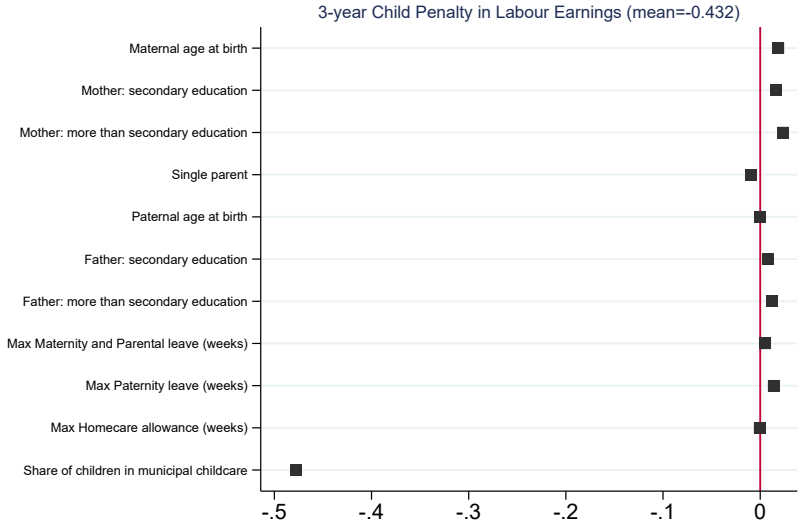
3. Changes in parental characteristics

	(1) 1971	(2) 1987	(3) 2003	(4) 2016
Mother: age at birth	23.75	26.54	27.94	29.08
	(4.29)	(4.73)	(5.33)	(5.35)
Father: age at birth	25.98	28.63	30.10	31.02
	(4.92)	(5.00)	(5.76)	(5.90)
Mother: Number of children 10 years after birth	2.20	2.42	2.34	N/A
	(1.15)	(1.24)	(1.17)	
Father: Number of children 10 years after birth	2.24	2.42	2.30	N/A
	(1.18)	(1.27)	(1.18)	
Mother: compulsory education	0.37	0.10	0.05	0.07
	(0.48)	(0.31)	(0.22)	(0.25)
Mother: secondary education	0.39	0.44	0.36	0.40
	(0.49)	(0.50)	(0.48)	(0.49)
Mother: tertiary education	0.24	0.46	0.59	0.53
	(0.43)	(0.50)	(0.49)	(0.50)
Father: compulsory education	0.42	0.19	0.11	0.09
	(0.49)	(0.39)	(0.32)	(0.29)
Father: secondary education	0.33	0.46	0.46	0.51
	(0.47)	(0.50)	(0.50)	(0.50)
Father: tertiary education	0.26	0.35	0.43	0.40
	(0.44)	(0.48)	(0.50)	(0.49)

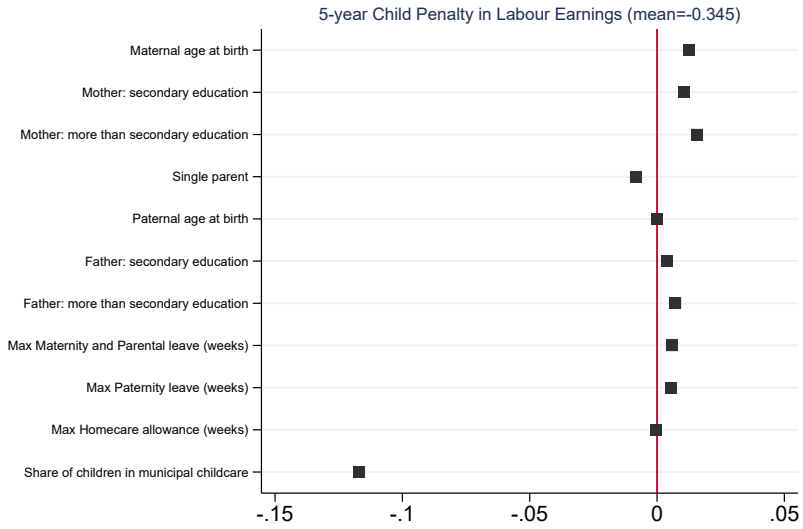
Understanding the role of parental characteristics and family policies

regressing individual-level penalty on parental characteristics, family policies and childcare coverage

(a) 1-year penalty



(b) 3-year penalty



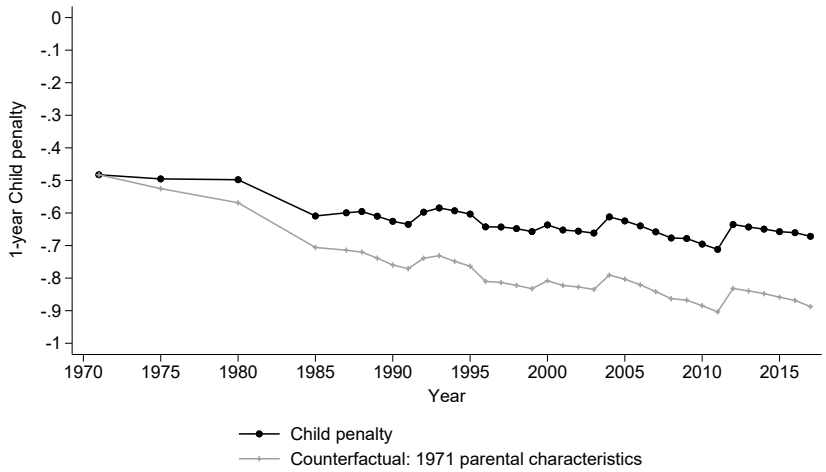
(c) 5-year penalty

(d) 10-year penalty

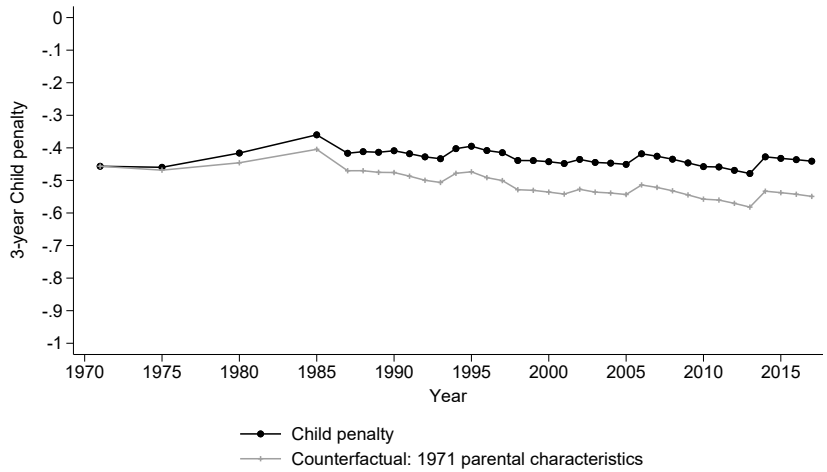
Counterfactual exercise

what if characteristics or family leaves had remained at 1971 levels?

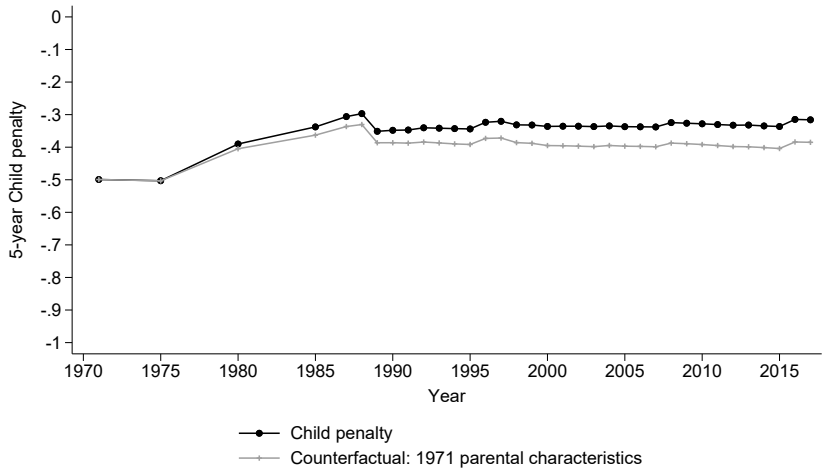
What if parental age and education had remained at the 1971 level?



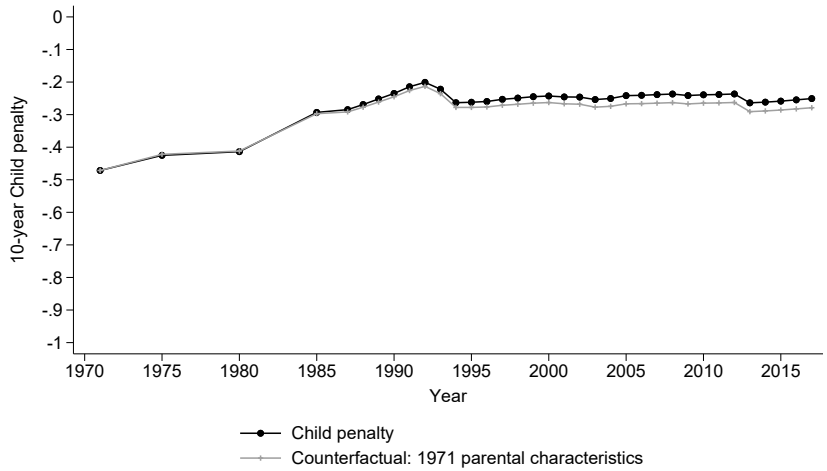
(a) 1-year penalty



(b) 3-year penalty



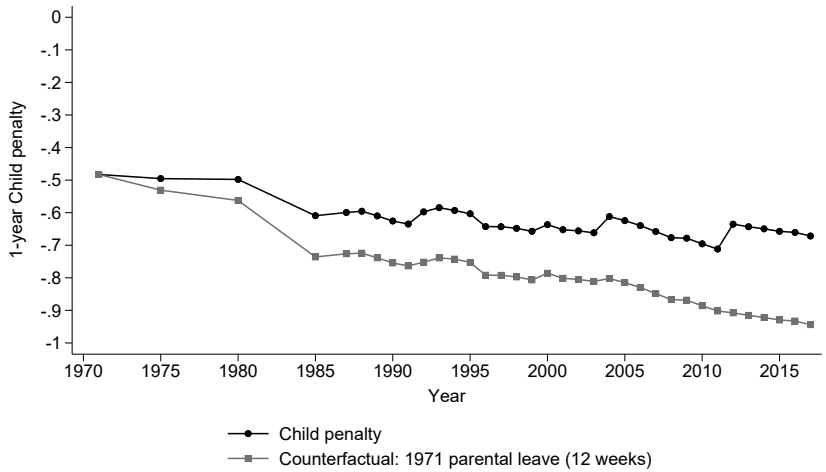
(c) 5-year penalty



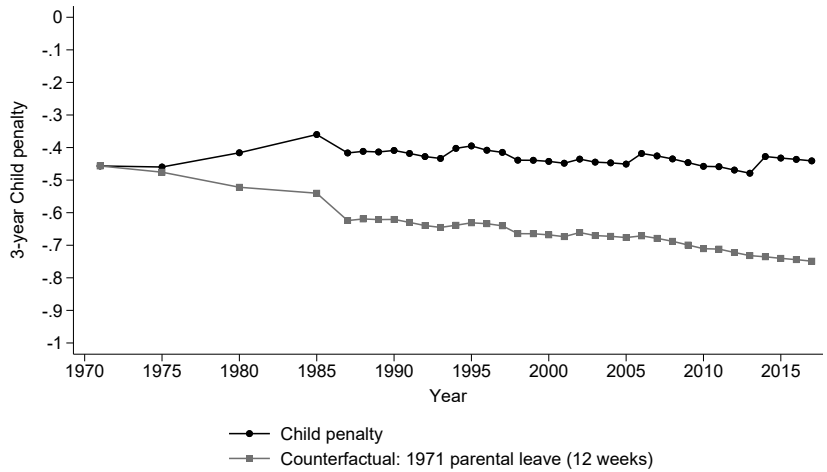
(d) 10-year penalty

What if parental leave had remained at 12 weeks?

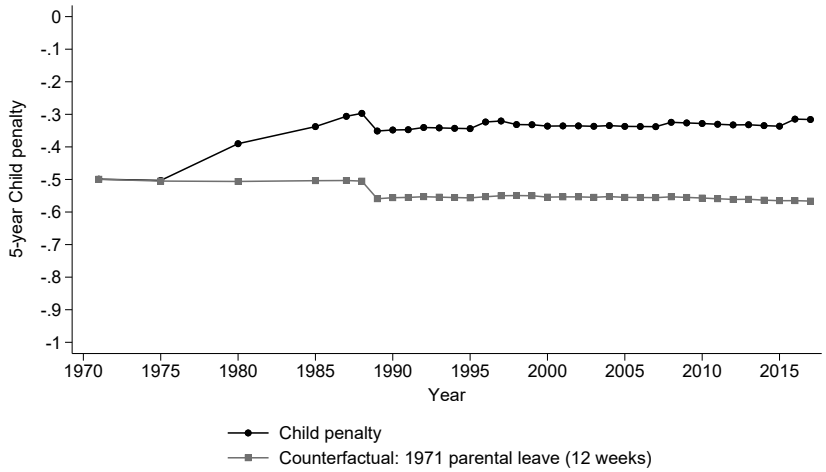
(but homecare allowance had been introduced)



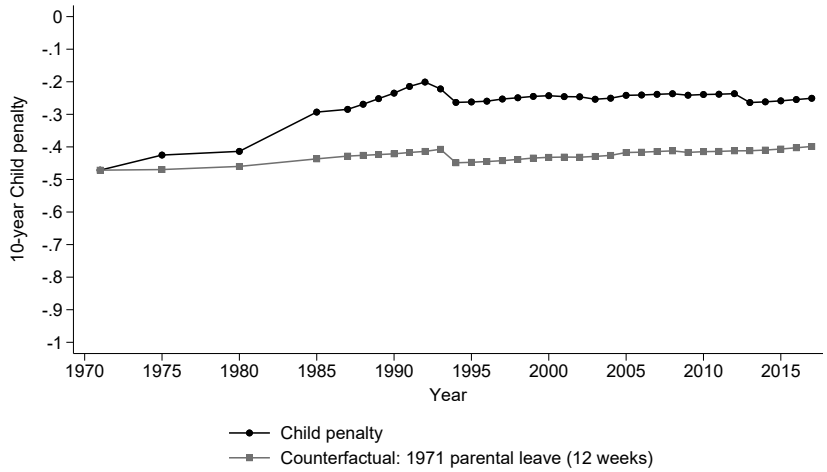
(a) 1-year penalty



(b) 3-year penalty



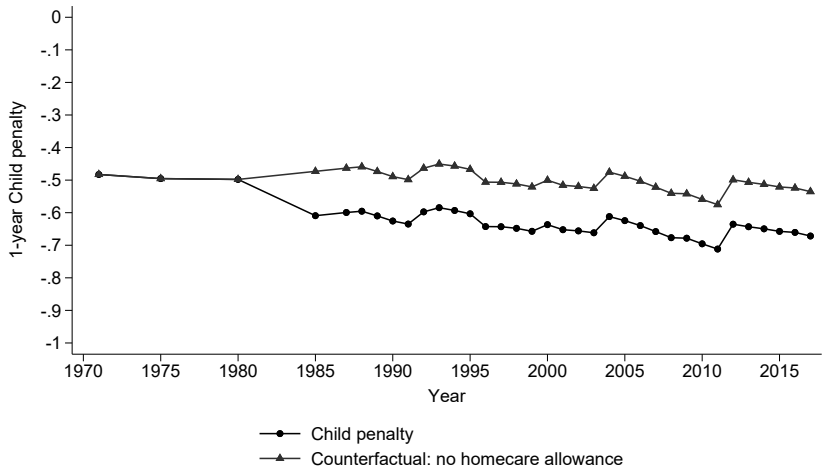
(c) 5-year penalty



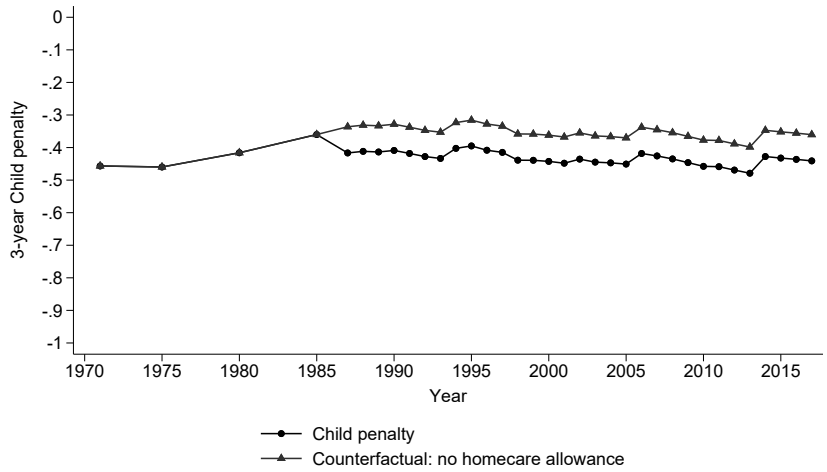
(d) 10-year penalty

What if homecare allowance had never been introduced?

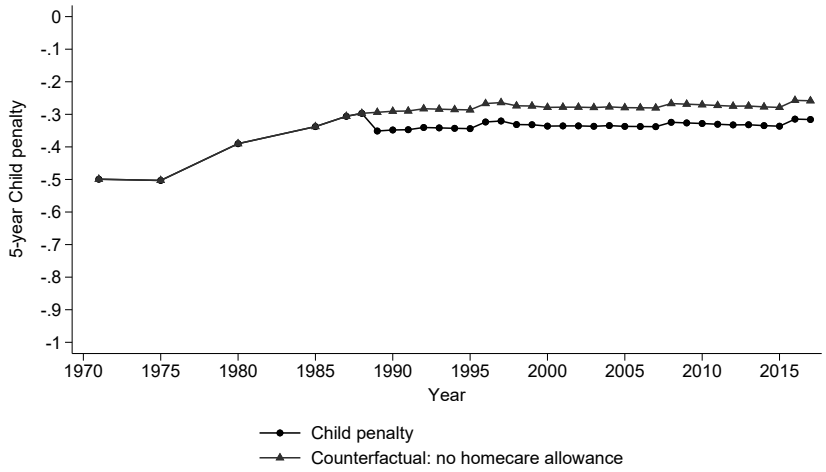
(but parental leave had been expanded to one year)



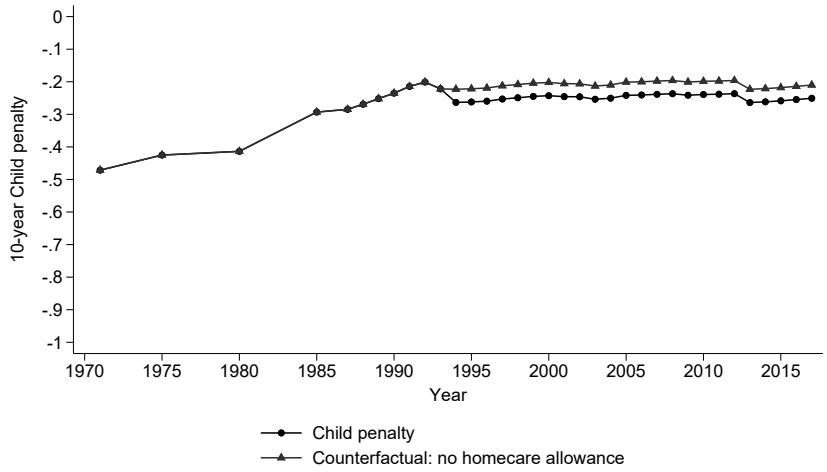
(a) 1-year penalty



(b) 3-year penalty

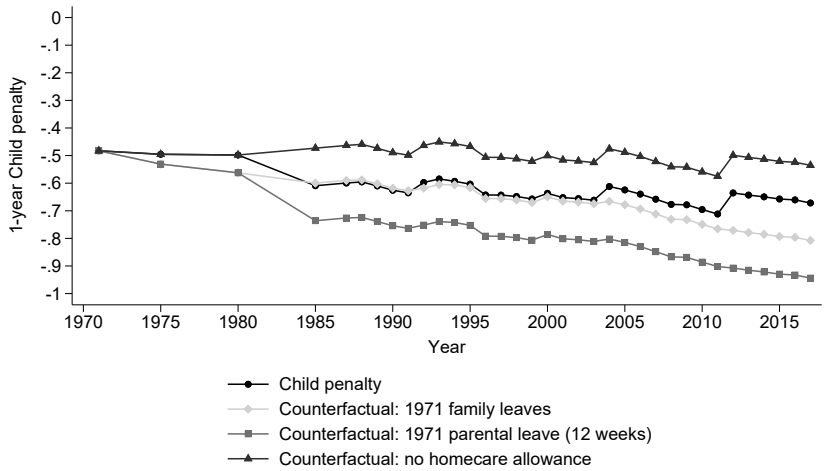


(c) 5-year penalty

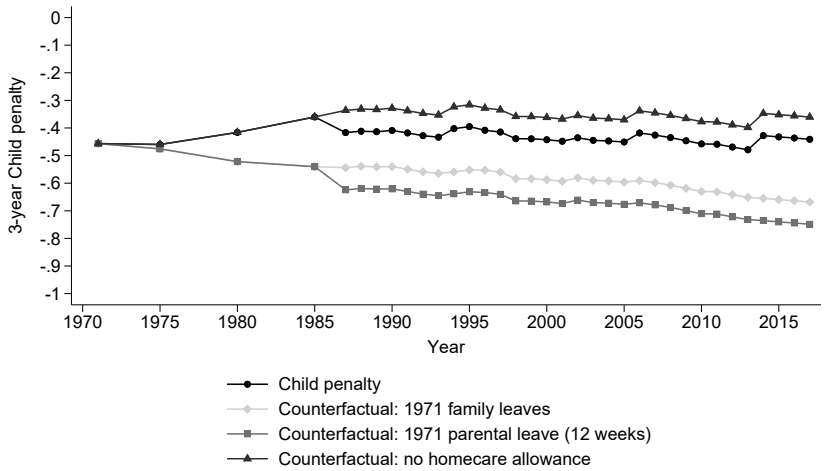


(d) 10-year penalty

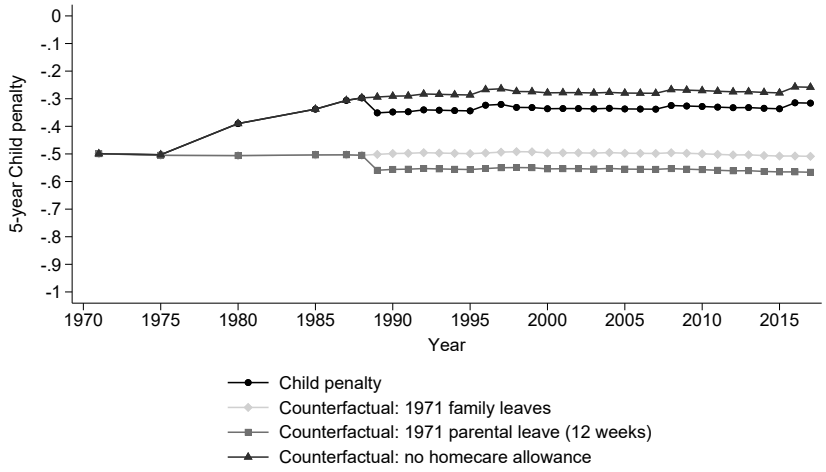
The net effect of parental leave and homecare allowance



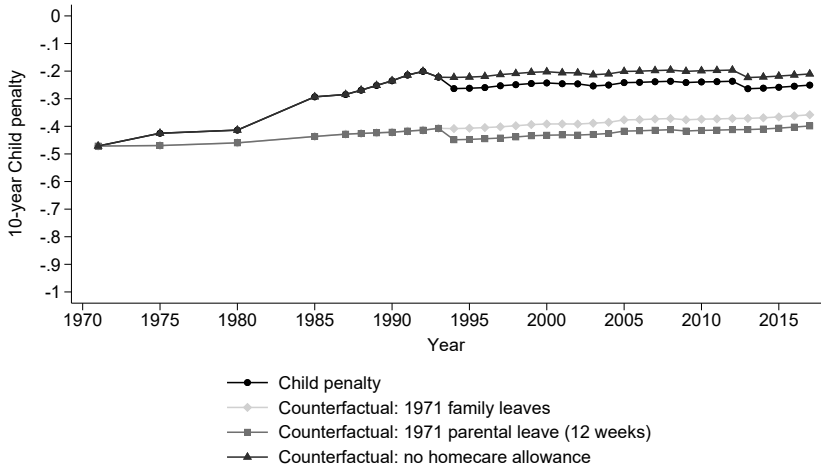
(a) 1-year penalty



(b) 3-year penalty



(c) 5-year penalty



(d) 10-year penalty

Summary

- The child penalty in Finland has decreased from nearly 60% in 1970 to 25% in 2016.
  - Most of the decrease occurred until the mid-1980s (introduction and expansions of maternity and parental leave; expansion of municipal childcare).
  - The decrease in the child penalty stopped in the late 1980s (introduction of the home care allowance)
- Higher parental age and education contributed to lowering the child penalty
- U-shaped relationship between child penalty and parental leave length:
  - Lengthening of parental leave up to one year contributed to lowering the child penalty
  - Lengthening of parental leave to three years (homecare allowance) contributed to increasing the child penalty
- Childcare expansion TBD

THANK YOU!

Estimating child penalties: Panel approach vs cross-sectional approach

Estimating child penalties: Panel approach

1993-2007

- Panel data:
  - Follow parents from five years before to ten years after the birth of the first child (event time: $-5 \leq t \leq 10$)

$$Y_{ist}^{g} = \sum_{j \neq 1} \alpha_j^g \cdot \boldsymbol{I}[j = t] + \sum_{k} \beta_k^g \cdot \boldsymbol{I}[k = age_{is}] + \sum_{y} \gamma_y^g \cdot \boldsymbol{I}[y = s] + \nu_{ist}^g \quad (1)$$

- Y_{ist}^{g} are earnings of parent i of gender g in calendar year s at event time t
- $\boldsymbol{I}[j = t]$ is an indicator for distance since child birth
- α_j^g measure the **"impact" of children at event time** t relative to $t = -1$
- Age dummies control for life-cycle trends
- Calendar year dummies control for time trends

Estimating child penalties: Panel approach

1993-2007

Predicted earnings "absent children"

$$\tilde{Y}_{ist}^{g} = \sum_{k} \hat{\beta}_{k}^{g} \cdot \boldsymbol{I}[k = age_{is}] + \sum_{y} \hat{\gamma}_{y}^{g} \cdot \boldsymbol{I}[y = s] \tag{2}$$

"Effects" of children by gender g

$$P_{j}^{g} \equiv \frac{\hat{\alpha}_{j}^{g}}{E[\tilde{Y}_{ist}^{g}|j]} \tag{3}$$

Child penalty for mothers

$$P_{j} \equiv \frac{\hat{\alpha}_{j}^{m} - \hat{\alpha}_{j}^{w}}{E[\tilde{Y}_{ist}^{w}|j]} \tag{4}$$

Estimating child penalties: "Cross-sectional" approach

An adapted event study method using cross-sectional data

- All individuals are observed in year s
- Each individual i is at a different distance j from childbirth that took place in year b (by sample construction, between 10 years before and 5 years after s)

$$Y_{ij}^{g} = \sum_{j \neq -1} \alpha_j^g \cdot \mathbf{I}[j = s - b] + \sum_k \beta_k^g \cdot \mathbf{I}[k = age_{ij}] + \nu_{ij}^g \tag{5}$$

- Y_{ij}^{g} are earnings of parent i of gender g at distance j from childbirth
- α_j^g measure the "impact" of children at various distances from childbirth j relative to $j = -1$
- Age dummies control for life-cycle trends

Estimating child penalties in other years

An adapted event study method using cross-sectional data

Predicted earnings "absent children"

$$\tilde{Y}_{ij}^{g} = \sum_{k} \hat{\beta}_{k}^{g} \cdot \boldsymbol{I}[k = age_{ij}] \tag{6}$$

Effects of children

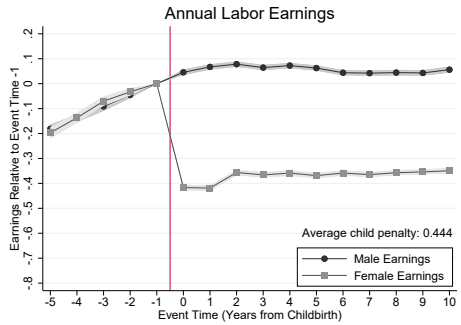
$$P_{j}^{g} \equiv \frac{\hat{\alpha}_{j}^{g}}{E[\tilde{Y}_{is}^{g}|j]} \tag{7}$$

Child penalty

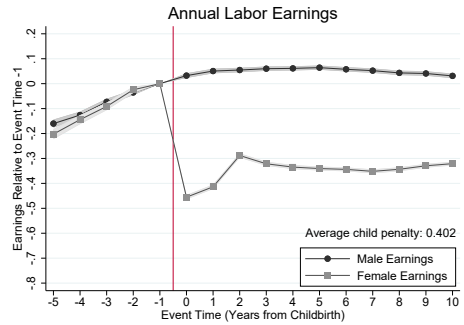
$$P_{j} \equiv \frac{\hat{\alpha}_{j}^{m} - \hat{\alpha}_{j}^{w}}{E[\tilde{Y}_{is}^{w}|j]} \tag{8}$$

◂ Back

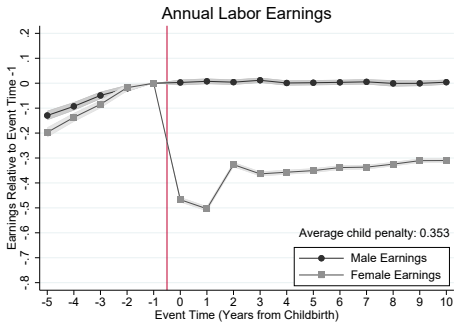
(a) 1971 (Census)



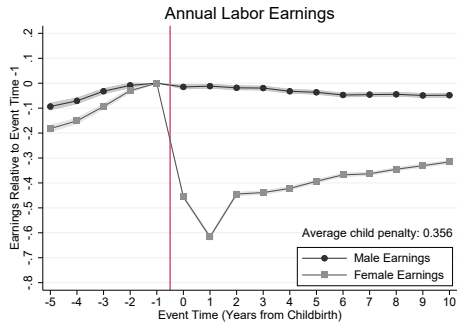
(b) 1975 (Census)



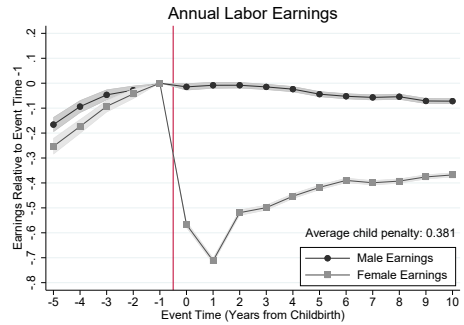
(c) 1980 (Census)



(d) 1985 (Census)



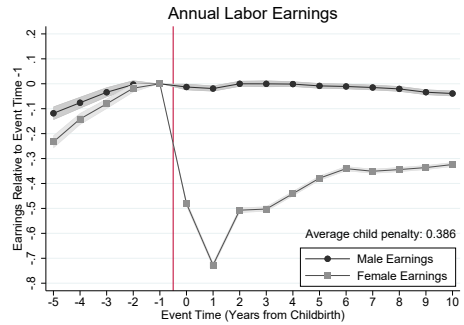
(e) 1990 (FOLK)



(f) 1995 (FOLK)

(g) 2000 (FOLK)

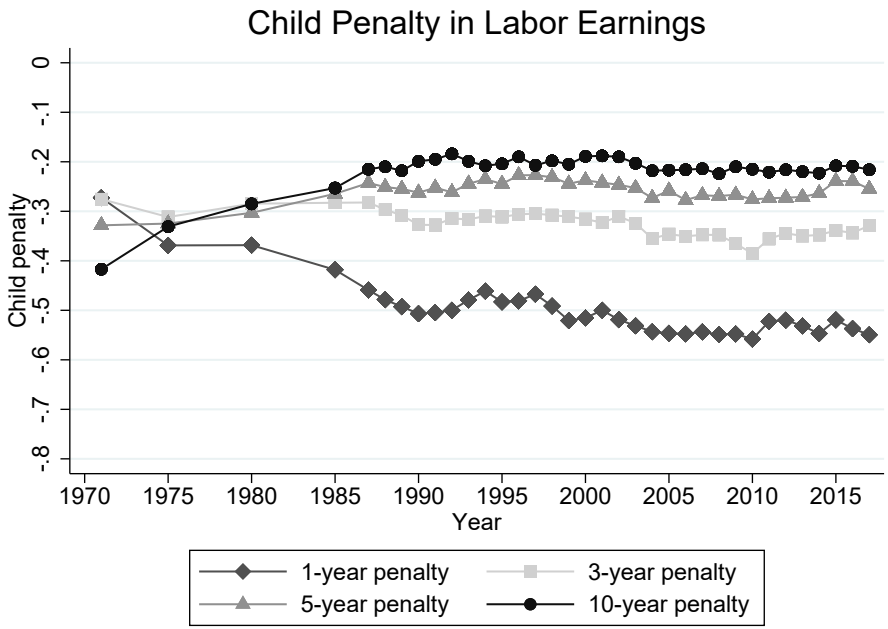
(h) 2005 (FOLK)



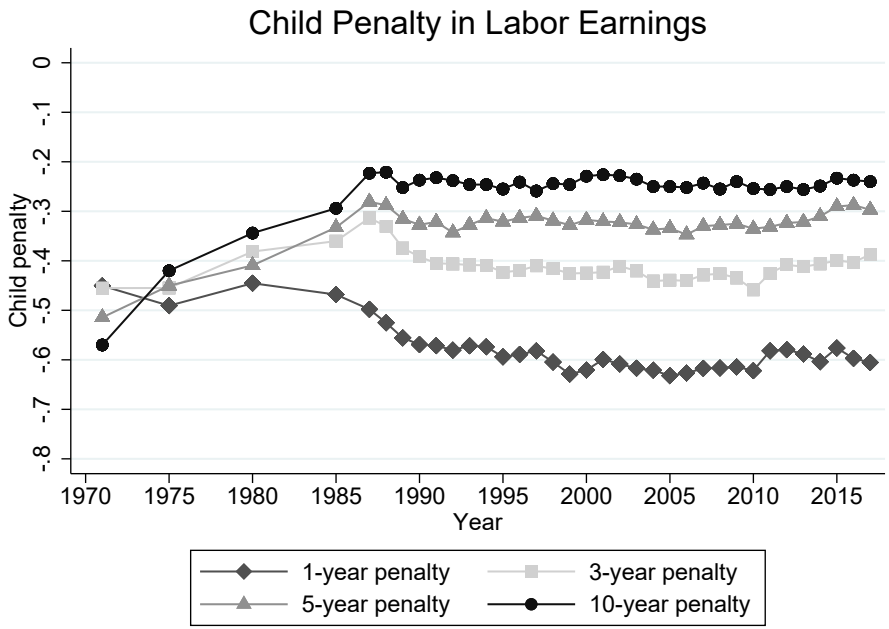
(i) 2010 (FOLK)

Back

A large portion of the child penalty in the early years is due to non-working women



(a) Excluded: zero-earners



(b) Full sample