

# Child care and child development: An economist's view

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## Origins of inequality

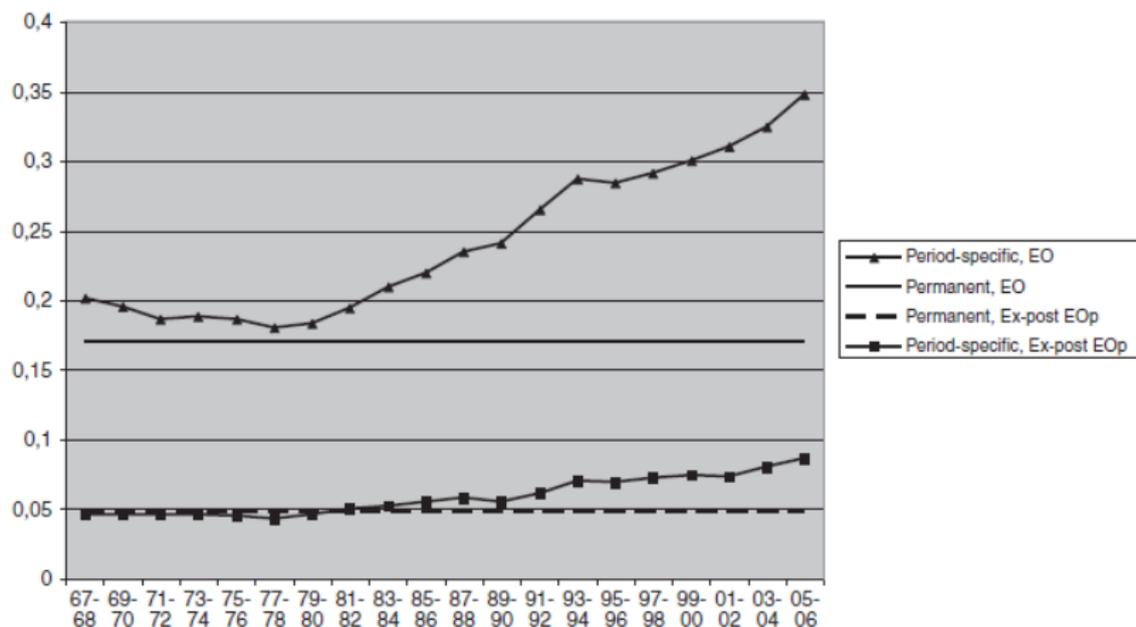
Considerable body of evidence suggests that inequality in lifetime income depends

- ▶ as much (or more) on differences established early in life
- ▶ as compared to shocks received over the working lifetime

(see e.g. Keane and Wolpin, 1997; Storesletten et al., 2004; Cunha and Heckman, 2007, 2008; Huggett et al., 2012)

## Origins of inequality: Norway

- ▶ EO: Inequality (Gini coefficient) in annual and lifetime income
- ▶ EOp: Inequality (Gini coefficient) in annual and lifetime income attributable to family background



Source: Aaberge, Mogstad, Peragine (JPubEc, 2011)

## Remedies of inequality

The importance of family background raises questions about the effectiveness of policies directed at modifying or at providing insurance for

- ▶ initial conditions
  - ▶ such as subsidized child care or paid parental leave
- ▶ shocks over the working lifetime
  - ▶ such as unemployment or disability insurance

## Child care and child development: Assessing the evidence

Several small-scale, randomized early childhood education programs document large returns for children from poor families

- ▶ But publicly subsidized child care may also have benefits for middle or upper-class children that exceed its costs
- ▶ Current evidence base for universal child care is insufficient:
  - ▶ small, non-experimental, and offers mixed results
  - ▶ focused on mean impacts

*(Literature reviews: Baker, 2011; Almond and Currie, 2010; Ruhm and Waldfogel; 2011)*

## Four challenges

To assess the evidence on how child care affects child development, we face four fundamental challenges.

1. What is the alternative? (The counterfactual mode of care)
2. Who are the recipients of policy? (Heterogeneous responses)
3. What is the relevant outcome?
4. Correlation vs causation. (Omitted variable bias)

## Issue 1: Type of care

- ▶ Counterfactual form of care matters
  - ▶ Parental care
  - ▶ Informal care (friends, relatives, unlicensed care givers)
  - ▶ Formal care (kindergartens and licensed care givers, preschool, special programs)

⇒ Differ substantially in quality
- ▶ Estimated effect is likely transition-specific
- ▶ Most studies unclear on the relevant transitions
  - ▶ hard to interpret results

## Issue 2: Heterogeneous response

- ▶ Literature on child development suggests systematic heterogeneity in the sign and magnitude of child care effects depending on:
  - ▶ Child characteristics (age, sex, innate ability, etc)
  - ▶ Parental characteristics (marital status, age, education, income, etc)
- ▶ Mean impact may miss a lot: averages together positive and negative effects
- ▶ Need to allow for heterogeneous responses to address distributional concerns

## Issue 3: Outcome measure

- ▶ Cognitive vs. non-cognitive (e.g. grades vs. aggression)
  - ▶ Sometimes opposite results (Baker et al, 2008, Loeb et al, 2004)
  - ▶ Both important for child long-run outcome (Cunha and Heckman 2007)
- ▶ Test scores
  - ▶ Hard to interpret, and hard to compare across studies (Cunha and Heckman, 2007)
  - ▶ Unclear how they relate to long-run outcomes
- ▶ Long-run vs. short-run
  - ▶ Initial cost of adjustment to new mode of care?
  - ▶ Inputs at different ages: Substitutes or complements?

## Issue 4: Omitted variable bias

- ▶ Correlation vs. causation
  - ▶ Is it true that a particular mode of care has a causal effect on child outcome?
  - ▶ Or is it the case that children spending time in this mode of care are inherently different and would have different outcomes in any case?
- ▶ Ideal: Experimental data with random assignment
- ▶ Evaluation of *universal* child care arrangements *require* methods for observational data

# Outline

## 1. The experimental ideal

- ▶ Causal relationship of interest
- ▶ Ideal experiment
- ▶ Identification strategy

## 2. Analysis using observational data: Examples

- ▶ Havnes and Mogstad (2011): “No Child Left Behind: Subsidized Child Care and Children’s Long-Run Outcomes”, *American Economic Journal: Economic Policy*
- ▶ Havnes and Mogstad (2011): “Money for Nothing? Universal Child Care and Maternal Employment”, *Journal of Public Economics*
- ▶ Havnes and Mogstad (2012): “What is the case for universal child care programs? Evidence from non-linear difference-in-differences”, *Mimeo*

## Experimental ideal: Q1

- ▶ What is the causal relationship of interest?
  - ▶ Relationship between child care and child development
  - ▶ Causal effect depends on the relative quality of actual and counterfactual form of care
  
- ▶ Causal relationship is necessary for policy recommendation
  - ▶ Tells us the consequences of changing circumstances of policies
  - ▶ That is, what would happen in counterfactual situations

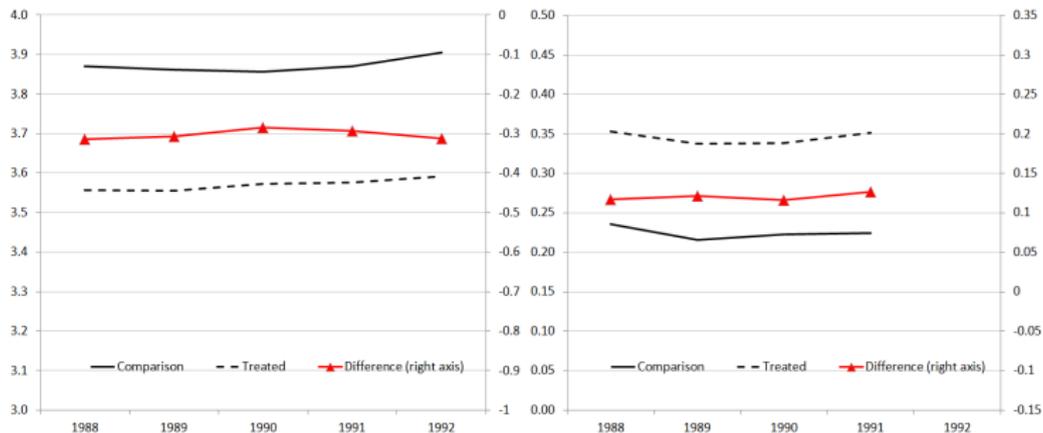
## Experimental ideal: Q2

- ▶ What is the ideal (hypothetical) experiment?
  - ▶ Randomized experiment: Restricted number of child care slots handed out in a lottery
  - ▶ Compare children who were in child care with children who were not in child care, by chance
- ▶ Might be difficult, practically or ethically, to implement
- ▶ Hypothetical experiments still fruitful:
  - ▶ Identifies research questions that are possible to answer
  - ▶ Tells which forces to manipulate and what factors to keep constant

## Experimental ideal: Q3

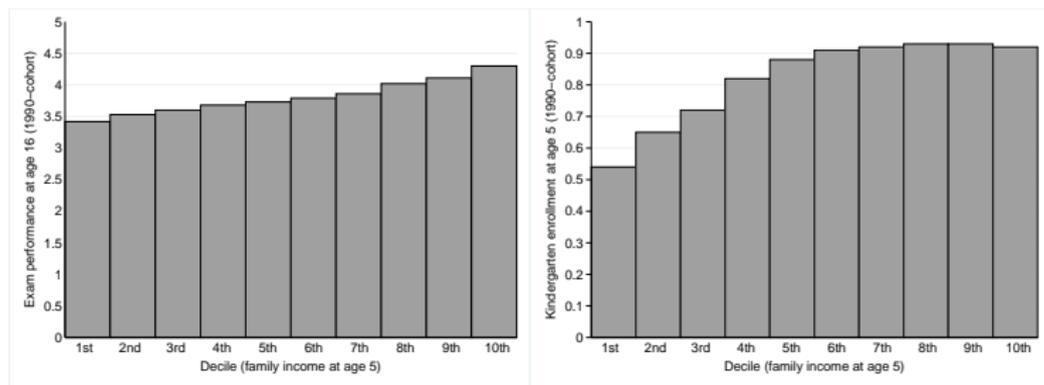
- ▶ What is your identification strategy?
  - ▶ That is, the manner in which observational data is used to approximate randomized experiments
  - ▶ Aim: Get read of omitted variable bias, so that the treatment and comparison groups are truly comparable
- ▶ Children in child care may be inherently different from children not in child care
  - ▶ Simple comparison will therefore produce biased estimates
  - ▶ Necessary to control for unobserved and observed differences

# Child care enrollment and high school performance



**Figure:** Exam performance and high school dropout rates among children enrolled and not enrolled in child care at age five. Source: Drange, Havnes and Sandsør (2012)

# Socio-economic sorting into child care



**Figure:** Social gradient in school performance and enrollment in kindergarten at age five. Source: Drange, Havnes and Sandsør (2012)

## Application: Long-run impacts in Norway

**Q1:** How large-scale child care affects children in the long run

**Q2:** Ideally, randomize children to alternative modes of care

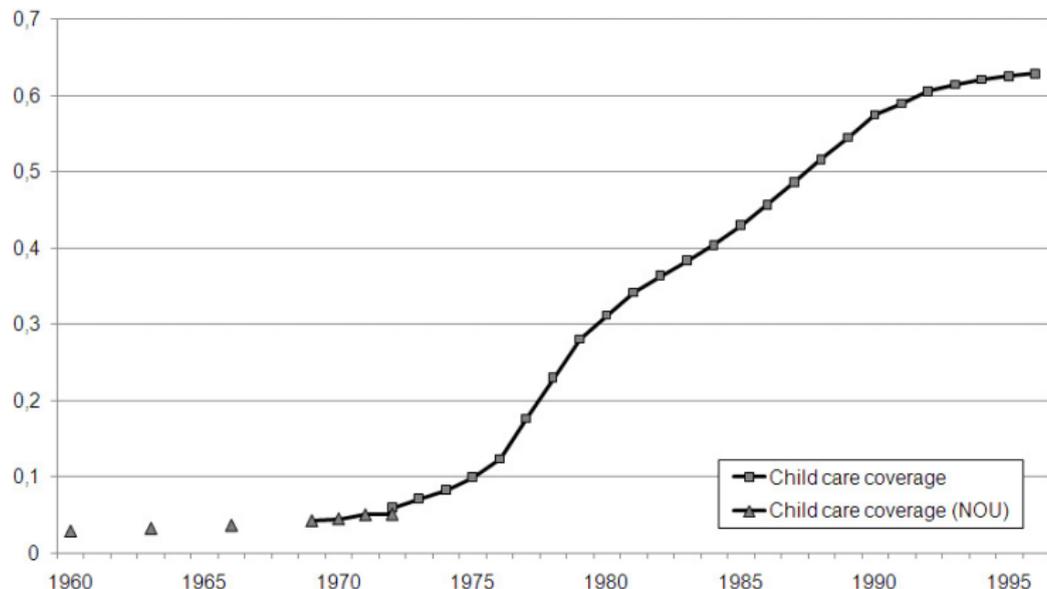
**Q3:** Take advantage of the Kindergarten Act of 1975

- ▶ compare children from municipalities where child care expanded a lot to children from municipalities where child care expanded little
  - ▶ same comparison before and after expansion
- ▶ allows identification of the effect of child care for children from municipalities that expanded
  - ▶ turns out to reflect almost uniquely shifts from informal sources of care

# Background: Kindergarten Act

- ▶ The Kindergarten Act:
  - ▶ assigned the responsibility for child care to local municipalities, but included federal provisions on educational content, group size, staff skill composition, and physical environment
  - ▶ increased federal subsidies for both running costs in general and establishment costs for new institutions
  - ▶ higher subsidy rates for municipalities with low child care coverage

## Child care coverage rates in Norway, 1960-1996



**Figure:** Child care coverage rates for children 3 to 6 years old, 1960–1996.

*Notes:* Data from 1972 are based on administrative registers. Data for 1960–1972 are taken from NOU 1972:39 (1960-1972).

## Spatial variation

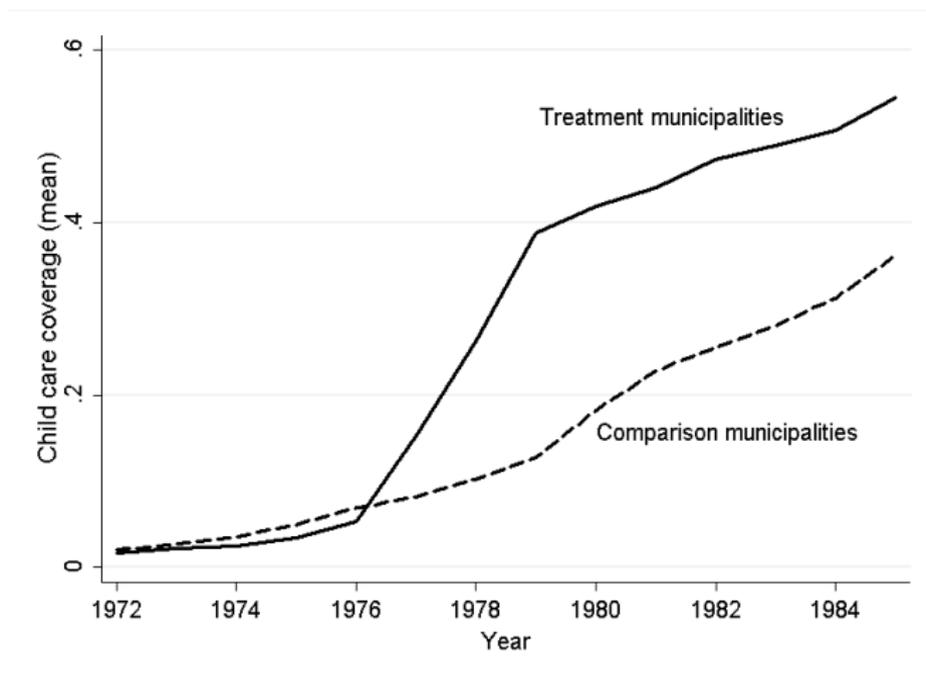
Sort municipalities into treatment and comparison groups by percentage point increase in subsidized child care coverage

- ▶ Main cutoff at the median
  - ▶ Robustness checks at 67th vs 33rd percentiles
- ▶ Main specification considers expansion from 1976 to 1979
  - ▶ Robustness checks at 1976–78 and 1977–79

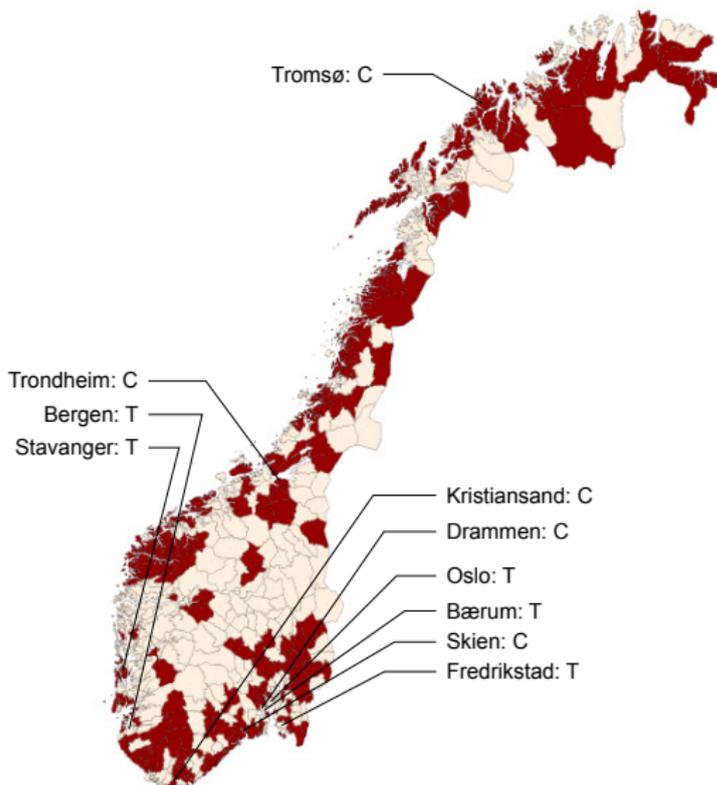
Large difference in child care expansion between treatment and comparison group

- ▶ Main definition: Median increase is 6 percentage points in comparison group vs. 30 points in treatment group
  - ▶ Mean: 6 vs 34 percentage points

## Treatment and comparison municipalities: Expansion



# Treatment and comparison municipalities: Geography



## Time variation

- ▶ **Post:** Children in child care age (3–6) after the expansion, i.e. born 1973–1976 ( $Post = 1$ )
- ▶ **Phase-in:** Children in child care age (3–6) during the expansion, i.e. born 1970–1972 ( $Phase-in = 1$ )
- ▶ **Pre:** Children in child care age (3–6) before the expansion, i.e. born 1967–1969

## Empirical strategy: Diff-in-diff

- ▶ We consider:
  - ▶ Change in outcome in the treatment group:  
$$\Delta \bar{Y}^1 = \bar{Y}_{post}^1 - \bar{Y}_{pre}^1$$
  - ▶ Change in outcome in the comparison group:  
$$\Delta \bar{Y}^0 = \bar{Y}_{post}^0 - \bar{Y}_{pre}^0$$
  - ▶ Difference-in-differences:  $\Delta \bar{Y}^1 - \Delta \bar{Y}^0$
- ▶ Controls for unobserved differences
  - ▶ between children from different municipalities
  - ▶ between children from different cohorts

## Empirical strategy: Diff-in-diff

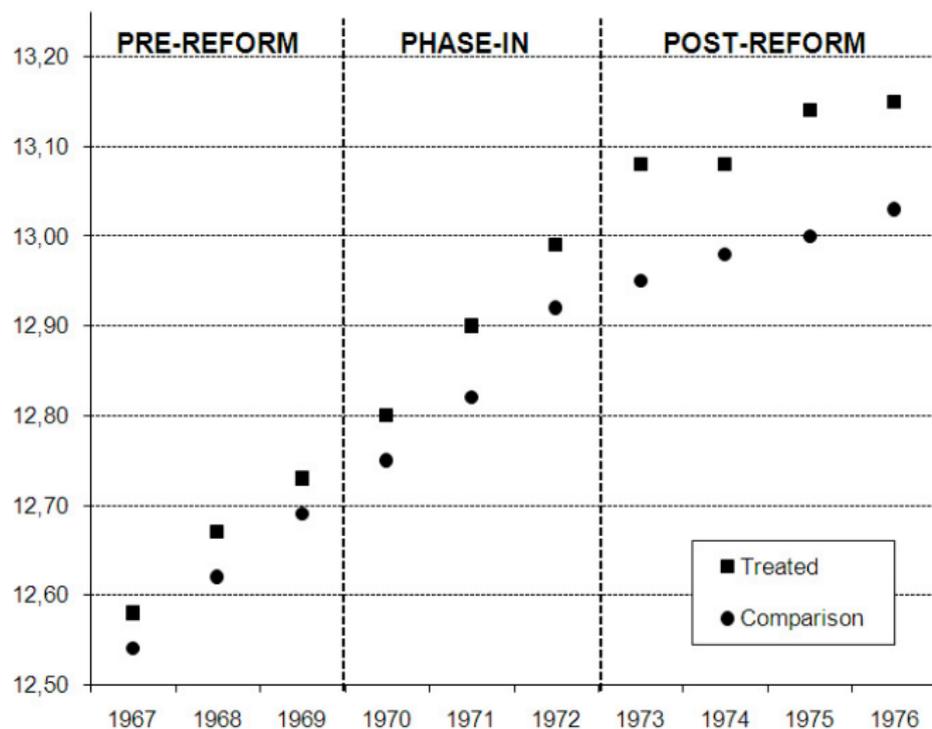
Identifying assumption:

- ▶ On average, 3–6 year olds after the expansion
  - ▶ would have the same outcome as children from the same municipality before the expansion
  - ▶ plus the impact of the child care expansion
  - ▶ minus the change observed among children from municipalities that don't expand
- ▶ Supported by a battery of checks

We also account for (changes in) observable differences

- ▶ individual characteristics: e.g. dummies for gender, number of older siblings, immigrant
- ▶ parental characteristics: e.g. education when child 2 y.o., age, age at first birth
- ▶ municipal-specific fixed effects

# Treatment and comparison municipalities: Years of schooling



Source: Havnes and Mogstad (AEJ: Policy, 2011)

## Descriptive statistics: Earnings (aged 30-36)

	Pre-reform	Pre-reform diff	Post-reform diff
<i>5th percentile</i>	0	0	0
<i>10th percentile</i>	31,685	-13	8,081
<i>25th percentile</i>	215,559	2,735	9,352
<i>50th percentile</i>	328,825	3,601	6,346
<i>75th percentile</i>	431,591	7,65	7,668
<i>90th percentile</i>	588,319	20,891	14,401
<i>95th percentile</i>	718,938	30,293	19,812
Mean (SD)	343,361	(270,402)	

Source: Havnes and Mogstad (2012)

# Main results

## ▶ **Education:**

- ▶ 17,500 new child care places produced 6,200 years of education
- ▶ effects on high school completion and college attendance similar to US race gap
- ▶ most, if not all, on children with less educated mothers

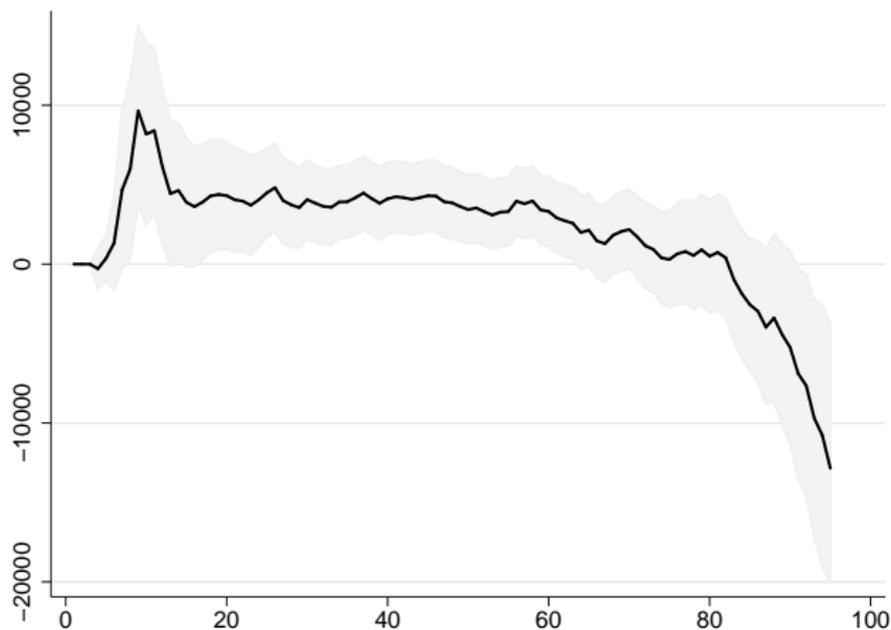
## ▶ **Earnings and welfare dependency:**

- ▶ lower chance of welfare dependency and having little or no earnings
- ▶ most, if not all, relates to girls
- ▶ lower chance of high or top earnings

## ▶ **Family formation:**

- ▶ Delayed child birth and family formation
- ▶ Mostly on girls

## RIF-DID: QTE on earnings distribution (aged 30–36)



Source: Havnes and Mogstad (2012)

## DiD: Mean impacts on earnings (age 30–36)

	<b>Estimate</b>	<b>SE</b>	<b>Mean</b>	<b>N</b>
Overall	333	1,596	361,860	498,947
<b>Family income</b>				
High	-8,095	4,575	410,678	99,761
Mid	-1,785	3,403	355,887	99,793
Low	9,287	3,331	325,523	99,801

Source: Havnes and Mogstad (2012)

## Mechanisms

Subsidized child care had little effect on maternal labor supply

- ▶ instead crowded out informal care used by working mothers

Effects on child outcomes should be interpreted as the consequences of

- ▶ moving children from informal care
- ▶ into subsidized care of medium quality
  - ▶ Positive/negative effects for children with informal care alternatives of lower/higher quality

Other possible mechanisms receive little support in the data (such as parental income, family size, etc.)

## Intermediate outcomes

To interpret the findings, we investigate the effects on:

- ▶ Educational attainment:
  - ▶ Increase in years of schooling
  - ▶ Largely driven by reduction in high school drop-out
- ▶ Cognitive test scores at age 18
  - ▶ Precise zeros for QTEs

Suggests that non-cognitive skill development is an important channel

- ▶ Specifically, positive/negative effects on non-cognitive skills for low-income/high-income children

## Concluding remarks

Evaluation of the distributional effects of early childhood interventions is still in its infancy

Important next steps include developing and applying tools to

- ▶ assess distributional effects on multiple outcomes
  - ▶ e.g. health, income, education
- ▶ disentangle redistribution from insurance
  - ▶ predictable changes in income
  - ▶ unpredictable changes in income
- ▶ use non-welfarist criteria
  - ▶ such as opportunities and capabilities