Long-run Benefits from Universal High Quality Preschooling

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Enrollment of children aged 3-5 in preschool, 2000 and 2005

Research question

• Does variation in preschool quality have a long-term impact on child development?
Population

Birth
~1992

Pre-school
~1995-1998
(age 3-6)

Testing
~2008
(age 15)

quality effects?
Previous evidence

• Heckman et al. (2006):
  → skills beget skills; skills acquired early make human capital investments more productive
  → Pre-school period important for school readiness

• Esping-Andersen (2006):
  → High-quality childcare potentially the single most effective policy of homogenizing early childhood investments

• Currie (1998):
  → early interventions can be more effective than giving families of disadvantaged children unrestricted cash transfers
Empirical literature

Little evidence on long-term effects of pre-schooling

- Lower probability of special education and delinquency
- Higher scholastic achievement and motivation

Campbell & Ramney (2008): Abecedarian programme
- Positive effects in particular on cognitive outcomes at age 15

- early gains could fade out throughout later schooling
- especially if insufficient continued support for children at risk
Our contribution

• New evidence on long-term effects of childcare (age 15/16)

• Adding to limited (European) evaluation literature → testing the case of ‘model country’ Denmark for universal day-care access

• First large-scale study with detailed measures of pre-school quality; staff, gender composition, etc.
Data

• Register data from Statistics Denmark
• Population of children born around 1992
• Daycare register 1995-1998: Children in preschool (3-6-year-old children)
• Merged with information on teachers at institution level
  ➔ indicators for preschool quality
• Child outcomes: 9th grade exam results
Register data

IDA register

- Mother 1
- Father 1
- Child 1
- Child 2
- Child 3
- Child B
- Mother B
- Father B

Day care register

- Institution 1
- Child 1
- Institution i
- Child b
- Institution I
- Child B

IDA register

- Workplace 1
- Employee 1
- Employee 2
- Employee 3
- Employee 4
- Employee n
- Employee N-1
- Employee N

- Workplace a
- Employee n
- Employee N-1
- Employee N

- Workplace A
5 quality indicators

**Q1 – Staff-to-child ratio**
More pre-school staff gives more adult time per child

**Q2 – Share of male teachers in institution**
Male staff members serve as role models

**Q3 – Share of trained staff in institution**
Higher share of pedagogically educated staff enhances quality of child care

**Q4 – Share of ethnic minority teachers**
Reflect ethnic diversity in society, serve as role models for ethnic minority children

**Q5 – Stability of staff**
High stability of staff = low staff turnover
# Test scores 9th grade written Danish

<table>
<thead>
<tr>
<th>Danish exam grade</th>
<th>Average standardized scores</th>
<th>Frequency</th>
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<tbody>
<tr>
<td>-3</td>
<td>Unacceptable 50.15</td>
<td>0.1%</td>
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<tr>
<td>0</td>
<td>Inadequate 65.86</td>
<td>1.1%</td>
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<tr>
<td>2</td>
<td>adequate 76.33</td>
<td>8.4%</td>
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<tr>
<td>4</td>
<td>fair 86.80</td>
<td>26.1%</td>
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<tr>
<td>7</td>
<td>good 102.50</td>
<td>38.1%</td>
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<td>10</td>
<td>Very good 118.21</td>
<td>21.3%</td>
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<tr>
<td>12</td>
<td>excellent 128.68</td>
<td>4.9%</td>
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Empirical model

$$CO_i = \beta_0 + \beta_1 X_i + \beta_2 F_i + \beta_3 Q_i + \beta_4 P_i + \varepsilon_i$$

- $CO_i$: Child outcome of child $i$
- $X_i$: Child characteristics
- $F_i$: Family characteristics
- $Q_i$: Indicators of preschool quality
- $P_i$: Peer characteristics
Econometric method

• Cross-sectional data
• OLS
• Potential endogeneity:
  Parents select preschool based on information about preschool quality and expected implications for child development
• Identification problem of true causal effects
Selection into preschool

Three “steps” of decisions which determine allocation

1. Parents choose municipality of residence. Based on municipality characteristics: quality of living, prices and quality of houses, local labour market conditions, transportation, public schools, preschool user fees

2. Within municipalities, parents choose particular districts based rather on information on public schools than daycare arrangements in neighbourhood

3. Within district, parents prioritize between daycare arrangements. Waiting lists govern allocation in institutions

- Large element of exogeneity in allocation of children in preschools
- OLS estimates interpreted as causal effects
### Results - OLS

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<tbody>
<tr>
<td><strong>Staff per child</strong></td>
<td>2.55*</td>
<td>2.06</td>
<td>-0.61</td>
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<tr>
<td><strong>Male staff</strong></td>
<td>1.89**</td>
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<td>1.76**</td>
<td>0.02</td>
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<td><strong>Trained staff</strong></td>
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<td>1.93***</td>
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<td>1.59**</td>
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<td><strong>Ethnic minority staff</strong></td>
<td>1.72</td>
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<td>1.66</td>
<td>2.61*</td>
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<td><strong>Stability of staff</strong></td>
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<td>-0.06</td>
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**Child subgroup interaction effects**

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<td><strong>Ethnic minority * Q</strong></td>
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<td>-7.50**</td>
<td>4.81*</td>
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<td><strong>Boys * Q</strong></td>
<td>5.49**</td>
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*Controls: Child and family characteristics, peer group effects.*  
*Standard errors clustered at individual preschool level.*  
*) p=0.10, **) p=0.05, ***) p=0.01
Instrumental variables (IV)

- IV1: Wider area characteristics – quality characteristics at county level (Dustman and Preston, 2001)
- IV2: Political parties governing at municipal level
- IV3: Demographic changes across municipalities and years
- IV4: Exogenous municipality variation in allocation process (guaranteed access to preschool - GAPS) (Datta Gupta and Simonsen, 2010)

→ Weak instrument problem with all instruments
Conclusion

• Large element of exogeneity in allocation process allows us to make causal inference based on OLS estimation
• Positive and significant long-term effects of preschool quality measured by:
  – Staff-to-child ratio
  – Share of male staff
  – Share of pedagogical staff
  – But not staff stability and share of ethnic minority staff
• Quality effects numerically very small - much smaller than family background
• More emphasis on research in quality in preschool warranted!