Universal Preschool and Mothers’ Employment

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Motivation

- Economic shocks affect labor market decisions, well-being and family stability.
- Gender inequality is a large social determinant of all sorts of outcomes.
- Childhood and adolescence are investment periods in which parents have a crucial role.
- Women and children can be at disadvantage positions but policies that target them can improve their well-being.
Labor Force Participation Rate (women 25-54 years old)

Female workers

Male workers

Source: OECD Online Employment Database based on Mexican Labor Force Surveys (ENE & ENOE)
http://www.oecd.org/els/employmentpoliciesanddata/onlineoecdemploymentdatabase.htm#unr
Education trajectories (women 25-54 years old)

Source: ENIGH 1989-2012
Motherhood trajectories (women 25-54 years old)

Source: ENIGH 1989-2012 (data from 1989-1994 is approximate)
Marital status trajectories (women 25-54 years old)

Source: ENIGH 1996-2012
Motivation for this Study

- For women with young children, labor participation and childcare are **jointly** determined (Berlinski & Galiani, 2007).
- Public preschools provide a price subsidy for childcare on the employment margin, encouraging mothers to enter paid work.
- Vast literature on the effects of changes in *pre-k laws, age cut-offs to school entry, school subsidies*, and *increased supply of schools* on mothers’ employment. **BUT, evidence is inconclusive.**
Questions of interest

- What was the effect of *universal preschool* on *preschool enrollment*?
- What was the effect of *sharp increases* on *preschool enrollment* on *mothers’ employment*?

Hypothesis

1. Sharper increases in preschool attendance increased maternal employment.

Contribution

I provide empirical evidence of mothers’ responsiveness to changes in compulsory education laws that target young children in a Latin American context.
Theory

Predictions

- Universal preschool provides an incentive to work for some mothers:
- Mothers with a working schedule equal to the length of a preschool day should be unaffected.
- On the margin, women working less than the length of a preschool day can increase/decrease their working hours.
- Non-working mothers have a significant incentive to enter the labor market.

The expected effect of universal preschool on mothers’ employment should be observed at the extensive margin
U.S.:
- Access to a childcare subsidy in 1980 increased mothers’ probability of employment (whose youngest child was 5 years old) by 6-24% (Gelbach, 2002).
- Higher kindergarten funding (in 1960s and 1970s) increased employment of single mothers with 5-year olds (and no younger children) by 12%, with no effects on other subgroups (Cascio, 2009).
- Married mothers with a 5 year old enrolled in school increased their hours and weeks worked by 16% to 17% (Barua, 2004).

Canada:
- A subsidized childcare for children under 5 years of age: (a) increased maternal employment for married mothers in 7 percentage points (pp) (Baker et al., 2008) (b) increased hours and weeks worked (Lafebvre & Merrigan, 2005).
Israel:
- Gradual implementation of compulsory pre-k laws for 3- and 4-yr olds in Arab towns increased maternal employment (*Schlosser, 2005*).

Germany:
- A 10 pp increase in public child care attendance rates increased mothers’ employment by 3.7 pp (*Bauernschuster, & Schlotter, 2015*).

Spain:
- Subsidized child care for all 3-year olds led to a significant increase in employment of 8%, and hours worked (9%) of mothers with age-eligible children, with long term effects (*Nollenberger & Rodriguez Planas, 2011*).
Argentina:

- A larger supply of preschools increased female employment by 7 to 14 pp through an increase in preschool enrollment (Berlinski & Galiani, 2007).

- Mothers whose youngest child attended preschool were 19.1 pp more likely to work for more than 20 hours/week, and weekly hours worked increased by 7.8 hours (Berlinski, Galiani & Ewan, 2011).
In Norway, a staged expansion of subsidized child care had a large correlation but a small causal effect on maternal employment (Havnes & Mogstad, 2011).

In the U.S., Fitzpatrick (2012) used enrollment rules and timing of birth (following Gelbach (2002)) and found that preschool enrollment had:

- Null effects on the employment of single mothers.
- Positive effects on the employment of married mothers.

In Georgia and Oklahoma in the 1990s subsidies for universal preschool resulted in an increase in enrollment but had no effect on maternal labor supply Fitzpatrick (2010).
On November 2002 the Mexican government modified the compulsory education laws to include preschool education.

Universal preschool was phased in:

- **First phase**: All 5 year-olds should be enrolled in preschool by academic year 2004-2005.
- **Second phase**: All 4 and 5 year olds should be enrolled in preschool by academic year 2005-2006.
- **Third phase**: All 3-5 year old children should be enrolled in preschool by academic year 2008-2009.
- **Caveat**: By 2008, the government relaxed the policy and it required children to have *at least one year of preschool* to be allowed to enroll in elementary school.
Figure: Average Preschool Enrollment by State in 2008-2009
In 2006 another legislation that affected prospective preschoolers.

**Policy change:** Minimum entry age to elementary school changed from *6 years old by September* to *6 years old by December* of the corresponding academic year.

**Consequence:**
- A 5-year old could be enrolled in primary school four months prior to his/her 6th birthday.
- After 2006 a large share of 5-year olds could either be enrolled in preschool or in primary school.

Hence, the impact of universal preschool on the employment of mothers of 5-year olds is excluded from the analysis.
Enrollment rates per grade

Data

Mexican Income and Expenditure Household Survey (ENIGH)
- Repeated cross section dataset (1996 - 2012)
- N= 85,000 approximately
- Information on socioeconomic and demographic characteristics.
- Representative of the Mexican population at the state level.

Mexican Ministry of Education
- Data on preschool enrollment by level, year, and state

Mexican think tank CIDAC
- Data on ruling party by state and year
Empirical Strategy (Probability of enrollment)

**Probability of preschool enrollment**

\[ P_{ijt} = \alpha_0 + \alpha_1 X_{ijt} + \beta_1 - 4 Year_t + \lambda_j + \delta_a + \epsilon_{ijta} \quad (1) \]

- \( i \): child; \( j \): state (1-32); \( a \): child’s age (3-6), \( t \): year (2004-2012)
- \( X_{ijt} \): number of male working adults in hh, number of elderly in hh
- State and age-of-the-child fixed effects

**Probability of first grade primary school enrollment for 5-year olds**

- Goal: explore the effect of change in entry age on the enrollment of 5-year olds

\[ E_{ijt} = \alpha_0 + \alpha_1 X_{ijt} + \beta_1 - 4 Year_t + \lambda_j + \epsilon_{ijt} \quad (2) \]

- Using the results of these models I calculated the average predicted probability in preschool enrollment per year.
Empirical Strategy (Probability of work)

Difference-in-difference (ITT)

Goal: estimate the effect of changes in preschool enrollment on potential beneficiaries.

\[ L_{ijt} = \alpha_0 + \alpha_1 X_{ijt} + \alpha_2 Z_{jt} + \beta_1 ENROL_{jt} + \beta_2 TREAT_i + \beta_3 ENROL \times TREAT_{ijt} + \nu_j + \lambda_t + \delta_m + \epsilon_{ijtm} \]  (3)

Treatment and Comparison groups (women 20-40 year olds)

- **Treatment**: Mother of a preschool-aged child (3-4 year old).
- **Comparison**:
  1. Women with *younger* child (0-2 year old)
  2. Women with *older* child (7-9 year old)
  3. Women with *no child*

**ITT estimate**: \( \beta_3 \)
Empirical Strategy (Probability of work)

**Difference-in-difference (TOT)**

\[ L_{ijt} = \alpha_0 + \alpha_1 X_{ijt} + \alpha_2 Z_{jt} + \gamma_1 ENROL_{jt} + \gamma_2 TREAT_i + \gamma_3 ENROL \ast TREAT_{ijt} + \nu_j + \lambda_t + \delta_m + \epsilon_{ijtm} \]  

**Treatment and Comparison groups (women 20-40 year olds)**

- **Treatment**: Mother of a child (3-7 yrs old) enrolled in preschool.
- **Comparison**
  1. Women with *younger* child (0-2 year old)
  2. Women with *older* child (8-9 year old)*
  3. Women with *no child*

**TOT estimate**: \( \gamma_3 \)
Empirical Strategy (Probability of work)

Controls

$i$: individuals; $j$: state (1-32); $m$: mothers’ age, $t$: year (1996-2012*)

$X_{ijt}$: education, marital status, family status, household composition, region

$Z_{jt}$: political environment

State, year and women’s-age fixed effects.
## Descriptive characteristics of women

<table>
<thead>
<tr>
<th>Mothers grouped by child’s age</th>
<th>Child 3-5</th>
<th>Child 0-2</th>
<th>Child 7-9</th>
<th>No children</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor force participation rate</td>
<td>0.444</td>
<td>0.349</td>
<td>0.514</td>
<td>0.624</td>
</tr>
<tr>
<td>Age groups</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-25</td>
<td>0.167</td>
<td>0.306</td>
<td>0.043</td>
<td>0.322</td>
</tr>
<tr>
<td>26-30</td>
<td>0.310</td>
<td>0.327</td>
<td>0.176</td>
<td>0.227</td>
</tr>
<tr>
<td>31-35</td>
<td>0.300</td>
<td>0.233</td>
<td>0.366</td>
<td>0.155</td>
</tr>
<tr>
<td>36-40</td>
<td>0.223</td>
<td>0.134</td>
<td>0.415</td>
<td>0.142</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>0.036</td>
<td>0.028</td>
<td>0.043</td>
<td>0.377</td>
</tr>
<tr>
<td>Married</td>
<td>0.907</td>
<td>0.940</td>
<td>0.882</td>
<td>0.548</td>
</tr>
<tr>
<td>Divorced/separated/widowed</td>
<td>0.057</td>
<td>0.032</td>
<td>0.076</td>
<td>0.076</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than primary</td>
<td>0.170</td>
<td>0.177</td>
<td>0.160</td>
<td>0.119</td>
</tr>
<tr>
<td>Primary and some secondary</td>
<td>0.246</td>
<td>0.247</td>
<td>0.246</td>
<td>0.167</td>
</tr>
<tr>
<td>Secondary and beyond</td>
<td>0.584</td>
<td>0.576</td>
<td>0.594</td>
<td>0.714</td>
</tr>
<tr>
<td>Number of children</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One</td>
<td>0.218</td>
<td>0.215</td>
<td>0.164</td>
<td>n/a</td>
</tr>
<tr>
<td>Two</td>
<td>0.348</td>
<td>0.336</td>
<td>0.399</td>
<td>n/a</td>
</tr>
<tr>
<td>Three or more</td>
<td>0.434</td>
<td>0.448</td>
<td>0.437</td>
<td>n/a</td>
</tr>
<tr>
<td>Household composition</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Head of household</td>
<td>0.124</td>
<td>0.087</td>
<td>0.155</td>
<td>0.207</td>
</tr>
<tr>
<td>Observations</td>
<td>21.5</td>
<td>25.9</td>
<td>6.1</td>
<td>13.3</td>
</tr>
</tbody>
</table>

Note: 1. Data come from ENIGH for the years 1996-2012 2. Observations are weighted and expressed in millions.
Results
Universal Preschool and Preschool Enrollment

Predictive Margins of 1st Year Preschool Enrollment (95% CI)

Year
Girl
Boy
All
Universal Preschool and Preschool Enrollment

Predictive Margins of 3rd Year of Preschool Enrollment (95% CI)

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Paris, September 1, 2016 27 / 40
Predictive Margins of 1st Year Elementary Enrollment (95% CI)
Mothers’ Employment Outcomes
Results: Mothers’ Employment

Predicted Marginal Changes of Mothers' Employment

ITT: 3-year old child
TOT: Enrolled in PRE-K

ITT: 4-year old child
TOT: Enrolled in PRE-K

Source: ENIGH 2000-2012

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Paris, September 1, 2016 30 / 40
Adjusted Results for Mothers’ Employment

A 10 pp Increase in Preschool Enrollment:

- Mothers of 3-year olds:
  - ITT: 0.6 - 1.8 pp in Mothers’ LFPR.
  - TOT: 1.2 - 2.6 pp in Mothers’ LFPR.
  - ITT w/ Predicted Enrol: 1.2 - 4.3 pp in Mothers’ LFPR.

- Mothers of 4-year olds:
  - ITT: 1.3 - 1.9 pp in Mothers’ LFPR.
  - TOT: 0.3 -1.05 pp in Mothers’ LFPR.
  - ITT w/ Predicted Enrol: 0.1 to 1.3 pp in Mothers’ LFPR.

Female Labor Force in 2004 (25-40 year old)

- Average rate: 46%.
- Each percentage point ↑ in employment = +15’000 female workers.
### Mean Preschool Enrollment Rates by Level and Year

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>15%</td>
<td>16%</td>
<td>19%</td>
<td>20%</td>
<td>23%</td>
<td>25%</td>
<td>31%</td>
<td>34%</td>
<td>38%</td>
<td>39%</td>
<td>43%</td>
<td>47%</td>
</tr>
<tr>
<td>Second</td>
<td>55%</td>
<td>55%</td>
<td>61%</td>
<td>62%</td>
<td>69%</td>
<td>80%</td>
<td>89%</td>
<td>93%</td>
<td>97%</td>
<td>99%</td>
<td>101%</td>
<td>104%</td>
</tr>
<tr>
<td>Third</td>
<td>81%</td>
<td>80%</td>
<td>81%</td>
<td>84%</td>
<td>88%</td>
<td>93%</td>
<td>97%</td>
<td>100%</td>
<td>96%</td>
<td>98%</td>
<td>98%</td>
<td>98%</td>
</tr>
</tbody>
</table>

Notes: Data come from the Mexican Ministry of Education’s yearly reports. 2. Enrollment rates include over-age children (younger and older aged children than the typical age at that grade level). Typically children of 3-5 years of age would be enrolled in 1st-3rd grades.
### Intent to treat estimates of preschool enrollment on weekly hours worked

<table>
<thead>
<tr>
<th></th>
<th>(1) Younger child</th>
<th>(2) Older child</th>
<th>(3) No child</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimate for mothers of child of 3 years of age</td>
<td>-10.31*** (0.107)</td>
<td>-5.952*** (0.160)</td>
<td>-13.44*** (0.0993)</td>
</tr>
<tr>
<td>Estimate for mothers of child of 4 years of age</td>
<td>-4.054*** (0.0558)</td>
<td>2.195*** (0.0784)</td>
<td>-15.57*** (0.0620)</td>
</tr>
<tr>
<td>State fixed effects</td>
<td>yes</td>
<td>Yes</td>
<td>yes</td>
</tr>
<tr>
<td>Year fixed effects</td>
<td>yes</td>
<td>Yes</td>
<td>yes</td>
</tr>
<tr>
<td>Age-of-the-mother fixed effects</td>
<td>yes</td>
<td>Yes</td>
<td>yes</td>
</tr>
</tbody>
</table>

Note: 1. Household composition, education, marital status, family status, and political environment controls are included. 2. Robust standard errors in parentheses. 3. Significance levels: ***p<0.001, ** p<0.01, * p<0.05, + p<0.10. 4. Sample includes years 2004-2012.
Limitations

Oh data, where art thou?

- Roll out did not work because of parent’s choices or supply shortage?
- No information on supply of schools per state/year - would have been a good instrument.
- No information on preschool enrollment prior to 2005 - to add pre-policy years.
  - No falsification test for TOT estimates.
  - But test for ITT estimates shows no effects.

Endogeneity?

- Possible, but for that reason I rely on ITT and IV-type estimates.
Policy implications

Summary

- Preschool enrollment plays an important role on women’s employment decisions.
- Mixed evidence from high-income countries, but this study reinforces evidence of positive effects.
- The effect is positive in Mexico, of up to 4.3 pp per every 10pp increase in enrollment.
- Perhaps because women’s participation is lower in Mexico?

Policy implications

- Mothers respond positively to indirect incentives that directly affect their children.
- This type of policy can level the playground for children with potential effects on all sorts of outcomes.
Thank You!
Appendix
### Marginal probability of mothers’ employment (ITT estimates)

<table>
<thead>
<tr>
<th></th>
<th>Younger child</th>
<th>Older child</th>
<th>No child</th>
</tr>
</thead>
<tbody>
<tr>
<td>ITT estimate (mother of 3-5-year old)</td>
<td>0.1591+ (0.089)</td>
<td>0.0981 (0.124)</td>
<td>0.2096 (0.135)</td>
</tr>
<tr>
<td>ITT estimate (mother of a 3-year old)</td>
<td>0.0797*** (0.001)</td>
<td>0.0648*** (0.001)</td>
<td>0.1787*** (0.001)</td>
</tr>
<tr>
<td>ITT estimate (mother of a 4-year old)</td>
<td>0.1855*** (0.001)</td>
<td>0.1360*** (0.001)</td>
<td>0.1505*** (0.001)</td>
</tr>
</tbody>
</table>

- State fixed effects: yes
- Year fixed effects: yes
- Mother’s age fixed effects: yes

<table>
<thead>
<tr>
<th>Observations</th>
<th>25,325</th>
<th>17,263</th>
<th>43,762</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weighted Observations</td>
<td>41.1</td>
<td>27.7</td>
<td>70.5</td>
</tr>
</tbody>
</table>

Note: 1. Weighted observations are in millions. 2. Household composition, education, marital status, family status, and political environment controls are included. 3. Robust standard errors in parentheses. 4. Significance level: ***p<0.001, **p<0.01, * p<0.05, + p<0.10. 5. Sample is restricted to years 2004-2012 to assure comparability with TOT estimates.
## Marginal probability of mothers’ employment (TOT estimates)

<table>
<thead>
<tr>
<th></th>
<th>(1) Younger child</th>
<th>(2) Older child</th>
<th>(3) No child</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOT estimate (all preschool grades)</td>
<td>0.0142*** (0.000)</td>
<td>0.1398*** (0.004)</td>
<td>0.2234*** (0.004)</td>
</tr>
<tr>
<td>TOT estimate (child enrolled in first-year)</td>
<td>0.1223*** (0.002)</td>
<td>0.1219*** (0.002)</td>
<td>0.2629*** (0.002)</td>
</tr>
<tr>
<td>TOT estimate (child enrolled in second-year)</td>
<td>0.0455*** (0.002)</td>
<td>0.0289*** (0.002)</td>
<td>0.1056*** (0.002)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>yes</th>
<th>yes</th>
<th>yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>State fixed effects</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year fixed effects</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother’s age fixed effects</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>18,864</td>
<td>6,312</td>
<td>8,391</td>
</tr>
<tr>
<td>Weighted observations</td>
<td>20.5</td>
<td>7.6</td>
<td>10.7</td>
</tr>
</tbody>
</table>

Note: 1. Weighted observations are in millions. 2. Household composition, education, marital status, family status, and political environment controls are included. 3. Robust standard errors in parentheses. 4. Significance level: ***p<0.001, ** p<0.01, * p<0.05, + p<0.10. 5. Sample includes years 2004-2012.
## Marginal probability of mothers’ employment using predicted enrollment

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Younger child</td>
<td>Older child</td>
<td>No child</td>
</tr>
<tr>
<td>Estimate for mothers of child of 3 years of age</td>
<td>0.3068***</td>
<td>0.1239***</td>
<td>0.4276***</td>
</tr>
<tr>
<td></td>
<td>(0.001)</td>
<td>(0.002)</td>
<td>(0.002)</td>
</tr>
<tr>
<td>Estimate for mothers of child of 4 years of age</td>
<td>0.0126***</td>
<td>0.0104***</td>
<td>0.1276***</td>
</tr>
<tr>
<td></td>
<td>(0.001)</td>
<td>(0.001)</td>
<td>(0.001)</td>
</tr>
<tr>
<td>State fixed effects</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Year fixed effects</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Mother’s age fixed effects</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>N1</td>
<td>14,339</td>
<td>6,197</td>
<td>19,761</td>
</tr>
<tr>
<td>N2</td>
<td>16,977</td>
<td>7,211</td>
<td>24,260</td>
</tr>
</tbody>
</table>

Note: 1. Weighted observations are in millions. 2. Household composition, education, marital status, family status, and political environment controls are included. 3. Robust standard errors in parentheses. 4. Significance level: ***p<0.001, **p<0.01, *p<0.05, +p<0.10. 5. Sample includes years 2004-2012.