

# **A flying start?**

## **Maternity Leave Benefits and Long Run Outcomes of children**

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# General Background

- And why is the intergenerational mobility so low in many countries?
- Why is family background important?
- Ref:
- Bjørklund and Salvanes (2010) “Education and family Background: Mechanisms and Policies ” Handbook of the economics of Education, Vol 3, chapter 3
- Black and Devereux (2011) “ Recent Developments in intergenerational mobility” Handbook of labor economics Vol 4b, ch 16
- Almond and Currie (2011) Handbookchapter in Handbook of Labor Economcis

# General background

- What are parents doing so differently?
- And can policy change this?
  
- Parental education?
- Investment in children?
- Preferences, risk, patience (time) etc

# Question

- Are there *long term* effects for children of an increased maternity leave period for mothers, or more specifically:
  - Are the long term effects for children of spending more time with the mother the first months/first year after birth?

# Motivation

- The socio-economic gradients in education and health has been found to be determined to a great extent in early childhood.  
(for instance overviews in Conti, Heckman and Zanolini, 2009; Currie, 2009)
- Returns to early childhood interventions have been shown to be high - especially for the poor.  
(Carneiro and Heckman, 2003; Leonetti, Nath and Hemam, 2007)

# Motivation cont`

- In this paper we estimate the effect of maternal time with the child during her first year of life.
- Potential benefits of maternal time:
  - Better attachment between mother and child.
  - Less stress for mother and child.
  - Fewer accidents and other health insults to the child.
  - Prolonged breastfeeding.

# Motivation cont`

- Because time is limited:
  - More time in one type of child care arrangement means less time in other arrangements or activities.
  - The more time the mother spends at home the less she spends in the labour market.
  - The quality of alternative care arrangements and the opportunity costs of maternal time will determine the net benefits of extended maternal time.

# Challenges

- This is a notoriously difficult question
  - Mothers spending more time with children may be different along many unobservable dimensions.
  - More time with children may mean less income, and it is difficult to isolate the two effects.



# Identification

- Explore the impact of a maternity leave reform in Norway introduced July 1st 1977.
  - Reform orthogonal to individual attributes of mothers (mothers already pregnant when the reform was announced).
  - Changes maternal time with children.
  - Kept on average family income constant.

# Identification

- Parental leave policy in Norway before 1977:
  - Pre-reform: 12 weeks of maternity leave - employment protection with little coverage.
    - Remarkably similar to parental leave policies in the US today.
  - July 1st 1977, Norway introduced 18 weeks of parental leave with full coverage and, in addition, the right to one year unpaid leave.
  - Prior to the reform mothers took, on average, 8 months of unpaid leave, unchanged post reform
  - Take up rate of paid leave: 100 percent (survey-info)
  - So we measure the effect of four months fully covered maternity leave on children's outcomes

# What do we do?

- The reform applied to all eligible mothers having a child after July 1st 1977.
- We use regression discontinuity (RD). Comparing outcomes of children of eligible mothers born just after and just before the reform.
- Perform standard checks of the sensitivity of our results to month of birth effects and potential manipulation of the date of birth.

# What do we do?

- Intermediate and long term outcomes for children:
  - Drop out rates from highschool.
  - IQ for boys, teenage motherhood for girls.
  - College attendance
  - Height for boys
  - Completed education and earnings at age 30.
- Mechanism: Outcomes for mothers:
  - Do they take more leave? Unpaid vs paid.
  - Do they return to work after the leave?
  - Short term and long term income effect.
  - Difference between eligible and non-eligible mothers.

# What do we do?

- Look at heterogeneity in effects across
  - Mothers' education level.
  - Length of unpaid maternity leave period.
  - Urban/rural areas.
  - Grandparents in the neighbourhood.

## Preview of results: pararmetric estimation of first difference and difference in difference, children born June and July

Birth month	Single Difference	Differences-in-differences using 1975 as controls
Children		
Dropout rates	-.020* (.011)	-.025* (.016)
College attendance	.094 (.069)	.131 (.098)
Ln(earnings) at age 30	.045** (.022)	.055* (.031)
Teenage pregnancy	.002 (.009)	.009 (.013)
IQ (males)	.142* (.074)	.295*** (.102)

# Preview of results: pararmetric estimation of first difference and difference in difference, children born June and July

Birth month	Regression discontinuity	Differences-in-differences using 1975 as controls
<b>Mothers</b>		
<b>Pre-characteristics</b>		
Years of education	-.023 (.063)	-.013 (.088)
Age at birth (in years)	-.096 (.134)	.051 (.187)
Ln(Income) in 1975	-.014 (.031)	.027 (.040)
Urban location in 1976	.009 (.014)	.009 (.020)
Distance to grandparents in 1980	.004 (.014)	-.019 (.020)
<b>Outcomes</b>		
Predicted months of unpaid leave	-.348 (.223)	.080 (.330)
Employed 2 years after	-.015 (.013)	-.023 (.018)
Employed 5 years after	-.002 (.012)	-.006 (.017)
Ln(Income) 5 years after birth	-.018 (.138)	-.068 (.194)

# What do we do?

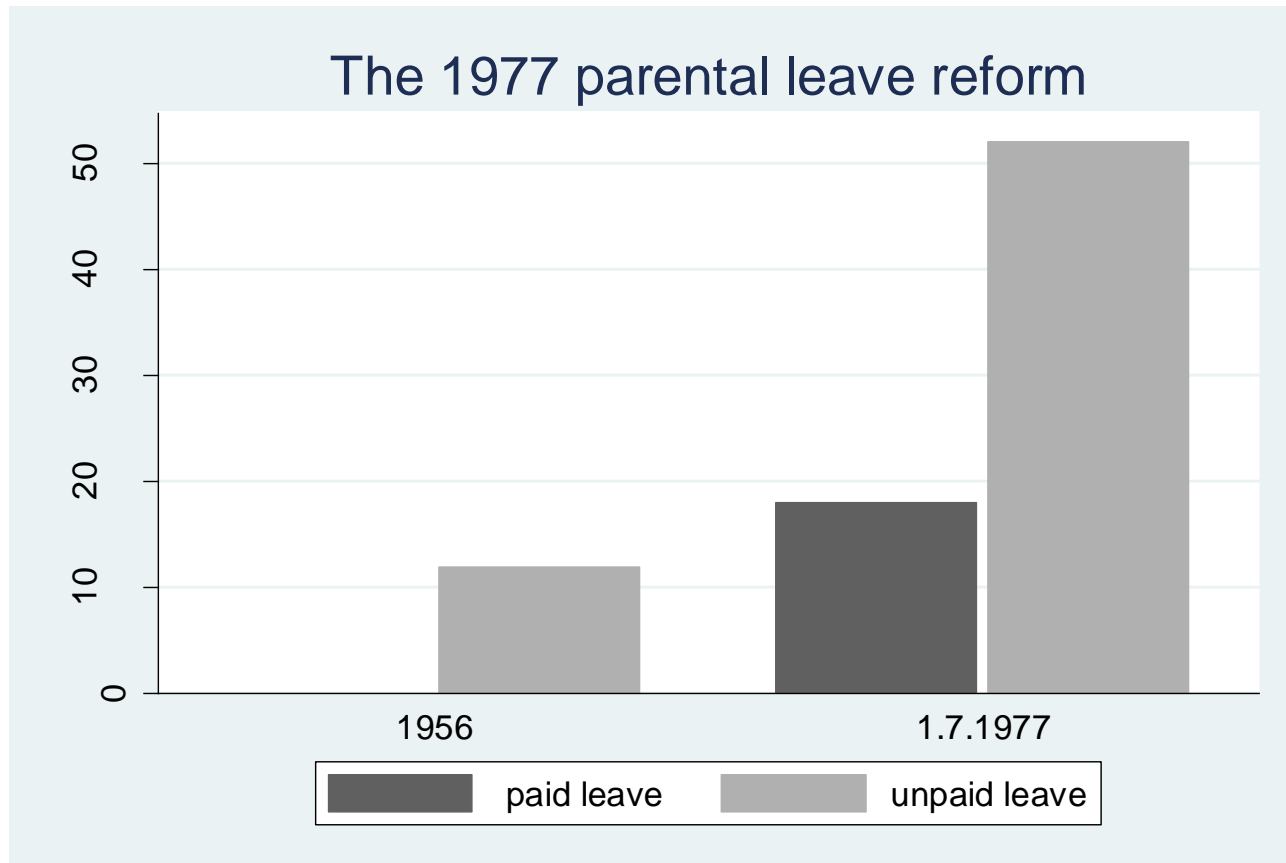
- Rest of the paper: develop, expand and discuss these results
- The main pattern of table 1 survive a more sophisticated estimation procedure.



# What do we do?

- A couple of papers identifying causal effects on long-term outcomes for children: Schoneberg and Dustmann (2008), Rasmussen (2007), Liu and Nordstrøm-Skans (2010). They find little or not effect of maternity leave reforms on long run child outcomes.
- Our study is different from these:
  - Identify eligible mothers which the other papers do not.
    - We find *no* significant effects if studying all mothers
  - We assess the impact of a reform early in a child's life (on average 8-12 months however lots of heterogeneity) while some of the others quite late (Swedish: 12-15 months).
  - Compared to the other Nordic countries the alternative for children was different: day care coverage at the time for this age group was very low.
  - Our reform allows us to isolate the effect of increased time at home from a decrease in household income

# Maternity leave reform

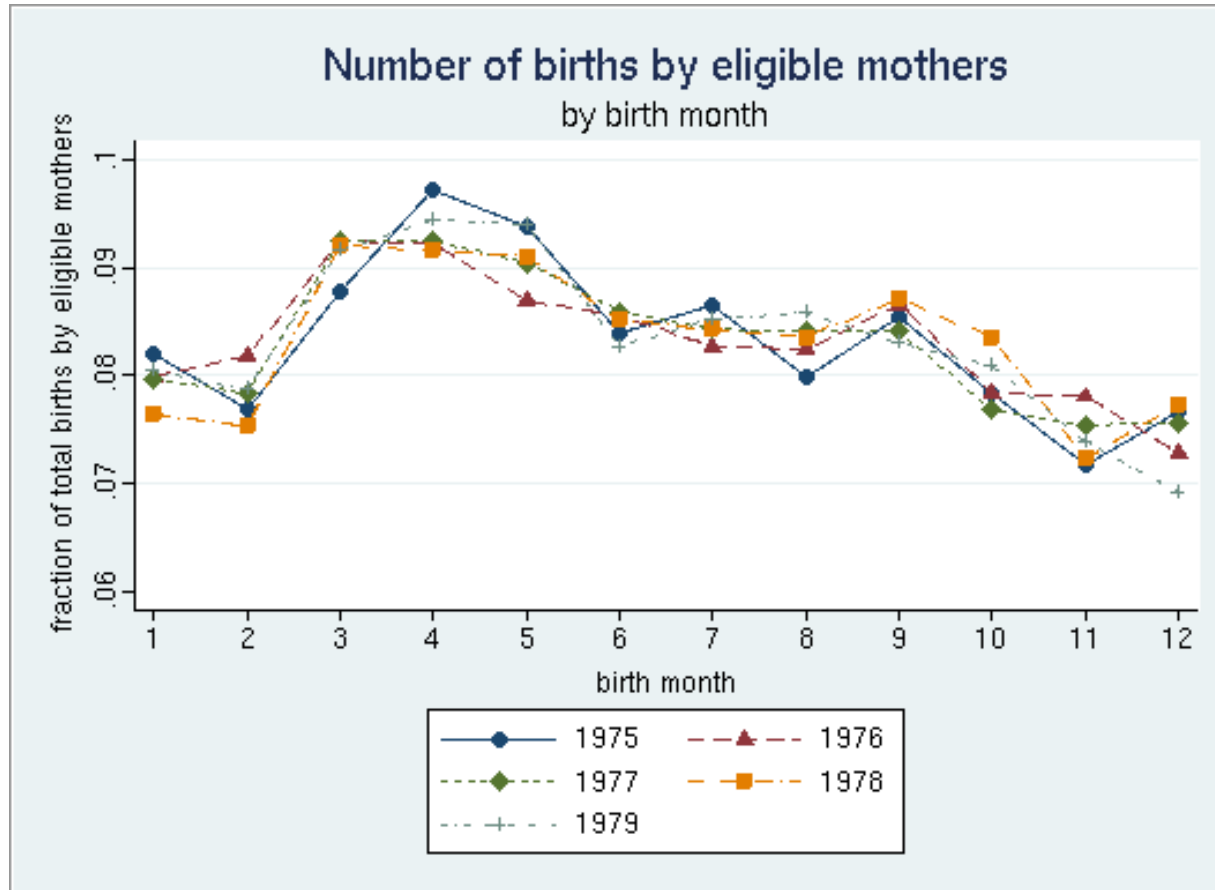


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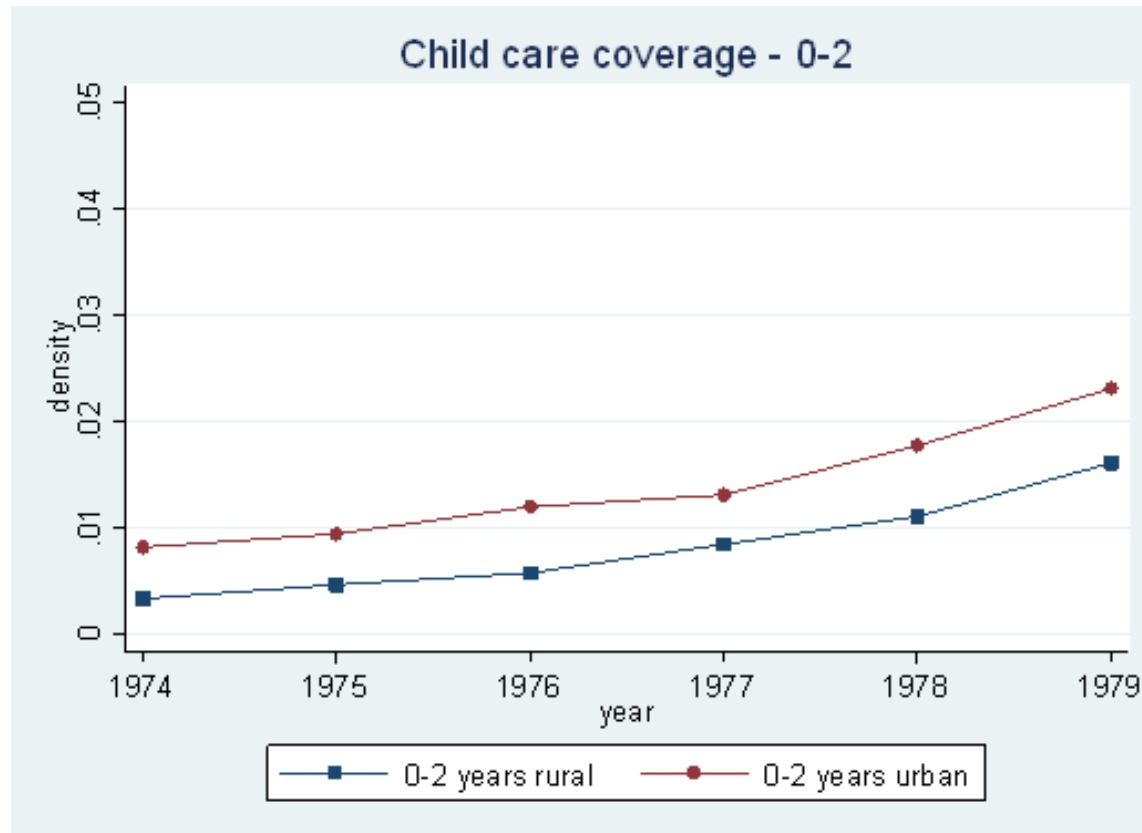
# Could the parents anticipate the reform?

- We find no evidence that the eligibility status of mothers responded to the reform:
    - No evidence of a discontinuity in number of births due to the reform.
    - First public evidence of the new law in April 1977: all mothers giving birth in 1977 were then pregnant.
    - To be eligible mothers had to work six of past ten months prior to birth.
- Therefore, in the short run (1977), it was not possible to change eligibility status.

# Number of children born to eligible mothers, by birth month, 1975-1979.



# Childcare Coverage Over Time



# Identification strategy

- Sharp regression discontinuity

$$E_i = I\{X_i > c\}$$

- Where  $c$  is the cutoff point July 1st 1977 and  $X$  is the month of birth.

- Then estimate

$$\alpha_{RD} = E\{y_i(1) | X_i = c\} - E\{y_i(0) | X_i = c\}$$

- Compare outcomes of mothers and children born before ( $y(0)$ ) and after the reform ( $y(1)$ ).
- Estimate these regressions using local linear regression using a triangle kernel and different bandwidths.
- Also use differences-in-differences (DiD) to better take into account direct effects of month of birth.

# Data

- Norwegian registry data - on average 60.000 births per year.
- Five main outcomes for mothers: predicted months of unpaid leave, income in year of giving birth, probability to return to work within two to five years after giving birth and income five years after giving birth
- Five main outcomes for children: dropout rates from high school, teenage pregnancy, college attendance, IQ scores and height for young men around age 18 (mandatory military service).
- Breastfeeding for a subsample of mothers.

# Constructing unpaid leave

- Assume takeup of paid leave to be 100 % (survey information)
- Assume that 1976 earnings, adjusted for inflation and general wage growth, is a good approximation for maternal potential post-birth earnings
- Unpaid leave: use pre-birth monthly income by dividing 1976 earnings by 12. Calculate total earnings in 1977-1980 (adjusted for month of birth) and divide by 1976 monthly earnings to obtain months of unpaid leave.

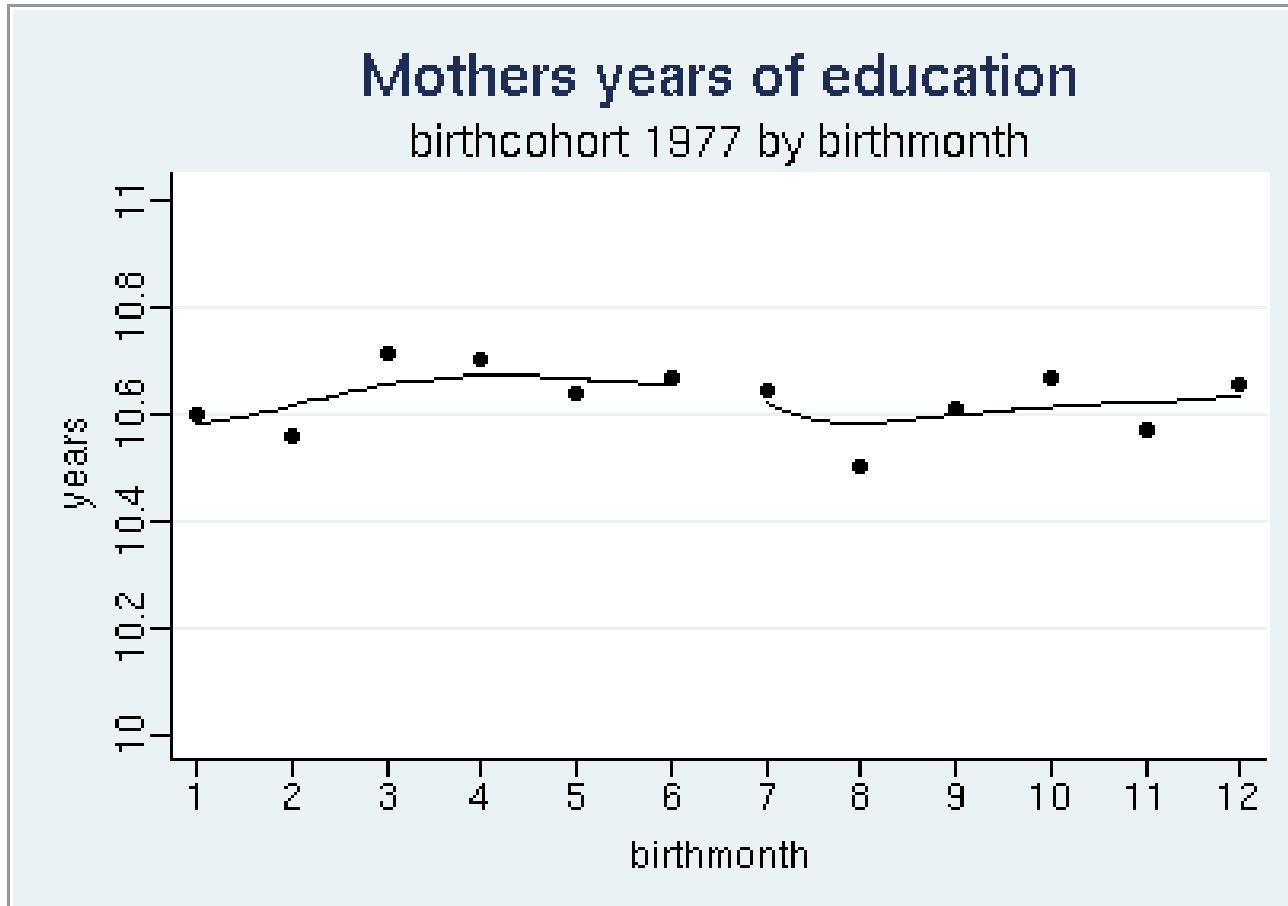


# Characteristics of eligible and non-eligible mothers

Eligibility status	Eligible 1977	Non-eligible 1977
<b>Mothers</b>		
Years of education	10.63 (2.18)	9.61 (1.72)
Age at birth (in years)	26.1 (.028)	26.5 (.041)
Income in 1975 in NOK	25216 (18390)	2831 (7080)
Employed 2 years after	.725 (.447)	.362 (.481)
Employed 5 years after	.758 (.428)	.534 (.499)
Income in 1982 in NOK	71216 (73324)	29434 (48202)

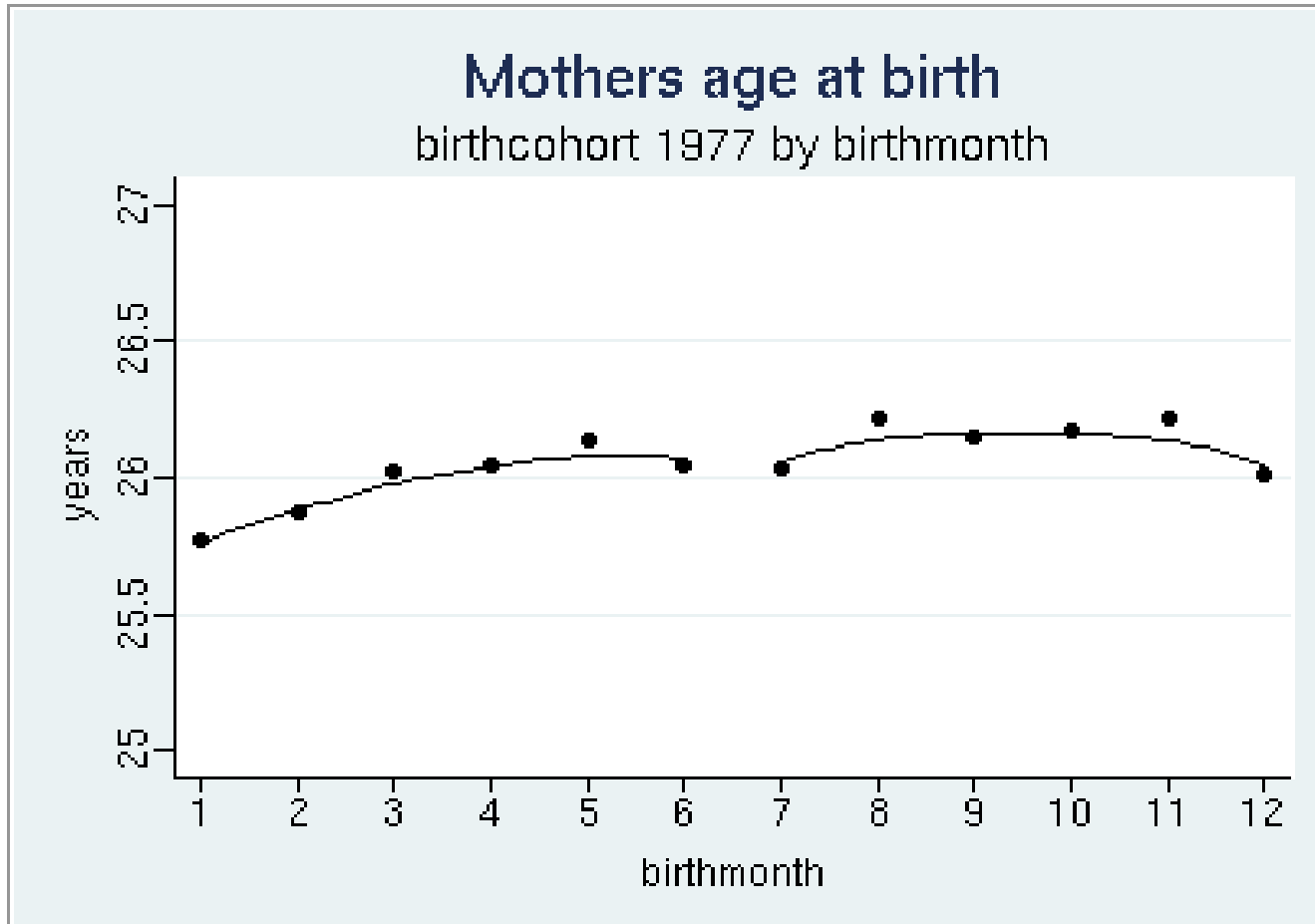
# Descriptive statistics- eligible mothers

## Balanced sample?



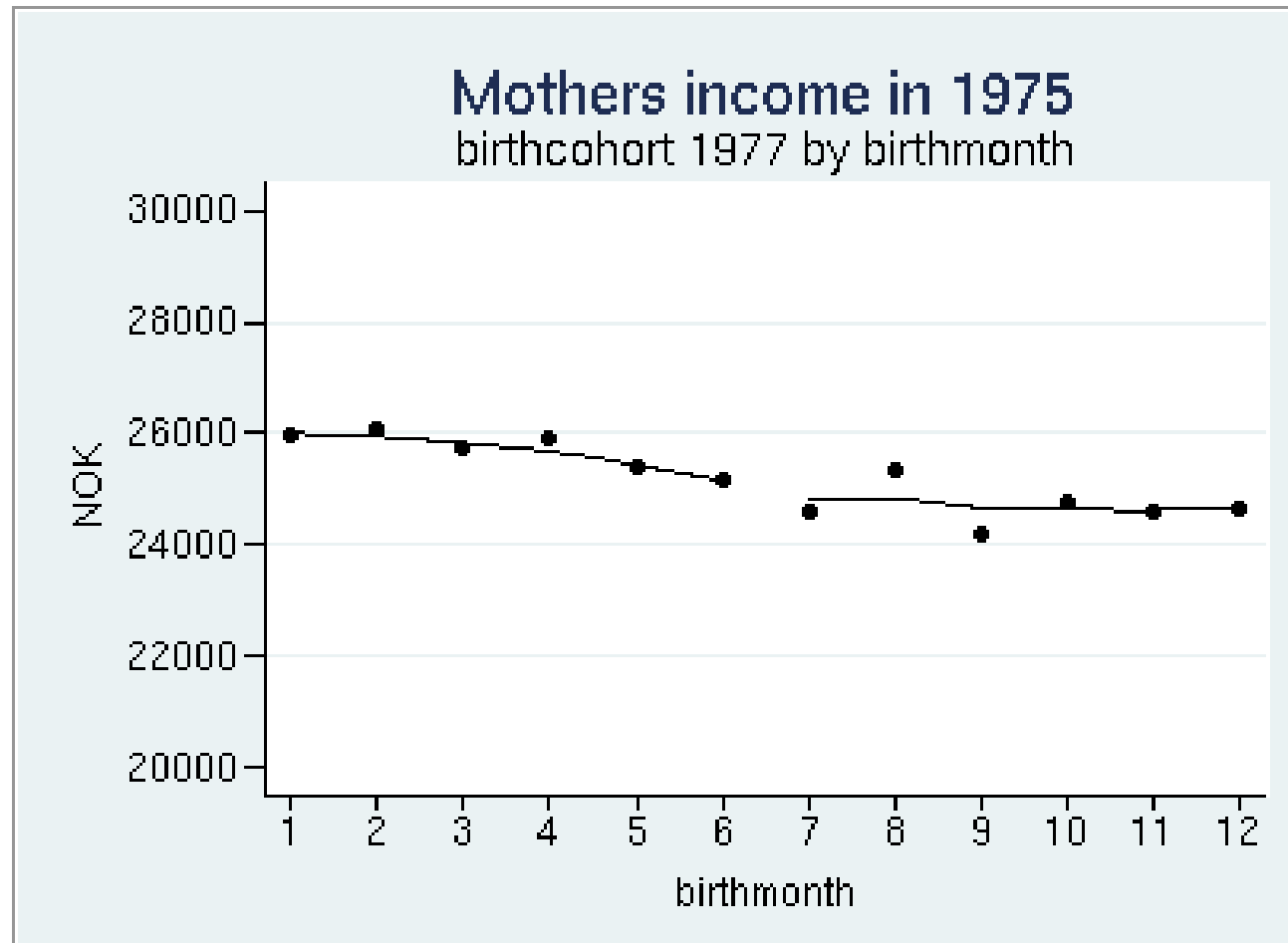
# Descriptive statistics continue

## Balanced sample



# Descriptive statistics continue

## Balanced sample



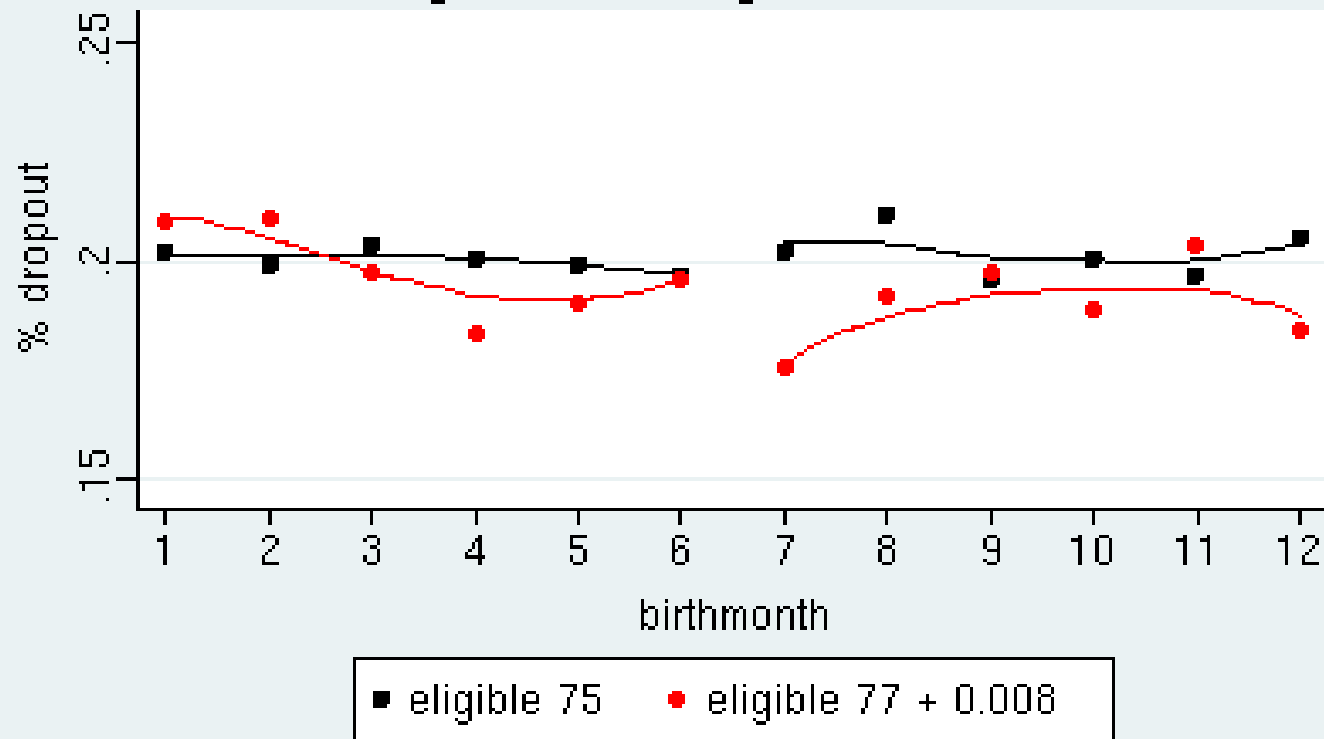
# Children's outcomes

Variables		Nonparametric Regression discontinuity	Nonparametric Differences-in- differences using 1975 as controls
	Bandwidth	3	3
	Mean		
Dropout rate	.19	-.019* (.010)	-.027** (.014)
College attendance	.46	.018 (.013)	.036** (.018)
Ln(earnings) at age 30	12.6	.048** (.020)	.055* (.029)
Teenage pregnancy	.052	.002 (.008)	.008 (.012)
IQ (males)	5.39	.110* (.067)	.240*** (.094)
N		29163 13150 (IQ-boys) 14070 (TP-girls)	59564 27304 (IQ-boys) 29042 (TP-girls)

# Childrens' outcomes

## Dropout rates

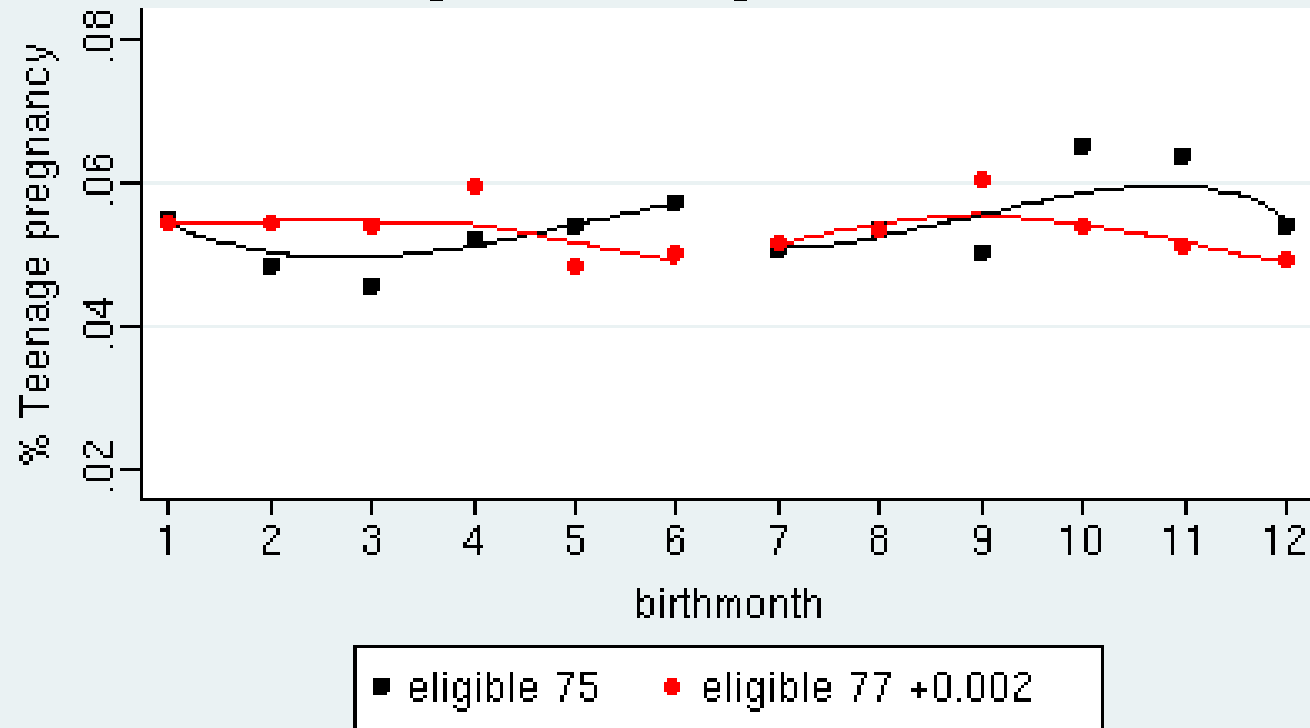
birthcohort 1975 and 1977 by birthmonth  
eligible 77 vs. eligible 75 mothers



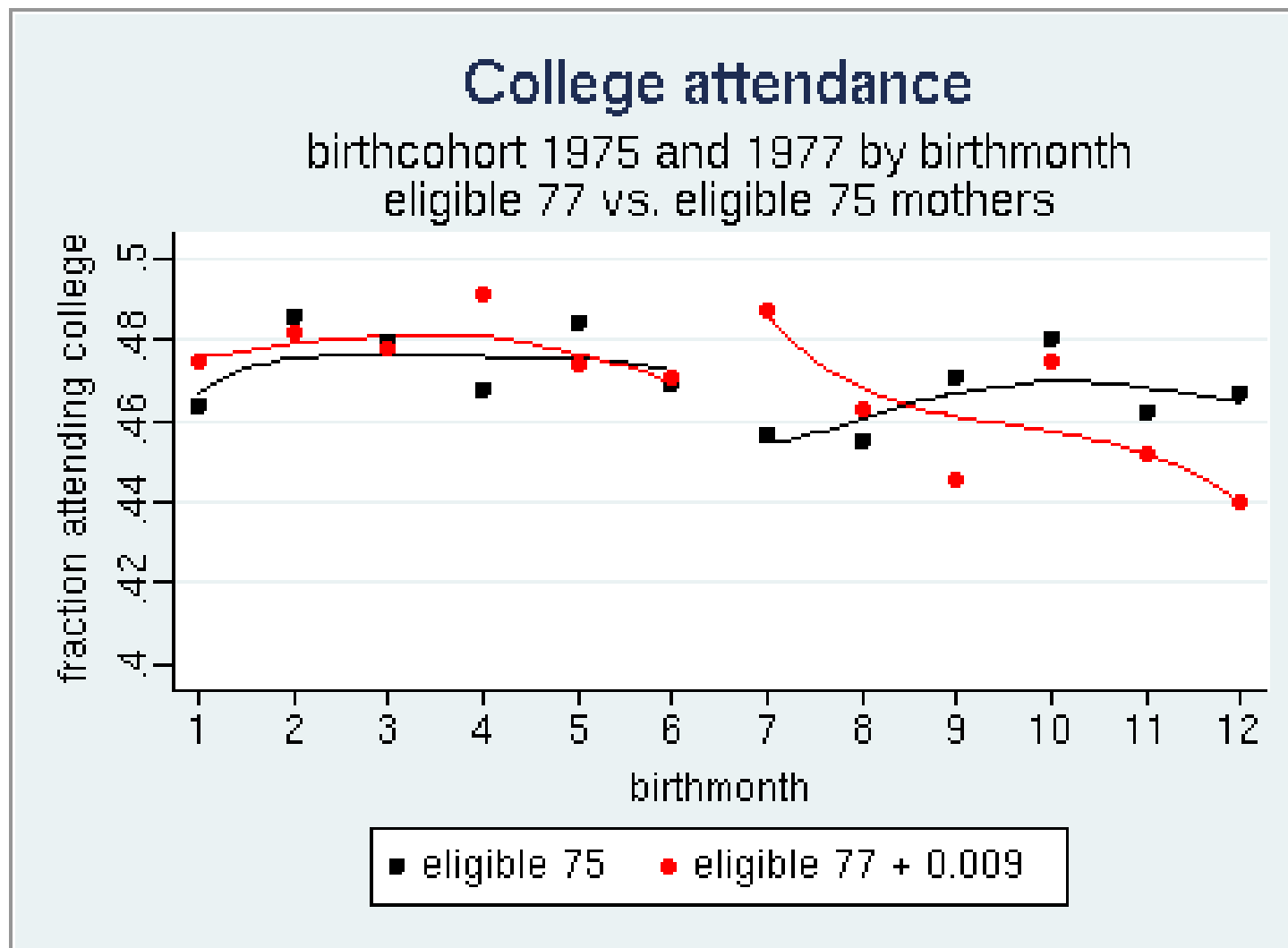
# Children's outcomes continue

## Teenage pregnancy

birthcohort 1975 and 1977 by birthmonth  
eligible 77 vs. eligible 75 mothers

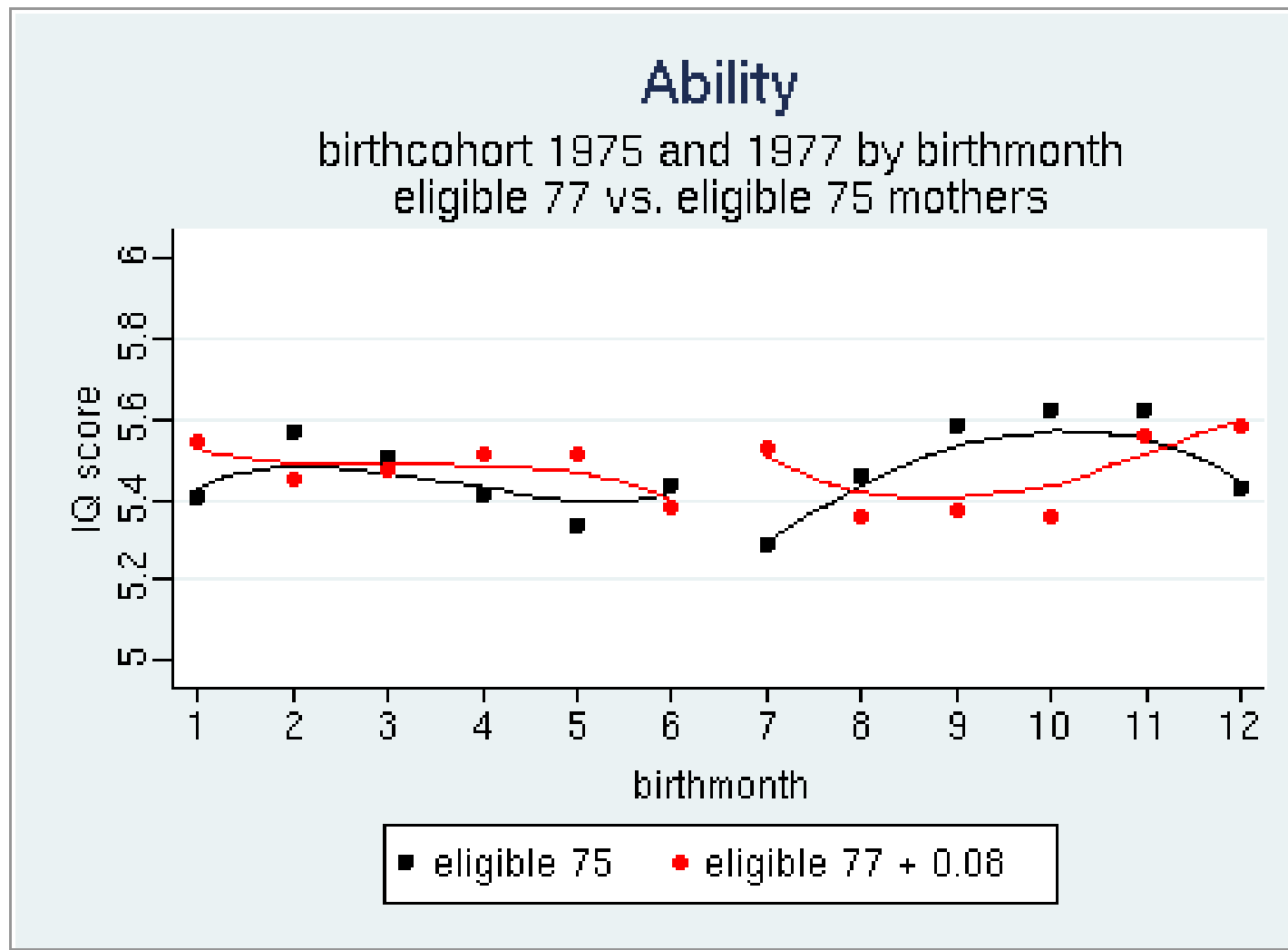


# Children's outcomes continue

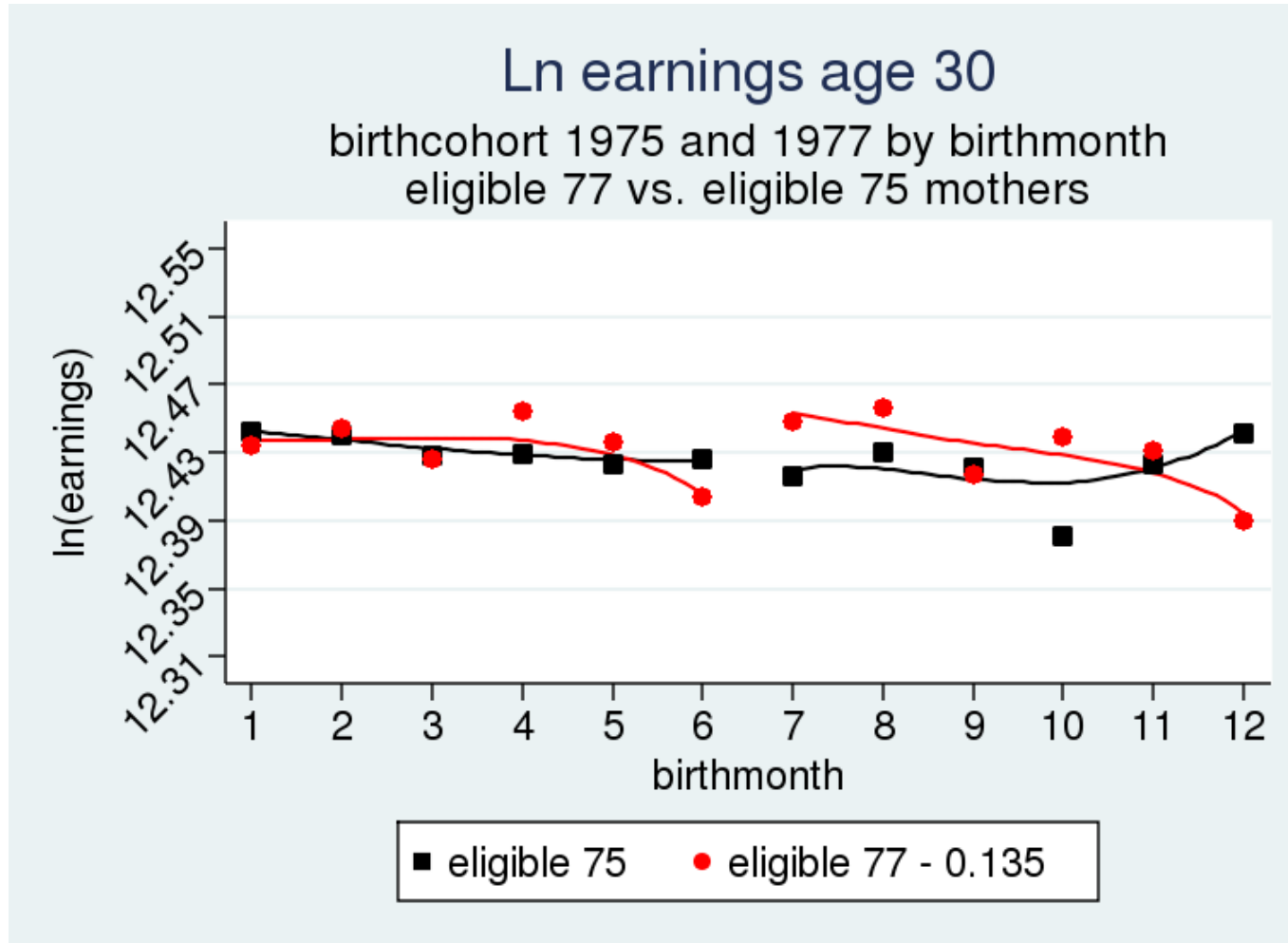




# Children's outcomes continue



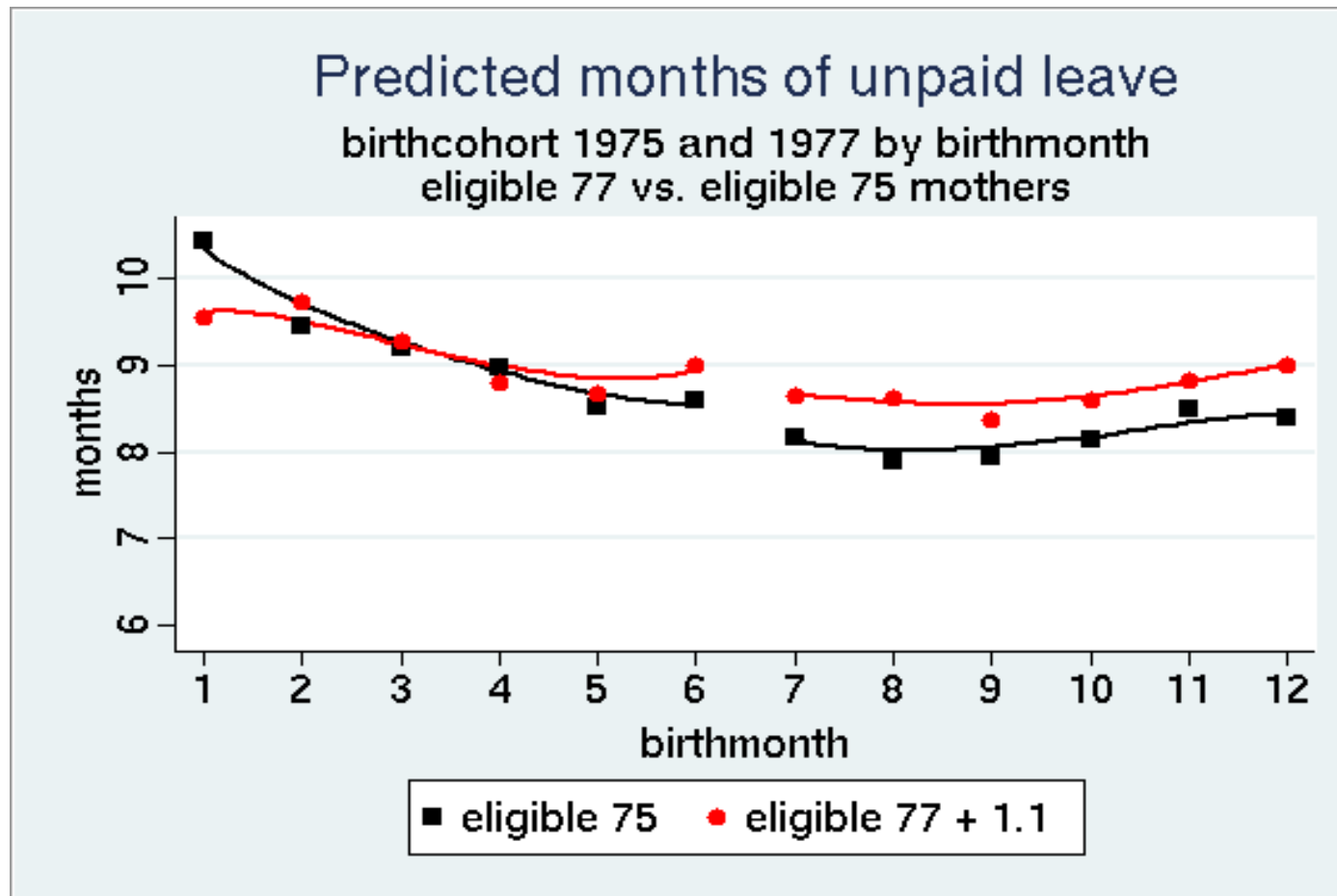
# Childrens' outcomes continue



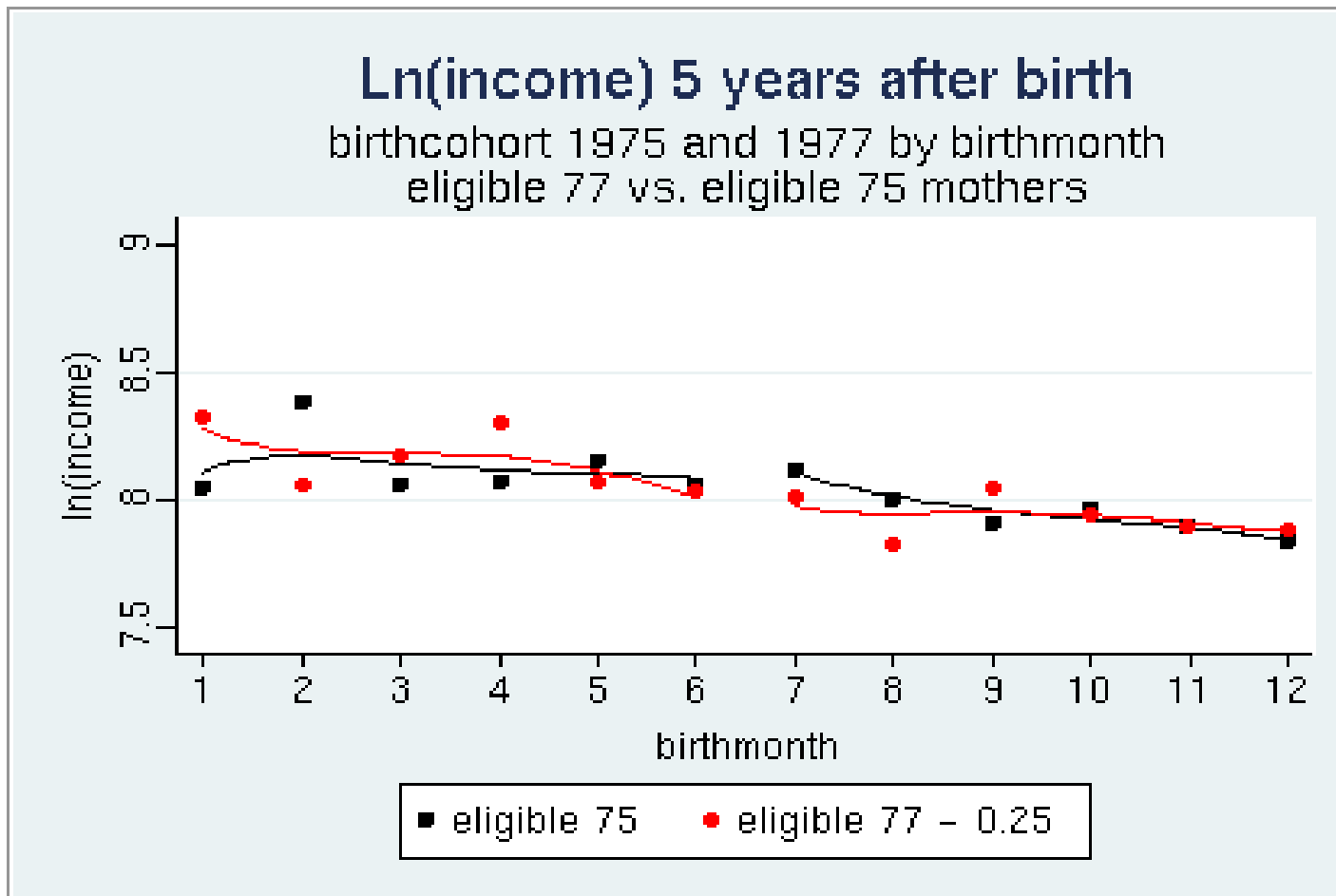
# Mother's outcomes

Variables		Nonparametric Regression discontinuity	Nonparametric Differences-in- differences using 1975 as controls
	<b>Bandwidth</b>	<b>3</b>	<b>3</b>
	Mean		
Predicted months of unpaid leave	7.81	-.276 (.198)	.121 (.291)
Employed 2 years after birth	.73	-.014 (.012)	-.018 (.017)
Employed 5 years after birth	.76	-.004 (.011)	-.004 (.016)
Ln(Income) 5 years after birth	8.31	-.039 (.126)	-.068 (.178)
N		29163	59564

# Mothers' outcomes (Diff-in-Diff)



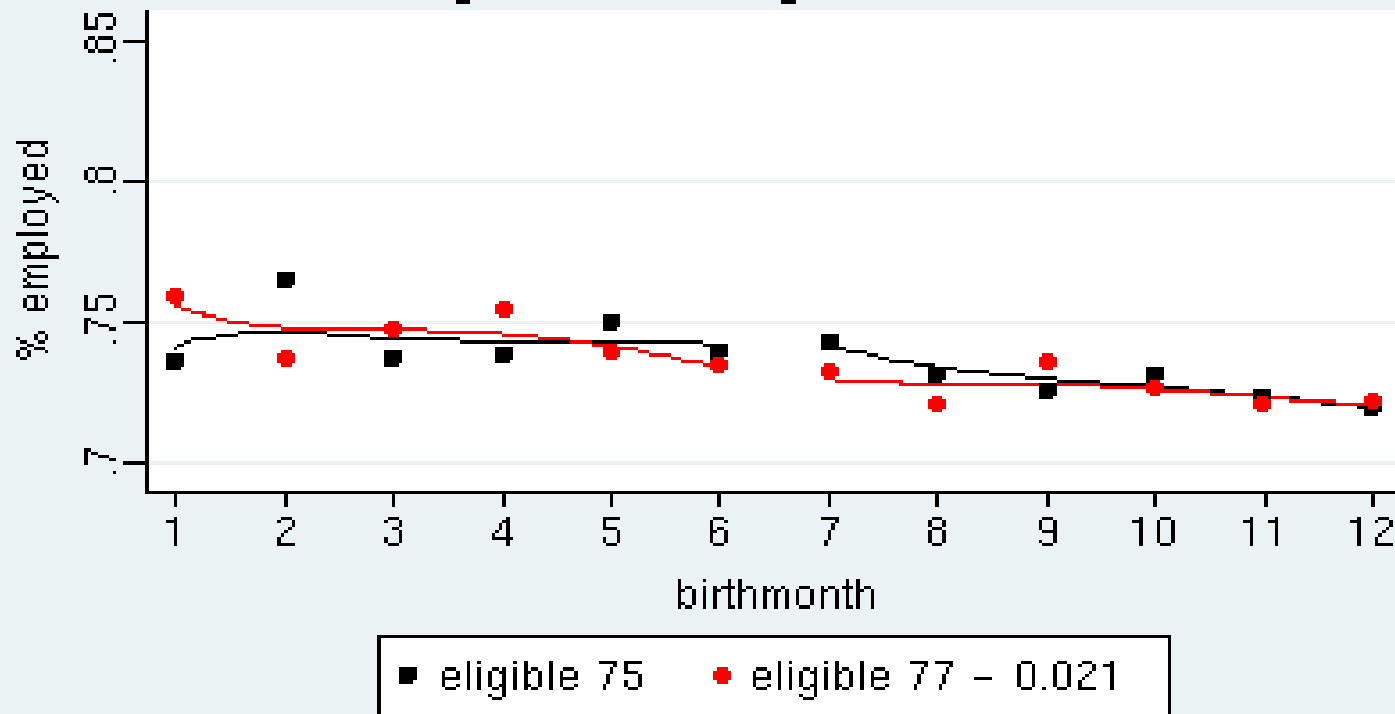
# Mother's outcomes continue (Diff-in-Diff)



# Mother's outcomes continue (Diff-in-Diff)

## Employed 5 years after birth

birthcohort 1975 and 1977 by birthmonth  
eligible 77 vs. eligible 75 mothers



# Placebo: children outcomes

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Variables	Nonparametric regression discontinuity	
<b>Bandwidth</b>	<b>3</b>	<b>3</b>
<b>Control</b>	<b>Eligible</b>	<b>Non-eligible</b>
<b>group</b>	<b>1975</b>	<b>1977</b>
Dropout rate	.007 (.010)	.001 (.015)
College attendance	-.018 (.013)	-.009 (.016)
Teenage pregnancy	-.006 (.008)	-.004 (.014)
IQ (boys)	-.109 (.066)	-.126 (.090)

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# Heterogeneous results and mechanisms

- The core of understand the effect of extended maternity leave:
  - What was the alternative for children pre-reform.
  - What are the potential mechanisms for the positive effect on children from mothers investing more time.
- Test effect of
  - Distance to grandparents
  - Parental education
  - Urban/rural
  - Quartiles of mother's unpaid leave



# By mother's education

Variables	Nonparametric differences-in-differences	
Bandwidth	3	
	Mother's education	
subgroups	Less than 10 years	10 years or more
Children		
Dropout rate	-0.052** (.026)	-0.019 (.016)
College attendance	.068** (.028)	.026 (.023)
Ln(earnings) at age 30	.089** (.045)	.033 (.037)

Differences-in-differences using eligible mothers in 1975 as control group;  
Results by quartiles of mother's months of unpaid leave.

Variables	Nonparametric differences-in-differences			
Bandwidth	3			
	Quartiles of mothers months of unpaid leave			
Quartiles	1 (lowest)	2	3	4 (highest)
Average levels of unpaid leave (Std.Dev)	.40 (.67)	5.14 (1.67)	9.46 (.92)	18.02 (10.2)
<b>Children</b>				
Dropout rate	-.090*** (.026)	-.050* (.027)	.008 (.029)	.015 (.032)
College attendance	.077** (.036)	.001 (.036)	.018 (.036)	.054 (.035)
Teenage pregnancy	.017 (.021)	-.004 (.023)	-.026 (.022)	.032 (.029)
IQ (males)	.307* (.188)	.318* (.181)	.002 (.188)	.334* (.190)
Height (males)	.686 (.736)	.218 (.756)	1.01 (.753)	.233 (.739)

# More on mechanisms

- Further attempts to understand mechanisms.
- Together they tell a consistent story.
  - Older siblings – no effects
  - Boys and girl – similar effects
  - Limited evidence on breastfeeding
  - A simple model of the high school dropout decision

# More on mechanisms

## A simple model of the high school dropout decision

- Run a regression of whether an individual is a high school dropout on available individual and family characteristics.
- Include interactions of reform, year and month controls
- Include reform effects interacted with all background characteristics
- Results of the reform and how background coefficients interacted with the reform affects the dropout rates:
  - No changes in the coefficients on ability, height, maternal education and income
  - Small changes on the coefficient on maternal age (amplifying its effect) and marital status (dampening the effect)
  - Substantial dampening of the effects of family size and being born in an urban area

# Conclusions

- Maternal time investment affects children's longer term outcomes:
  - A fall in dropout rates from high school (2.7 percentage points).
  - A positive effect on earnings at 30 (5 percent)
  - An increase in college attendance (2 percentage points)
  - A positive effect on IQ for young men around the age of 18.
- Heterogeneity in effects:
  - Effects stronger for children of low educated mothers.
  - A fall in dropout rates from high school (5.2 percentage points).
  - A positive effect on earnings at 30 (8 percent)
  - Largest effect for mother's taking low unpaid leave: largest effect in the first months.

# Possible extensions

- Other interesting research questions linked to maternity leave:
  - What is the optimal leave and coverage?
    - Use several changes
  - Father's leave?
  - Fertility effects of maternity leave reforms