Replication Report for "Maternal Labor Supply and the Introduction of Kindergartens into American Public Schools"

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Contents

About the Paper

Cascio, Elizabeth U. **"Maternal Labor Supply and the Introduction of Kindergartens into American Public Schools."** The Journal of Human Resources 44, no. 1 (2009): 140–70.

- **Background:** Since the mid-1960s, many states in the U.S. introduced subsidies for school districts that offer kindergarten.
- **Aim:** To examine policy affects on maternal labor supply as well as children's enrollment and estimates how the enrollment status affects maternal labor supply.
- **Data used:** PUMS of decennial *U.S. CENSUS* for employment information and *NCES* grade span data.

Data Resources

- CENSUS data: Public Used Micro Sample of 1950, 1960(1%), 1970(1%), 1980 (A sample 5%) and 1990(5%).
- NCES microdata: school year 1972 to 1989 datasets, 1974 absent.
- Education Directory: school year 1968 to 1971 datasets were manually drawn from a series of publications.

Specification of Variables

Variable	Description
year	year of census
Kratio	fraction of kindergarten contained school districts
*num**	number of children of some age
five	=1 if the mother has a children at age 5 or 6
work	=1 if worked in last week
hrwork-mean	mean hours of work in she's interval
public	=1 if enrolled in public school
private	=1 if enrolled in private school

Models

- DID

$$y_{ist} = \theta Kratio_{st} + X'_{ist}\beta + \alpha_s + \gamma_t + \epsilon_{ist}$$

Some of the findings imply a downward biased estimates from conventional DID. Then author employed DDD approach to uncover consistent estimates against unobservable factors.

- DDD

$$\begin{aligned} y_{ist} =& \theta_1 Kratio_{st} five_i + \theta_2 Kratio_{st} + X'_{ist}\beta_1 + X'_{ist} five_i \beta_2 \\ &+ \alpha_{1s} + five_i \alpha_{2s} + \gamma_{1t} + five_i \gamma_{1t} + \epsilon_{ist} \end{aligned}$$

Here y_{ist} includes various outcome variables for mothers or kids.

Census Data

A. Split and merge the datasets twice.

- To match all individuals with household and subfamily information.
- To match mothers with their children, also match children with their mother by identification of famlies they belong to .

B. Restrict the sample.

- On states: where kindergarten funding policy was passed after 1965.
- On mothers: who has children aged 0 to 17.
- On quality: drop observation with allocated employment data.

The final dataset size: 1545678 for mothers, 2802342 for children.

Codes for CENSUS Data Operation

```
forvalues v=1/9 {
clear
infix rectype 120 hhid 2-6 state 7-8 ... relate 1 subfunit 3 ... using
DS000‘v’/07756-000‘v’-Data.txt,clear
save pick1960/ All1960_‘v’ ,replace }

cd ".../pick1960"
local data: dir ".../pick1960" files "All1960_*.dta"
foreach v of local data {
append using ‘v’,force }
save Census1960_All_mix,replace

use mother1960,clear
duplicates drop madehhid famunit subfunit madestate,force
merge 1:n madehhid madestate famunit subfunit using children1960
keep if _merge==3
bysort momid: gen ttchildren=_N
gen kid5=(kidage==5)
bysort momid: egen num5=sum(kid5)
```

Policy Variable and Weights

Policy variable ($share_{st}$) is defined as $Kratio_{st} = \frac{Knum_{t-2,s}}{Allnum_{t-2,s}}$

- $Kumt-2,s$ is number the school districts with public kindergarten available in state s two years prior to census year t; $Allnum_{t-2,s}$ is the number of all school districts.
- The reason of using lag values of school districts information:
  1. the census month and beginning month of semester differs;
  2. the potential lag on districts information updating.

The personal weights data is only available in some years, thus I applied total population by state and year as a substitute.

Codes for Descriptive Statistics

```
gen hrtitle="Hours last week"
keep if five==1&single==1&num04==0

tabout work year [weight=resipop]
using ...,replace c(col) ...

tabout hrtitle year
[weight=resipop] using ...,append
c(mean hrwork_mean) sum ...

tabout hrtitle year
[weight=resipop] using ...,append
c(sd hrwork_mean ) sum ...
```

```
        1950    1960    1970    1980    1990
=1 if hours of working is positive last week
not %   46.49   40.81   39.15   32.82   34.45
Worked lastweek %       53.51   59.19   60.85   67.18   65.55
Total % 100.00  100.00  100.00  100.00  100.00


hrtitle
Hours last week 21.73   21.82   22.97   25.85   25.54
Total   21.73   21.82   22.97   25.85   25.54


hrtitle
Hours last week 22.08   20.34   20.09   19.75   20.62
Total   22.08   20.34   20.09   19.75   20.62
N       908     734     1,978   10,739  14,785
```

Descriptive Statistics of Children

Table 2

School Enrollment Rates of Five-year-olds, by Marital Status of Mother and Presence of Younger Siblings: 1960–90

	1960	1970	1980	1990	1960	1970	1980	1990
	Mother Single, No Younger Siblings				Mother Married, No Younger Siblings			
Public school (=1)	0.43	0.52	0.73	0.70	0.42	0.48	0.67	0.64
Private school (=1)	0.05	0.12	0.14	0.10	0.07	0.15	0.18	0.17
N	950	1457	12706	20548	8749	10822	47878	51001
	Mother Single, With Younger Siblings				Mother Married, With Younger Siblings			
Public school (=1)	0.42	0.47	0.74	0.70	0.39	0.46	0.66	0.61
Private school (=1)	0.04	0.07	0.09	0.09	0.07	0.14	0.16	0.16
N	1,356	1,354	7,694	13,630	14,347	10,654	40,636	43,603

Notes: Data are from the Decennial Census. Calculations are weighted by population weights. Sample includes children aged five or six as of the Census who are matched to mothers residing in the treated region (see Table 1). See text and Appendix 2 for further description of sample.

	1960	1970	1980	1990	1960	1970	1980	1990
	Mother Single, No Young Siblings				Mother Married, No Young Siblings			
Public school	42.8	54.4	73.0	70.6	40.2	51.0	66.7	64.2
Private school	6.4	11.4	13.9	9.6	7.7	15.3	18.7	16.4
N	853	2,532	12,020	16,676	9,379	18,783	52,982	49,513
	Mother Single, With Young Siblings				Mother Married, With Young Siblings			
Public school	44.0	50.4	73.4	71.0	36.7	49.1	66.1	61.7
Private school	3.7	7.3	8.4	5.3	6.9	13.1	16.0	15.6
N	1,123	2,395	6,943	12,728	15,601	21,017	44,617	42,902

Descriptive Statistics of Mothers

Table 3a

Characteristics of Mothers of Five-year-olds with No Younger Children, by Ma

	Single, No Younger Children				
	1950	1960	1970	1980	1990
Employment					
Worked last week (=1)	0.52	0.56	0.59	0.65	0.67
Hours last week	20.9	20.5	22.5	24.7	25.8
	(21.9)	(20.3)	(20.4)	(19.9)	(20.4)
Background					
High school degree (=1)	–	0.35	0.50	0.67	0.76
White (=1)	0.71	0.65	0.61	0.59	0.58
Children aged 7–12	0.84	1.01	1.13	0.66	0.62
	(1.00)	(1.10)	(1.09)	(0.83)	(0.77)
Children Aged 13–17	0.41	0.36	0.51	0.28	0.22
	(0.75)	(0.66)	(0.87)	(0.66)	(0.52)
Age	34.9	35.2	33.7	30.8	31.8
	(8.5)	(8.6)	(7.8)	(6.8)	(6.4)
N	1,041	807	1,276	11,955	19,248

1950	1960	1970	1980	1990
Employment				
53.51	59.19	60.85	67.18	65.55
21.73	21.82	22.97	25.85	25.54
(22.08)	(20.34)	(20.09)	(19.75)	(20.62)
Background				
-	32.53	48.76	65.70	72.83
68.76	63.87	62.17	57.36	56.99
0.99	1.04	1.24	0.67	0.63
(1.03)	(1.11)	(1.18)	(0.86)	(0.83)
0.50	0.44	0.56	0.28	0.25
(0.82)	(0.73)	(0.93)	(0.67)	(0.58)
35.20	35.43	35.22	30.91	32.27
(8.75)	(8.59)	(10.22)	(6.89)	(8.46)
908	734	1,978	10,739	14,785

Five-year-olds is defined as age 5 or 6, for the fuzzy information on age attributed to absence of quarter age in some years.

Codes for Regression

```
areg work Kratio c.age##c.age ... i.year if five==1&num04==0&single==1
[weight=resipop], absorb(state) vce(cl state)

reghdfe work Kratio c.age##c.age ... if five==1&num04==0&single==1
[weight=resipop], absorb(state year) vce(cl state)

qui areg...
mat var=e(V)
sca vK=var[1,1]
dis _b["Kratio"] " , " sqrt(vK)
```

```
. dis _b["Kratio"] " , " sqrt(vK_areg)
.06702431 , .06083079
```

```
. dis _b["Kratio"] " , " sqrt(vK_reghdfe)
.06702431 , .06079008
```

DID Regression Results

Dependent Variable	(1)	(2)
A. Single, no younger children		
a. Worked last week	0.58	0.045
		(0.033)
b. Hours last week	21.85	1.314
		(1.419)
N		34,327
c. Child in public school	0.48	0.151***
		(0.050)
d. Child in private school	0.12	−0.050*
		(0.026)
N		35,322
B. Married, no younger children		
a. Worked Last Week	0.36	−0.032***
		(0.011)
b. Hours last Week	12.66	−1.259**
		(0.461)
N		120,673
c. Child in public school	0.43	0.153***
		(0.035)
d. Child in private school	0.15	−0.058**
		(0.022)
N		116,891

(2)
0.067
(0.061)
3.616
(2.760)
29144
0.142***
(0.058)
-0.023
(0.019)
32081
-0.021
(0.027)
-0.618
(1.039)
127957
0.256***
(0.071)
-0.121***
(0.028)
130657

Estimates on $Kratio$;
State and time fixed effects, maternal characteristics are included in all regressions.

DDD Regression Results

Dependent Variable	(4)	(5)
A. Single, no younger children		
a. Worked last week	0.060	0.069**
	(0.037)	(0.033)
b. Hours last week	1.616	2.402*
	(1.549)	(1.287)
N	65,168	66,787
c. Child in public school	—	0.152**
		(0.059)
d. Child in private school	—	−0.056*
		(0.033)
N	—	68,827
B. Married, no younger children		
a. Worked Last Week	−0.001	−0.011
	(0.010)	(0.011)
b. Hours last Week	0.107	−0.309
	(0.368)	(0.475)
N	226,088	230,368
c. Child in public school		0.145***
		(0.032)
d. Child in private school	—	−0.057**
		(0.021)
N	—	225,028

(4)	(5)
0.027	0.044
(0.032)	(0.050)
0.077	2.005
(1.525)	(1.931)
48535	51539
	0.150**
	(0.065)
	-0.039**
	(0.018)
	80479
-0.002	-0.008
(0.021)	(0.014)
0.226	-0.010
(0.777)	(0.470)
259612	261104
	0.235***
	(0.082)
	-0.097 ***
	(0.037)
	358718

Estimates on $Kratio * five$; FE and controls interacted with $five$.
Column (4): mother with 3-4 years-olds, column (5): with 7-8 years-olds.

Why the Results differ?

Issues	Author's Operation	My Operation
Weights	Population weights	Total population weights
Policy Variable	Allocated: 1970, 1974, 1984	Allocated: 1967, 1970, 1974
Data quality	Else unknown	Only allocated employment dropped
Match	Unknown	Dropped

127615.

rectype	hhid	recnum	prwt	selfwtpr	slperson	relate
P	230694	9	300	1	1	5

gqmemb	instyp	sex	race	age	birmo	marsta	active	wkstat
9	99	2	2	18	99	1	2	1

jobsek	havjob	employ	hrwork	class	famunit	famsize	famrel
1	1	6	99	9	2	11	4

famtype	subfunit	subfrel	subftype
2	1	2	1

127616.

rectype	hhid	recnum	prwt	selfwtpr	slperson	relate
P	230694	8	300	1	1	5

gqmemb	instyp	sex	race	age	birmo	marsta	active	wkstat
9	99	2	2	27	99	1	2	1

jobsek	havjob	employ	hrwork	class	famunit	famsize	famrel
1	1	6	99	9	2	11	4

famtype	subfunit	subfrel	subftype
2	1	2	1

Duplicated Observations

P53	FAMUNIT	Family unit membership
P54-55	FAMSIZE	Family size of unit indicated in FAMUNI
P56	FAMREL	Family relationship summary
P57	FAMTYPE	Family type and presence of own childre
P58	SUBFUNIT	Subfamily unit membership
P59	SUBFSIZE	Subfamily size of unit indicated in SUB
P60	SUBFREL	Relationship to head of subfamily
P61	SUBFTYPE	Subfamily type and presence of own chil
P62	SURSIM	Surname similarity code
P78	ACTIVEDQ	Data quality flag for ACTIVE
P79	WKSTATDQ	Data quality flag for WKSTAT
P80	JOBSEKDQ	Data quality flag for JOBSEK
P81	HAVJORDQ	Data quality flag for HAVJOB
P82	EMPLOYDQ	Data quality flag for EMPLOY
P83	HRWORKDQ	Data quality flag for HRWORK
P84	OCCUPDQ	Data quality flag for OCCUP
P85	INDUSDQ	Data quality flag for INDUS
P86	CLASSDQ	Data quality flag for CLASS

Variables for Matching and Restriction