

The Long-term Effects of Maternal Employment on Daughters' Later Labour Force Participation and Earnings

Catherine Deri Armstrong, University of Ottawa

Ross Finnie, University of Ottawa

Jennifer Stewart, Carleton University

Estimated Effects of Maternal Employment (ME)

Cognitive Outcomes

- Blau and Grossberg (1992) , Baum (2003), Ruhm (2004), Gregg et al. (2005), Bernal (2008), Gagne (2002), Berger et al. (2005), James-Burdumy (2005) , Gennetian et al. (2002), Waldfogel et al. (2002) and Ruhm (2008)

Behavioural Outcomes

- Baker et al. (2008) , Aughinbaugh and Gittleman (2004) , Lopoo (2004)

Health Outcomes

- Anderson et al. (2003)

Literature focuses on the effects of **current** maternal employment on **current** child outcomes

Evidence of Long Term Effects

- Ermisch and Francesconi (2002)
- Dustman and Schoenberg (2008)
- Wurtz (2009)

Our paper:

We examine the long run effects of ME when the daughter is between 1-17 years of age on two measures of the daughter's later labour force activity at ages 20-40:

- Probability of working
- Earnings

What makes our paper unique:

1. Long run effects of ME
2. ME measured at between 1-17 years (not just young ages)
3. Outcomes measured between 20-40 years
4. Unique administrative data (huge!)

Theoretical Framework

- **Household Production Model, Becker and Tomes (1986)**
 - ME will decrease the time available for producing child outcomes, but will increase the amount of market goods that can be purchased.
- **Socialization or Role Model Theory, (see discussion in Haveman and Wolfe (1995))**
 - ME changes the preferences of the child by creating specific values about working and attachment to the labour force.

Empirical Strategy

$$\begin{aligned} \text{Working}_{it} = & \alpha + \beta ME(1-17)_i + \text{Time Invariant Family Charac} \delta_i \\ & + \text{Daughter's Current Situation Charac}_{it} \phi + \varepsilon_{it} \end{aligned}$$

Identification Concern

Non-Random Selection into Employment (Unobserved Heterogeneity)

- Mothers who choose to work may be different in unobserved ways, such as skill, ability or preferences, from mothers who choose not to work.
- Direction of Bias is ambiguous

I. Sister Fixed Effects

- Controls for any unobserved factors that are constant across sisters over time, including mothers' fixed characteristics, such as education

II. Instrumental Variables

- Using the average unemployment rate for the Economic Region for each year we have information on the mothers' employment status as our instrument

III. “Gottshalk (1996)”

- Exploit the order in which events occur to identify the effects of unobserved heterogeneity
- Achieves identification through assumptions about timing rather than the usual exclusionary restrictions required for IV
- Include a measure of future ME in our models in addition to past ME.
 - As future ME cannot be causal, we interpret a significant coefficient as evidence of unobserved heterogeneity.

Findings:

- Linear Probability Models (LPM) suggest a strong positive relationship between ME and daughters' later labour force participation and earnings
 - Strongest relationship when the daughters are in their late teens (15-17 years)
- No long term effects remain (in most cases) when unobserved heterogeneity is addressed.

Longitudinal Administrative Database (LAD)

- 20 % random sample of Canadian tax filers (N=6 million in 2000)
- 1982 - 2005
- Longitudinal
- Individuals are matched into family units on an annual basis and the related family information is added to each individual's record
- Sources of income, taxes and demographic information at both individual and family levels.

LAD Years

| 3 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
|----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| -1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | |
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | |
| 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | |
| 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | |
| 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | |
| 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | |
| 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | |
| 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | |
| 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | |
| 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | |
| 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | |
| 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | |
| 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | |
| 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | |
| 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | |
| 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | |
| 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | |
| 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | |

Sample Selection

- Daughters, 20-40 yrs. between 1985-2005
who
- Filed a tax return while living at home with their parents between the ages of 15-19 (70%)
and whose
- Mother (stepmother) also appears in the LAD (19.74%)
and whose
- Mothers filed taxes for at least one year when the her daughter was between 1 and 17 (99%)

Final Sample

- 94,500 daughters
- 935,300 observations when multiple observations per daughter are included

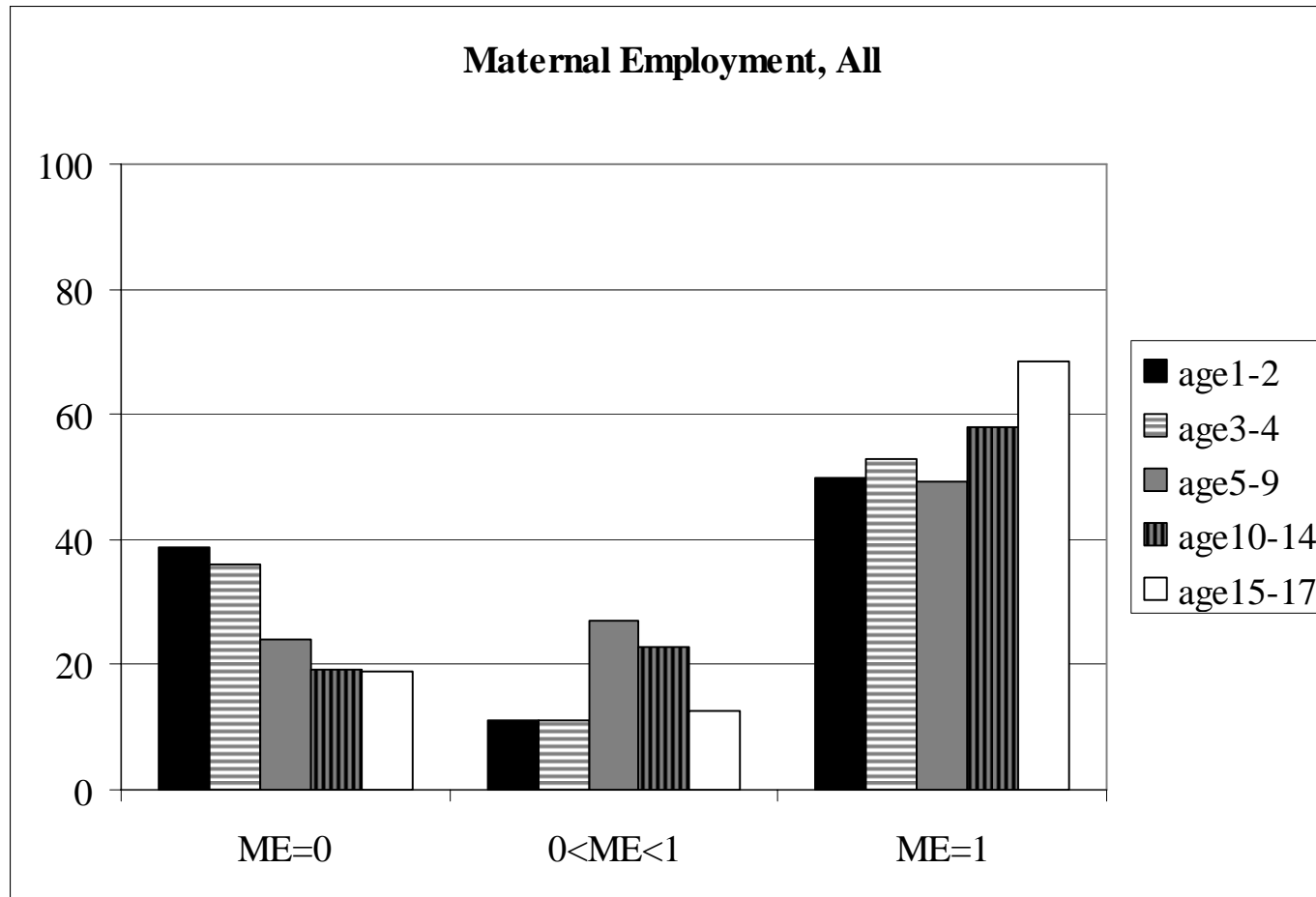
Maternal Employment Variable

- For each year, we construct a 0/1 indicator for the presence of maternal employment income in excess of \$1000.
- ME = number of years 'mom worked' as a proportion of observed years between ages 1-17
 - ME $\in [0,1]$

Other Independent Variables

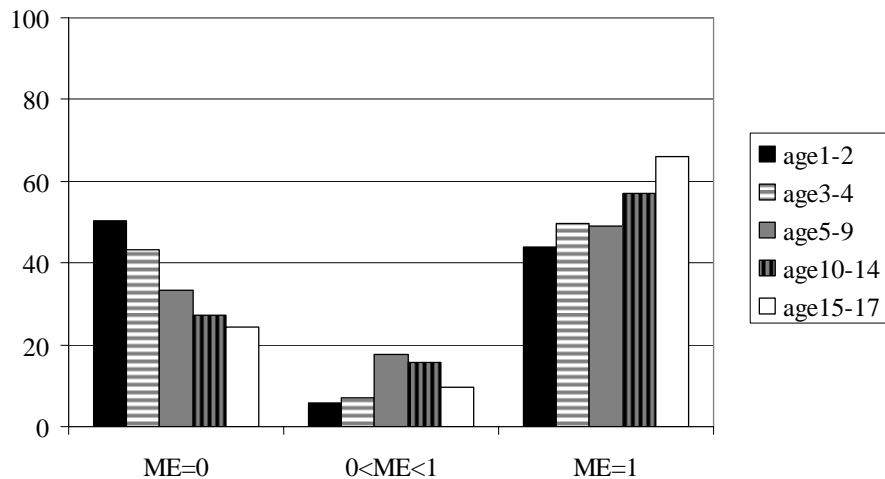
- Daughter's situation growing up
 - Average family market income (ages 1-17)
 - % years daughter is observed to be in a lone parent family (ages 1-17)
- Daughter's current situation
 - Family status
 - Region size
 - Province
 - Currently residing with parents
 - English speaker in QC/French speaker outside of QC
 - Age
 - Calendar Year
 - Age at match
 - Missing data regarding ME
 - Age of Mother at birth of daughter

Distribution of ME by age

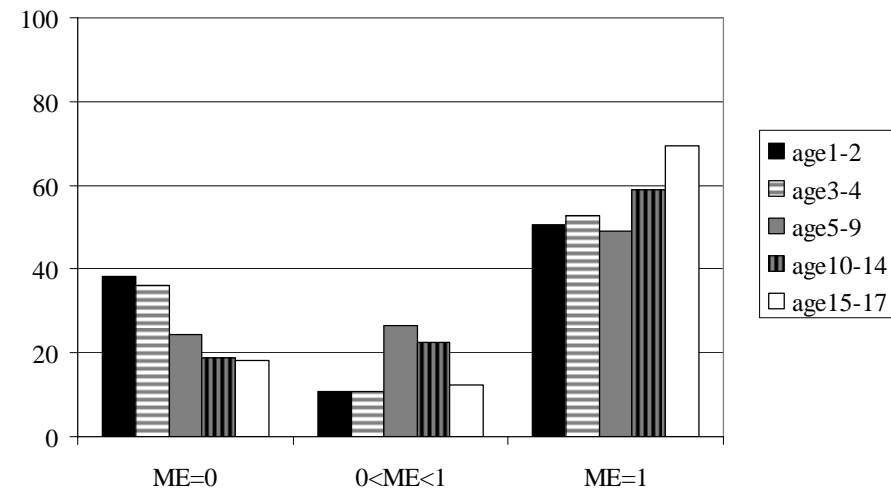


Distribution of ME, Family Type

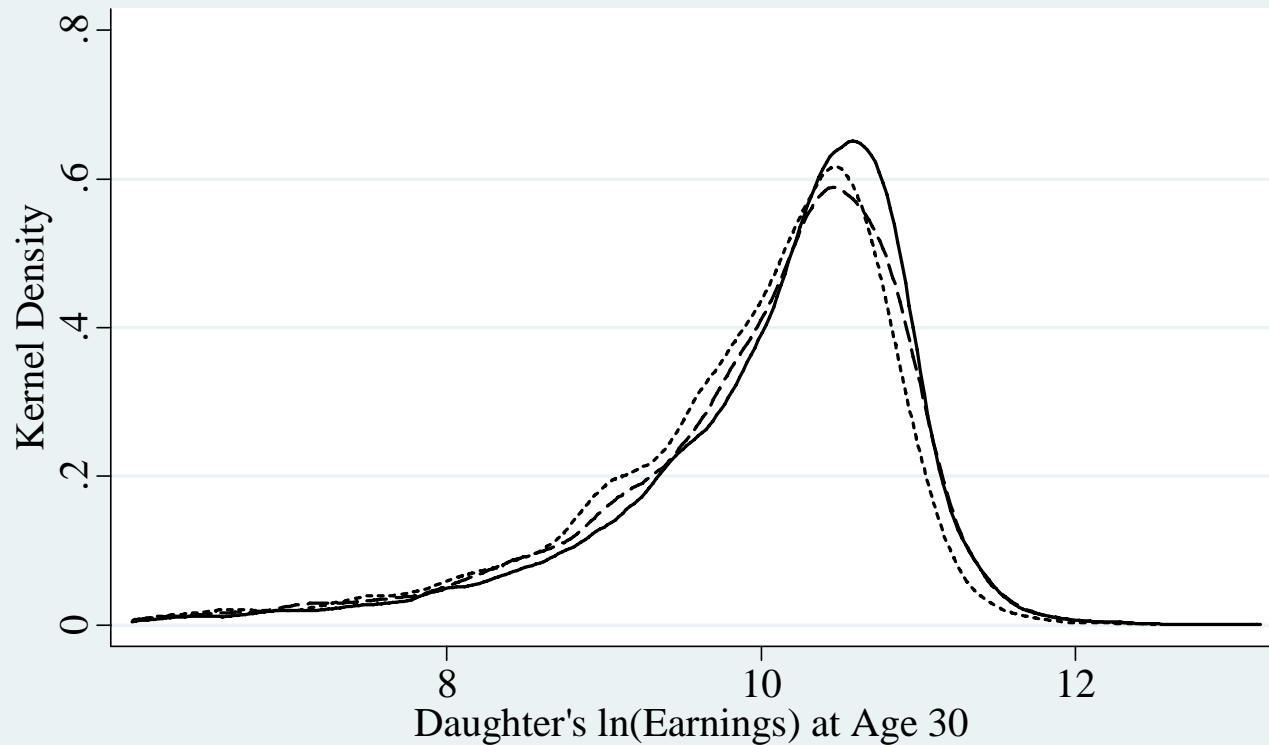
Maternal Employment,
Always Lone-Parent Family



Maternal Employment,
Always Two Parents Family



Kernel Density $\ln(\text{earnings})$



..... Mother never worked - - - - - Mother sometimes worked
——— Mother always worked

Main Results

Dependent Variable: Working

| | LPM | FE | IV | Gottshalk |
|---|----------------------|----------------------|----------------------|----------------------|
| Maternal Employment Ages 1-17 | 0.054*** [0.002] | 0.002 [0.012] | 0.049 [0.136] | 0.040*** [0.002] |
| Family Market Income Ages 1-17 | 0.001*** [0.000] | -0.002*** [0.001] | 0.001*** [0.000] | 0.001*** [0.000] |
| Always Lone Mother Family Ages 1-17 | -0.046*** [0.004] | -0.023 [0.023] | -0.046*** [0.007] | -0.044*** [0.004] |
| Maternal Employment 'After' | | | | 0.045*** [0.002] |
| 1 st Stage t-stat for instrument | | | -3.67 | |
| Hausman Test | | | 0.8543 | |
| N | 935300 | 935300 | 935300 | 847155 |

Variation in Maternal Employment across Sisters

| | N | With Sisters | ME Same | ME Different |
|-----------|--------|--------------|---------|--------------|
| Age 1-2 | 27,975 | 2,355 | 1,425 | 930 |
| Age 3-4 | 36,260 | 3,255 | 2,005 | 1,250 |
| Age 5-9 | 57,885 | 5,535 | 3,520 | 2,015 |
| Age 10-14 | 81,060 | 7,810 | 5,555 | 2,255 |
| Age 15-17 | 92,240 | 8,720 | 6,770 | 1,955 |

Main Results

Dependent Variable: $\ln(\text{earnings})$

| | LPM | FE | IV | Gottshalk |
|--|----------------------|----------------------|----------------------|----------------------|
| Maternal Employment Ages 1-17 | 0.058*** [0.007] | -0.073* [0.043] | 2.421** [1.002] | 0.045*** [0.007] |
| Family Market Income Ages 1-17 | 0.002*** [0.001] | -0.008*** [0.003] | 0.003*** [0.001] | 0.002*** [0.001] |
| Always Lone Mother Family Ages 1-17 | -0.124*** [0.011] | -0.177** [0.086] | -0.265*** [0.063] | -0.121*** [0.011] |
| Maternal Employment 'After' | | | | 0.038*** [0.006] |
| 1st Stage t-stat for instrument | | | -2.85 | |
| Hausman Test | | | 0.0000 | |
| N | 827205 | 827205 | 827205 | 748795 |

**Regressions are CONDITIONAL on working.

Breaking down ME into age groups

Dependent Variable: Working

| | LPM | FE | IV | Gottshalk |
|-----------------------------|---------------------|---------------------|-------------------|---------------------|
| ME Ages 1-2 | 0.020*** [0.004] | 0.007 [0.010] | -0.226 [0.534] | 0.019*** [0.004] |
| ME Ages 3-4 | 0.001 [0.003] | 0.002 [0.008] | 0.123 [0.480] | -0.001 [0.004] |
| ME Ages 5-9 | 0.010*** [0.003] | 0.023*** [0.007] | -0.165 [0.153] | 0.007** [0.003] |
| ME Ages 10-14 | 0.018*** [0.003] | 0.015** [0.006] | 0.12 [0.162] | 0.015*** [0.003] |
| ME Ages 15-17 | 0.041*** [0.003] | 0.012* [0.006] | 0.042 [0.141] | 0.031*** [0.003] |
| Maternal Employment 'After' | | | | 0.041*** |
| N | 935300 | 935300 | 935300 | 847155 |

Breaking down ME into age groups

Dependent Variable: ln(earnings)

| | LPM | FE | IV | Gottshalk |
|-----------------------------|----------|-----------|---------|-----------|
| ME Ages 1-2 | 0.001 | -0.057 | -0.604 | -0.001 |
| | [0.011] | [0.036] | [2.662] | [0.012] |
| ME Ages 3-4 | -0.015 | -0.007 | 0.594 | -0.021** |
| | [0.010] | [0.029] | [2.364] | [0.010] |
| ME Ages 5-9 | -0.006 | -0.055** | 0.173 | -0.008 |
| | [0.009] | [0.024] | [0.533] | [0.009] |
| ME Ages 10-14 | 0.026*** | -0.070*** | 0.502 | 0.021** |
| | [0.009] | [0.021] | [0.626] | [0.009] |
| ME Ages 15-17 | 0.042*** | 0.009 | 0.776 | 0.033*** |
| | [0.008] | [0.023] | [0.650] | [0.009] |
| Maternal Employment 'After' | | | | 0.035*** |
| | | | | [0.006] |
| N | 827205 | 827205 | 827205 | 748795 |

Dependent Variable: Working

| | LPM | FE | IV | Gottshalk |
|---|---------------------|----------------------|---------------------|---------------------|
| Always 2 Parent Family | | | | |
| ME Ages 1-17 | 0.045*** [0.002] | 0.018 [0.013] | 0.076 [0.055] | 0.033*** [0.002] |
| Family Market Income Ages 1-17 | | | | |
| | 0.001*** [0.000] | -0.003*** [0.001] | 0.001*** [0.000] | 0.001*** [0.000] |
| Maternal Employment 'After' | | | | 0.038*** [0.002] |
| 1 st Stage t-stat for instrument | | | -8.55 | |
| Hausman Test | | | 0.0350 | |
| N | 776195 | 776195 | 776195 | 705535 |
| Always Lone Parent Family | | | | |
| ME Ages 1-17 | 0.098*** [0.012] | 0.088 [0.176] | 0.042 [0.116] | 0.074*** [0.012] |
| Family Market Income Ages 1-17 | | | | |
| | -0.002 [0.003] | -0.026*** [0.009] | -0.002 [0.003] | -0.002 [0.003] |
| Maternal Employment 'After' | | | | 0.068*** [0.011] |
| 1 st Stage t-stat for instrument | | | -4.44 | |
| Hausman Test | | | 0.1819 | |
| N | 47400 | 47400 | 47400 | 44205 |
| Sometimes Lone Parent Family | | | | |
| ME Ages 1-17 | 0.117*** [0.008] | 0.098* [0.055] | 0.091 [0.088] | 0.089*** [0.008] |
| Family Market Income Ages 1-17 | | | | |
| | 0.003*** [0.001] | 0.003 [0.002] | 0.003*** [0.001] | 0.003*** [0.001] |
| Maternal Employment 'After' | | | | 0.076*** [0.007] |
| 1 st Stage t-stat for instrument | | | 6.22 | |
| Hausman Test | | | 0.5520 | |
| N | 111705 | 111705 | 111705 | 97420 |

Dependent Variable: ln(earnings)

| | LPM | FE | IV | Gottshalk |
|-------------------------------------|---------------------|----------------------|---------------------|---------------------|
| Always 2 Parent Family | | | | |
| ME Ages 1-17 | 0.056*** [0.007] | -0.036 [0.047] | 0.755*** [0.218] | 0.044*** [0.008] |
| Family Market Income Ages 1-17 | 0.002*** [0.001] | -0.011*** [0.003] | 0.003*** [0.001] | 0.002*** [0.001] |
| Maternal Employment 'After' | | | | 0.037*** [0.007] |
| 1st Stage t-stat for instrument | | | -7.82 | |
| Hausman Test | | | 0.0000 | |
| N | 692180 | 692180 | 692180 | 628800 |
| Always Lone Parent Family | | | | |
| ME Ages 1-17 | 0.070** [0.033] | -0.727 [0.614] | 0.794** [0.383] | 0.043 [0.036] |
| Family Market Income Ages 1-17 | 0.009 [0.012] | -0.003 [0.057] | 0.007 [0.012] | 0.009 [0.012] |
| Maternal Employment 'After' | | | | 0.066** [0.030] |
| 1st Stage t-stat for instrument | | | -4.47 | |
| Hausman Test | | | 0.0000 | |
| N | 39520 | 39520 | 39520 | 36860 |
| Sometimes Lone Parent Family | | | | |
| ME Ages 1-17 | 0.086*** [0.020] | 0.228 [0.177] | -0.530* [0.294] | 0.073*** [0.022] |
| Family Market Income Ages 1-17 | 0.005** [0.002] | 0.002 [0.006] | 0.010*** [0.003] | 0.005** [0.002] |
| Maternal Employment 'After' | | | | 0.039** [0.018] |
| 1st Stage t-stat for instrument | | | 5.98 | |
| Hausman Test | | | 0.0000 | |
| N | 95505 | 95505 | 95505 | 83140 |

Conclusions

- LPM overestimates the true relationship between ME and daughters' later labour force participation and earnings*
- Results call into question the growing concern previous research has raised regarding the negative effects of ME on child outcomes