Effects of the Minimum Wage on Infant & Child Health

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University of Toronto
Research Question

• How does the minimum wage affect
  ◦ Infant health outcomes?
    • Birthweight & Low BW
    • Gestation & Premature birth
    • Fetal growth
    • Potential mechanisms?
  ◦ Child health outcomes?
    • General health, BMI
    • Mental health
    • Learning / missing school
    • Developmental outcomes
    • Potential mechanisms?
Outline

- Background
- Framework & Mechanisms
- Relevant Literature
- Data
- Empirical Approach
- Results
  - Infants – 2-3% improvement in low BW
  - Children – 5-15% improvement
- Implications
**Background**

- **Federal MW introduced in 1938**
  - Fair Labor Standards Act
  - $0.25 ($4.20 in current $)
  - Raised 22 times (currently $7.25)
Why is this Important?

- **Cornerstones of US income-support programs**
  - Earned Income Tax Credit (EITC)
  - Minimum wage

- **Debate has expectedly centered on the labor market effects of the MW**
  - Raise earnings, reduce poverty / income inequality
  - Raise labor costs, decrease employment, raise prices
Labor Market Effects

- **Raise earnings, reduce poverty / income inequality**
  - Consistent evidence that a higher MW raises earnings among workers – both males & females
    - Belman et al. (2015); Aaronson, Agarwal, and French (2012); Autor, Katz, and Kearney (2008); Card and DiNardo (2002); David, Manning, and Smith (2016); DiNardo, Fortin, and Lemieux (1996); Lee (1999); Lemieux (2002, 2006); Luttmer (2007); Reich and Hall (2001)
    - Somewhat stronger effects for females
      - 63% of MW earners are females (CPS)

- **Effects on employment mixed**
  - No effects
    - Hirsch et al. (2015), Addison, Blackburn, & Cotti, 2012; Dube, Lester, & Reich, 2010; Yuen 2003; Card & Krueger, 1994
  - Decrease in employment
    - Neumark, Salas, & Wascher, 2014; Sabia, Burkhauser & Hansen 2012; Sen et al. 2011; Pinoli 2010; Sabia 2008; Capolieti et al. 2006, 2005; Baker et al. 1999; Neumark & Wascher, 1992;
  - Net decrease in earnings
    - Neumark, Schweitzer, & Wascher, 2004

- **Overview (CBO 2014)**
  - Slight reduction in employment (0.3%, 500,000 workers)
  - Substantial increase in earnings (16.5 million workers)
  - Net increase in earnings
Why is this Important?

- MW ultimately affects earnings (and employment)

- Large literature linking income to health
  - Income-health gradient for both adults & children
    - Chetty et al. 2016; Cutler et al. 2011; Fletcher & Wolfe 2014; Case, Lee, & Paxson 2008

- Broader secondary effects of the MW on non-labor market outcomes such as health?
  - Not commonly considered in the MW debate
Motivation - Infant health

• Fetal development may be particularly sensitive to income changes during pregnancy
  ◦ Studies of other income-enhancing policies such as the EITC
    Strully et al, 2010; Hoynes, Miller, and Simon 2015

• Low birthweight associated with myriad long-term poor outcomes for children
  ◦ Adult health, including respiratory and cardiovascular sickness, cognitive and developmental issues, and lower educational attainment
**MW effects on Infant Health**

Grossman model (1972); Dave et al. (2015)

1. \( U_i = U (H_i, H_{child}, C_i^{Healthy}, C_i^{Unhealthy}, X_i; \nu_i) \)

2. \( H_i = H_i(C_i^{Healthy}, C_i^{Unhealthy}, MedCare_i, T_{Hi}; E_i) \)

3. \( H_{child} = H_c(C_i^{Healthy}, C_i^{Unhealthy}, MedCare_i, T_{Hi}, H_i; E_i) \)

4. \( W^*T_W = P_c*C + P_m*MedCare + X \)

5. \( T = T_W + T_H + T_X \)
Why would MW affect Infant Health?

- **First-order effects**
- **Positive income effect**
  - *Improve nutrition* (Dave & Kelly 2012; Banerjee et al. 2010; Duflo 2003)
    - Evidence linking lower MW to higher BMI (Meltzer & Chen 2011)
  - *Increase medical care / prenatal care services*
    - MW jobs less likely to provide health insurance
  - *Increase financial security & reduce maternal stress*
    - Linked to fetal growth (Camacho 2008)
  - *Greater savings & consumption smoothing*
    - Point to some cumulative effects of the MW
  - *May affect both healthy & unhealthy consumption*
Why would MW affect Infant Health?

- **Second-order effects**
  - **Greater financial security / mental health, reduced stress may reduce risky behaviors** (Byrne & Mazanov; Saffer & Dave 2005)
  
  - **Improved contact with physicians may also promote health behaviors (diet, nutrition, smoking cessation)**
    US Preventive Services Task Force (2003, 2004); Dave & Kaestner (2009)
  
  - **Raise nutrition by raising prices of out-of-home food consumption**
    (MaCurdy 2015; Aaronson 2001)
  
  - **Reduce reliance on welfare programs**
    - Decline in SNAP (Reich & West 2015)
    - No evidence on effects on other programs (WIC, Medicaid, housing assistance, welfare)

- **Employment effects (likely weak)**
  - **Greater availability of non-work time**
  
  - **Increase in time-intensive activities (preparing home-cooked meals, exercise, obtaining healthcare)**
    Colman & Dave (2013)
Literature: MW & Health

- Meltzer & Chen (2011)
  - Reduced BMI

- Mccarrier (2011)
  - Lower levels of unmet medical needs

- Horn, Maclean, & Strain (2017)
  - No systematic effects on workers’ health
  - Suggestive decline in mental strain among employed workers

- Lenhart (2017)
  - Improvements in SRH & reduction in financial stress in UK
  - Improvements in health (mortality, LE) based on cross-national OECD data
**Literature: Infant Health**

- **EITC**
  - Hoynes, Miller, & Simon (2015)
    - 1993 Federal EITC expansion
    - Decline in low BW, increase in prenatal care, & decline in maternal smoking
  - Strully, Rehkopf, & Xuan (2010)
    - State EITC
    - Increase BW & reduce maternal smoking
  - Markowitz et al. (2017)
    - State EITC
    - Increase BW & gestation

- **MW**
  - Komro et al. (2016)
    - State-aggregated data
    - 1-2% decrease in prevalence of low BW & 4% decrease in post-neonatal mortality
Our Contributions

- Adding to very sparse evidence directly linking the MW to its broader / non-economic effects

- Evidence base on infant health outcomes based on micro/detailed natality data
  - Broader range of outcomes
  - Timing of the effects
  - Link health effects to groups most likely to be impacted by the MW
  - Suggestive evidence on proximal mechanisms

- First study on older children’s health

- Inform *causal effects of income* (among low-SES population) on child/infant health
**Data:Births**

- **U.S. Vital Statistics Detailed Natality Files**
  - CDC / NCHS

- **Universe all individual births occurring in the 50 states and D.C.**
  - Date and place of birth
  - Demographic characteristics of the mother: age, race, education, marital status, and parity
  - 91.3 million births

- **Main Analysis Sample**
  - Mothers with a high school degree or less
  - Group most likely to contain MW workers
  - Ages 18 to 39
  - 46 million births
Outcomes

- **Infant Health**
  - Birthweight
  - Low Birthweight (< 2500 grams)
  - Gestational age (weeks)
  - Preterm birth (< 37 weeks)
  - Fetal growth (BW / Gestational age)

- **Prenatal Inputs**
  - Any prenatal smoking
  - Smoking > 5 cigs daily
  - Prenatal care visits
  - Prenatal care visits < 5
  - # Months Delayed Prenatal Care
  - First trimester care
  - Adequate Prenatal Care (Kotelchuck criteria)
Data: Income

- **Current Population Survey (CPS)**
  - Bureau of Labor Statistics
  - 60,000 households monthly
  - Interviewed 4 mos. – out 8 months – re-interviewed 4 mos.

- **March CPS**
  - 98,000 households (March each year)

- **Monthly CPS (Merged Outgoing Rotation Groups)**
  - 15,000 households (monthly)
    - Household earnings
    - Annual earnings
    - Hourly wage
    - State-specific median hourly wage
    - Workers paid hourly wage
    - Workers paid MW & close to MW
Data: Minimum Wage

- Dept. of Labor
- Effective ‘nominal’ minimum wage
- Effective real minimum wage (2012$)

Relative minimum wage
- $\frac{MW_{st}}{\text{Median Hourly Wage}_{st}}$
- $\frac{MW_{st}}{\text{Median Hourly Wage}_{st-1}}$
- $\frac{MW_{st}}{\text{Median Hourly Wage}_{1987}}$

- Match Average MW over pregnancy period
State Variation in MW

44% Cross-sectional
23% National
33% Within-state
Data: Policy Controls

- **State EITC**
  - Any EITC, Refundable, Amount (% Federal)

- **Welfare Reform**
  - AFDC Waivers, TANF

- **Medicaid eligibility**
  - Pregnant women

- **State cigarette excise tax**

- **Merge average MW over period of pregnancy**
- **Merge policy controls based on state/year of pregnancy**
<table>
<thead>
<tr>
<th>Sample</th>
<th>Percent Paid Hourly</th>
<th>Wage &lt; 1.10*MW</th>
<th>Wage &lt; 1.20*MW</th>
<th>Wage &lt; 1.25*MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>High School or Below</td>
<td>80.24</td>
<td>19.28</td>
<td>30.51</td>
<td>33.94</td>
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<tr>
<td>Less than High School</td>
<td>82.13</td>
<td>26.12</td>
<td>40.01</td>
<td>43.60</td>
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<tr>
<td>High School</td>
<td>79.28</td>
<td>15.67</td>
<td>25.49</td>
<td>28.83</td>
</tr>
<tr>
<td>High School or Below - White</td>
<td>79.16</td>
<td>18.09</td>
<td>28.33</td>
<td>31.46</td>
</tr>
<tr>
<td>High School or Below - Non-White</td>
<td>82.00</td>
<td>21.14</td>
<td>33.92</td>
<td>37.81</td>
</tr>
<tr>
<td>High School or Below - Non-Married</td>
<td>76.64</td>
<td>14.32</td>
<td>23.48</td>
<td>26.40</td>
</tr>
<tr>
<td>High School or Below - Married</td>
<td>83.19</td>
<td>23.02</td>
<td>35.80</td>
<td>39.62</td>
</tr>
<tr>
<td>High School or Below - Ages 18-29</td>
<td>84.51</td>
<td>24.30</td>
<td>37.73</td>
<td>41.72</td>
</tr>
<tr>
<td>High School or Below - Ages 30-39</td>
<td>75.56</td>
<td>13.13</td>
<td>21.64</td>
<td>24.39</td>
</tr>
</tbody>
</table>

Notes: Rates are estimated from the monthly CPS data and weighted by the CPS sampling weights. Sample sizes ranged from 103,932 to 303,195.
Research Design: Reduced Form

\[ H_{ist} = \alpha_{s} + \theta_{t} + \delta_{MW_{st}} + X_{ist} \Gamma + Z_{st} \Psi + \beta_{Mst} + \mu_{ist} \]

- Outcome for birth \( i \) occurring in state \( s \) in year \( t \)
- Year & State fixed effects
- \( X \): individual demographics
- \( Z \): time-varying state policy controls
- \( M \): Mean outcome rate for college-educated married mothers ages 25-39

**Parameter of interest:** \( \delta \)

- **Estimate for all low-educated women and for several demographic groups defined by age, race and education**
  - Heterogeneous responses
  - Different demographic groups are more or less likely to be affected by the minimum wage
Heterogeneity in the Parameters

\[ H_{ist} = \alpha_{st} + \theta_{t} + \delta MW_{ist} + X_{ist} \Gamma + \]

\[ Z_{ist} \Phi + \mu_{ist} \]

- Reduced form \( \delta = \frac{\partial Health}{\partial MW} \)

\[ = \frac{\partial Health}{\partial Income} \]

* \( \frac{\partial Income}{\partial MW} \)

Structural Effect of Income on Health

First-stage effect of MW on Income
Research Design: “First-Stage”

\[
Income_{\text{lst}} = \alpha_{\text{s}} + \theta_{\text{t}} + \pi MW_{\text{lst}} + X_{\text{lst}} \Gamma + Z_{\text{st}} \Psi + \mu_{\text{lst}}
\]

Based on CPS

\[
H_{\text{lst}} = \alpha_{\text{s}} + \theta_{\text{t}} + \delta MW_{\text{lst}} + X_{\text{lst}} \Gamma + Z_{\text{st}} \Psi + \beta M_{\text{st}} + \mu_{\text{lst}}
\]

Based on Detailed Natality Files

- Implied IV = $\delta / \pi$
- Causal effect of MW-induced increase in
Effects of a $1 increase in the Minimum Wage on Earnings, Household Income, and Hourly Wage

<table>
<thead>
<tr>
<th>Sample</th>
<th>High School or Below</th>
<th>Less than High School</th>
<th>High School</th>
<th>White</th>
<th>Non-White</th>
<th>Age 18-29</th>
<th>Age 30-39</th>
<th>Married</th>
<th>Not Married</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ages 18-39</td>
<td>772.53**</td>
<td>681.74*</td>
<td>1125.5***</td>
<td>933.91*</td>
<td>861.91**</td>
<td>884.87**</td>
<td>726.39*</td>
<td>-81.44</td>
<td>1124.0***</td>
</tr>
<tr>
<td>Ages 18-39</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Panel A
Household Income

| Minimum Wage
Panel B
Annual Earnings
| Minimum Wage
Panel C
Hourly Wage
| Birthweight Results
## Sample Means

<table>
<thead>
<tr>
<th>Sample</th>
<th>High school grad. or below</th>
<th>All</th>
<th>MW = Federal</th>
<th>MW &gt; Federal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth weight (grams)</td>
<td></td>
<td>3269.1</td>
<td>3260.4</td>
<td>3293.2</td>
</tr>
<tr>
<td>Low birth weight</td>
<td></td>
<td>0.082</td>
<td>0.085</td>
<td>0.075</td>
</tr>
<tr>
<td>Fetal growth (birth weight / gestational age in week)</td>
<td></td>
<td>84.051</td>
<td>83.834</td>
<td>84.662</td>
</tr>
<tr>
<td>Gestation (weeks)</td>
<td></td>
<td>38.783</td>
<td>38.778</td>
<td>38.797</td>
</tr>
<tr>
<td>Preterm birth</td>
<td></td>
<td>0.123</td>
<td>0.126</td>
<td>0.114</td>
</tr>
<tr>
<td>Prenatal care visits</td>
<td></td>
<td>10.793</td>
<td>10.713</td>
<td>11.018</td>
</tr>
<tr>
<td>Prenatal care visits &lt; 5 visits</td>
<td></td>
<td>0.070</td>
<td>0.074</td>
<td>0.058</td>
</tr>
<tr>
<td>Months delayed prenatal care</td>
<td></td>
<td>3.066</td>
<td>3.086</td>
<td>2.971</td>
</tr>
<tr>
<td>Any prenatal smoking</td>
<td></td>
<td>0.190</td>
<td>0.199</td>
<td>0.161</td>
</tr>
<tr>
<td>Smoking &gt;5 cigarettes daily</td>
<td></td>
<td>0.132</td>
<td>0.139</td>
<td>0.107</td>
</tr>
<tr>
<td>Minimum wage (nominal)</td>
<td></td>
<td>5.206</td>
<td>4.860</td>
<td>6.172</td>
</tr>
<tr>
<td>Minimum wage (relative to 1-year lagged median wage)</td>
<td></td>
<td>0.437</td>
<td>0.432</td>
<td>0.451</td>
</tr>
<tr>
<td>Observations</td>
<td></td>
<td>45.8m</td>
<td>33.6m</td>
<td>12.2m</td>
</tr>
</tbody>
</table>
# Effect of a 10% increase in the Relative MW on Birthweight

## Table 3

### Effect of the Relative Minimum Wage on Birth Weight

<table>
<thead>
<tr>
<th>Minimum wage</th>
<th>Less than High School</th>
<th>Less than High School</th>
<th>High School</th>
<th>High School</th>
<th>White</th>
<th>Non-White</th>
<th>Age 18-29</th>
<th>Age 30-39</th>
<th>Married</th>
<th>Not Married</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>11.92***</td>
<td>10.00***</td>
<td>18.67***</td>
<td>16.17***</td>
<td>12.03***</td>
<td>22.41***</td>
<td>15.10***</td>
<td>6.87**</td>
<td>12.13***</td>
<td>14.0****</td>
</tr>
<tr>
<td>Implied IV  ($1000 income increase)</td>
<td>14.0</td>
<td>11.7</td>
<td>13.3</td>
<td>11.5</td>
<td>10.3</td>
<td>20.8</td>
<td>13.6</td>
<td>7.6</td>
<td>-</td>
<td>9.9</td>
</tr>
<tr>
<td>Sample mean</td>
<td>3243.1</td>
<td>3243.1</td>
<td>3284.1</td>
<td>3284.1</td>
<td>3315.4</td>
<td>3258.8</td>
<td>3303.7</td>
<td>3334.6</td>
<td>3194.3</td>
<td></td>
</tr>
<tr>
<td>State Controls</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td></td>
</tr>
</tbody>
</table>

First Stage

EITC 19-28g

EITC 7-8g
## Effect of a 10% increase in the Relative MW on Low Birthweight

<table>
<thead>
<tr>
<th></th>
<th>Less than High School</th>
<th>High School</th>
<th>High School or Below</th>
<th>White</th>
<th>Non-White</th>
<th>Age 18-29</th>
<th>Age 30-39</th>
<th>Married</th>
<th>Not Married</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Low birth weight</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Minimum wage</strong></td>
<td>-0.0017*</td>
<td>-0.0031***</td>
<td>-0.0018***</td>
<td>-0.0057***</td>
<td>-0.0026***</td>
<td>-0.0018*</td>
<td>-0.0017***</td>
<td>-0.0032***</td>
<td></td>
</tr>
<tr>
<td><strong>Implied IV ( $1000 income increase)</strong></td>
<td>-0.0020</td>
<td>-0.0022</td>
<td>-0.0015</td>
<td>-0.0020</td>
<td>-</td>
<td>-0.0024</td>
<td>-0.023</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sample Mean</strong></td>
<td>0.086</td>
<td>0.080</td>
<td>0.070</td>
<td>0.125</td>
<td>0.081</td>
<td>0.088</td>
<td>0.067</td>
<td>0.100</td>
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</tr>
<tr>
<td><strong>Fetal growth</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Minimum wage</strong></td>
<td>0.15***</td>
<td>0.24***</td>
<td>0.14***</td>
<td>0.22***</td>
<td>0.08</td>
<td>0.15***</td>
<td>0.23***</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Implied IV ( $1000 income increase)</strong></td>
<td>0.18</td>
<td>0.17</td>
<td>0.12</td>
<td>0.36</td>
<td>0.20</td>
<td>0.09</td>
<td>-</td>
<td>0.16</td>
<td></td>
</tr>
<tr>
<td><strong>Sample Mean</strong></td>
<td>83.458</td>
<td>84.391</td>
<td>85.014</td>
<td>80.777</td>
<td>83.676</td>
<td>85.300</td>
<td>85.502</td>
<td>82.391</td>
<td></td>
</tr>
</tbody>
</table>

*Significance levels: *p < 0.1, **p < 0.05, ***p < 0.01
<table>
<thead>
<tr>
<th></th>
<th>Less than High School</th>
<th>High School</th>
<th>High School or Below</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>White</td>
<td>Non-White</td>
<td>Age 18-29</td>
</tr>
<tr>
<td><strong>Gestation Weeks</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Minimum wage</strong></td>
<td>0.11***</td>
<td>0.12***</td>
<td>0.11***</td>
</tr>
<tr>
<td><strong>Implied IV ($1000 income increase)</strong></td>
<td>0.13</td>
<td>0.09</td>
<td>0.09</td>
</tr>
<tr>
<td><strong>Sample mean</strong></td>
<td>38.8</td>
<td>38.8</td>
<td>38.9</td>
</tr>
<tr>
<td><strong>Preterm (Weeks&lt;37)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Minimum wage</strong></td>
<td>-0.0043***</td>
<td>-0.0044***</td>
<td>-0.0049***</td>
</tr>
<tr>
<td><strong>Implied IV ($1000 income increase)</strong></td>
<td>-0.0050</td>
<td>-0.0042</td>
<td>-0.0026</td>
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<tr>
<td><strong>Sample Mean</strong></td>
<td>0.130</td>
<td>0.119</td>
<td>0.109</td>
</tr>
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</table>
# Prenatal Inputs – Prenatal Care

<table>
<thead>
<tr>
<th>Prenatal Care Visits &lt;5</th>
<th>Less than High School</th>
<th>High School</th>
<th>High School or Below</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>White</td>
<td>Non-White</td>
<td>Age 18-29</td>
</tr>
<tr>
<td>Minimum wage</td>
<td>-0.014***</td>
<td>-0.0053***</td>
<td>-0.0133***</td>
</tr>
<tr>
<td>Implied IV Sample mean</td>
<td>-0.0038</td>
<td>-0.0114</td>
<td>-0.0002</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Months delayed prenatal care</th>
<th>Less than High School</th>
<th>High School</th>
<th>High School or Below</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>White</td>
<td>Non-White</td>
<td>Age 18-29</td>
</tr>
<tr>
<td>Minimum wage</td>
<td>-0.18****</td>
<td>-0.05</td>
<td>-0.16***</td>
</tr>
<tr>
<td>Implied IV Sample Mean</td>
<td>-0.04</td>
<td>-0.14</td>
<td>0.04</td>
</tr>
</tbody>
</table>

**Sample Mean**
- Prenatal Care Visits <5: 0.104, 0.050, 0.058, 0.108, 0.072, 0.062, 0.047, 0.096
- Months delayed prenatal care: 3.427, 2.842, 3.365, 3.106, 2.886, 2.774, 3.381

**Significance Levels**
- ***** p < 0.001
- **  p < 0.01
- *  p < 0.05
## Prenatal Inputs – Prenatal Smoking

<table>
<thead>
<tr>
<th>Any Prenatal Smoking</th>
<th>Less than High School</th>
<th>High School</th>
<th>High School or Below</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>White</td>
<td>Non-White</td>
<td>Age 18-29</td>
</tr>
<tr>
<td>Minimum wage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any Prenatal Smoking</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smoking&gt;5 Cigs. Daily</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Sample Mean

<table>
<thead>
<tr>
<th>Minimum wage</th>
<th>Implied IV 4%</th>
<th>Sample Mean</th>
<th>Implied IV 5%</th>
<th>Sample Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum wage</td>
<td>-0.0090***</td>
<td>0.226</td>
<td>-0.0082**</td>
<td>0.160</td>
</tr>
<tr>
<td>Implied IV</td>
<td>-0.0054</td>
<td>0.171</td>
<td>-0.0066</td>
<td>0.117</td>
</tr>
<tr>
<td>Sample Mean</td>
<td>-0.0037</td>
<td>0.208</td>
<td>-0.0052</td>
<td>0.151</td>
</tr>
<tr>
<td>Implied IV</td>
<td>-0.0138***</td>
<td>0.134</td>
<td>-0.0104***</td>
<td>0.071</td>
</tr>
<tr>
<td>Sample Mean</td>
<td>-0.006*</td>
<td>0.197</td>
<td>-0.007**</td>
<td>0.134</td>
</tr>
<tr>
<td>Implied IV</td>
<td>-0.0015</td>
<td>0.167</td>
<td>-0.0026</td>
<td>0.122</td>
</tr>
<tr>
<td>Sample Mean</td>
<td>-0.008***</td>
<td>0.15</td>
<td>-0.007***</td>
<td>0.11</td>
</tr>
<tr>
<td>Implied IV</td>
<td>-0.0095**</td>
<td>0.23</td>
<td>-0.0097**</td>
<td>0.15</td>
</tr>
</tbody>
</table>
## Cumulative & Lead Effects (HS & Below)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Birth weight</th>
<th>Low birth weight</th>
<th>Fetal growth</th>
<th>Gestation (weeks)</th>
<th>Preterm birth</th>
<th>Months delayed prenatal care</th>
<th>Prenatal Care Visits &lt;5</th>
<th>Any prenatal smoking</th>
<th>Smoking &lt; 5 cigs. daily</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Panel A</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MW (pregnancy)</strong></td>
<td>13.56***</td>
<td>-0.0025***</td>
<td>0.20***</td>
<td>0.10***</td>
<td>-0.004**</td>
<td>-0.11**</td>
<td>-0.0097***</td>
<td>-0.0055*</td>
<td>-0.006*</td>
</tr>
<tr>
<td><strong>Avg. MW (pregnancy + past 2 yrs.)</strong></td>
<td>14.08***</td>
<td>-0.0034***</td>
<td>0.23***</td>
<td>0.12***</td>
<td>-0.006***</td>
<td>-0.16***</td>
<td>-0.0141***</td>
<td>-0.0085*</td>
<td>-0.009*</td>
</tr>
<tr>
<td><strong>Panel C</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Avg. MW (pregnancy + past 2 yrs. +3 years of leads)</strong></td>
<td>11.75***</td>
<td>-0.0030***</td>
<td>0.20***</td>
<td>0.10***</td>
<td>-0.004**</td>
<td>-0.12**</td>
<td>-0.0110***</td>
<td>-0.010**</td>
<td>-0.010*</td>
</tr>
<tr>
<td><strong>MW (one-year lead)</strong></td>
<td>0.14</td>
<td>0.0004</td>
<td>0.01</td>
<td>-0.003</td>
<td>0.0006</td>
<td>0.01</td>
<td>0.0028</td>
<td>0.0001</td>
<td>0.0004</td>
</tr>
<tr>
<td><strong>MW (two-year lead)</strong></td>
<td>1.36</td>
<td>-0.0008</td>
<td>0.005</td>
<td>0.03***</td>
<td>-0.002***</td>
<td>-0.05**</td>
<td>-0.0045**</td>
<td>0.0017</td>
<td>0.0023</td>
</tr>
<tr>
<td><strong>MW (three-year lead)</strong></td>
<td>3.69***</td>
<td>-0.0011**</td>
<td>0.07**</td>
<td>0.03**</td>
<td>-0.002***</td>
<td>-0.09**</td>
<td>-0.008**</td>
<td>0.0022</td>
<td>-0.0013</td>
</tr>
<tr>
<td><strong>Sample Mean</strong></td>
<td>3269.1</td>
<td>0.082</td>
<td>82.051</td>
<td>38.8</td>
<td>0.123</td>
<td>10.8</td>
<td>0.727</td>
<td>0.190</td>
<td>0.132</td>
</tr>
</tbody>
</table>
Specification Checks

- All results / relative magnitudes robust to alternate measures of the MW
  - “Nominal” MW
  - Real MW
  - MW / Baseline Median Wage

- Decision to raise MW cannot be predicted by prior trends in BW, low BW, outcomes

- Non-linear / Dose-response checks
  - Bins for MW Difference (State – Federal)
### Compositional Selection?

#### Panel A: Aggregate State/Year Data

**Outcome: Birth Rate**

<table>
<thead>
<tr>
<th>Sample</th>
<th>Less than High School</th>
<th>High School Graduate</th>
<th>High School or below</th>
<th>Married</th>
<th>Unmarried</th>
<th>White</th>
<th>Black</th>
<th>Ages 18-24</th>
<th>Ages 25-29</th>
<th>Ages 30-34</th>
<th>Ages 35-39</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum Wage (t)</td>
<td>-1.283</td>
<td>1.350</td>
<td>0.624</td>
<td>1.478</td>
<td>-0.789</td>
<td>4.093</td>
<td>6.035</td>
<td>0.433</td>
<td>1.898</td>
<td>2.471</td>
<td>0.221</td>
</tr>
<tr>
<td></td>
<td>(2.240)</td>
<td>(2.141)</td>
<td>(1.995)</td>
<td>(4.205)</td>
<td>(1.432)</td>
<td>(2.976)</td>
<td>(12.343)</td>
<td>(3.176)</td>
<td>(2.678)</td>
<td>(1.809)</td>
<td>(0.995)</td>
</tr>
<tr>
<td>Minimum Wages (t-1)</td>
<td>-0.889</td>
<td>1.820</td>
<td>1.122</td>
<td>2.784</td>
<td>-0.597</td>
<td>4.910</td>
<td>3.870</td>
<td>1.067</td>
<td>3.820</td>
<td>1.755</td>
<td>0.605</td>
</tr>
<tr>
<td></td>
<td>(2.174)</td>
<td>(2.178)</td>
<td>(1.961)</td>
<td>(4.278)</td>
<td>(1.401)</td>
<td>(2.963)</td>
<td>(10.338)</td>
<td>(2.601)</td>
<td>(2.449)</td>
<td>(1.801)</td>
<td>(1.112)</td>
</tr>
<tr>
<td>Mean of Outcome</td>
<td>85.2</td>
<td>78.1</td>
<td>79.7</td>
<td>109.6</td>
<td>60.9</td>
<td>75.3</td>
<td>118.2</td>
<td>120.3</td>
<td>102.9</td>
<td>57.0</td>
<td>23.9</td>
</tr>
<tr>
<td>Observations</td>
<td>1273</td>
<td>1275</td>
<td>1275</td>
<td>1275</td>
<td>1274</td>
<td>1275</td>
<td>1275</td>
<td>1275</td>
<td>1274</td>
<td>1274</td>
<td>1273</td>
</tr>
</tbody>
</table>

#### Panel B: Micro-level Birth Records

**Outcome: Demographic Subgroup**

<table>
<thead>
<tr>
<th>Sample</th>
<th>Less than High School</th>
<th>High School Graduate</th>
<th>High School or below</th>
<th>Married</th>
<th>White</th>
<th>Black</th>
<th>Contin. Age</th>
<th>Ages 18-24</th>
<th>Ages 25-29</th>
<th>Ages 30-34</th>
<th>Ages 35-39</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum Wage</td>
<td>-0.0105*</td>
<td>0.0067</td>
<td>-0.0038</td>
<td>0.0206*</td>
<td>0.0056</td>
<td>-0.0016</td>
<td>0.0065</td>
<td>-0.0038</td>
<td>-0.0027*</td>
<td>0.0031</td>
<td>0.0034*</td>
</tr>
<tr>
<td></td>
<td>(0.0059)</td>
<td>(0.006)</td>
<td>(0.0030)</td>
<td>(0.0093)</td>
<td>(0.0062)</td>
<td>(0.0037)</td>
<td>(0.0680)</td>
<td>(0.0056)</td>
<td>(0.0020)</td>
<td>(0.0038)</td>
<td>(0.0020)</td>
</tr>
<tr>
<td>Mean of Outcome</td>
<td>0.189</td>
<td>0.328</td>
<td>0.517</td>
<td>0.532</td>
<td>0.772</td>
<td>0.181</td>
<td>25.4</td>
<td>0.501</td>
<td>0.268</td>
<td>0.161</td>
<td>0.070</td>
</tr>
<tr>
<td>Observations</td>
<td>87533037</td>
<td>87533037</td>
<td>87533037</td>
<td>45281775</td>
<td>45281775</td>
<td>45281775</td>
<td>45281775</td>
<td>45281775</td>
<td>45281775</td>
<td>45281775</td>
<td>45281775</td>
</tr>
</tbody>
</table>

**Minor selection on marital status (?)**

Not nearly enough to explain the magnitude of the infant health improvements

**At worst – can explain 10% of the improvement**
Placebo?
College-educated Married Mothers

<table>
<thead>
<tr>
<th>Low BW</th>
<th>Fetal Growth</th>
<th>Preterm</th>
<th>Number Prenatal Visits</th>
<th>First trimester care</th>
<th>Months delayed prenatal care</th>
<th>Prenatal Visits &lt; 5</th>
<th>Any prenatal smoking</th>
<th>Smoke &gt; 5 cigs daily</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.0003</td>
<td>0.0256</td>
<td>-0.0019</td>
<td>0.1246</td>
<td>0.0077</td>
<td>-0.0175</td>
<td>-0.0018</td>
<td>-0.0052*</td>
<td>-0.0046</td>
</tr>
<tr>
<td>(0.0004)</td>
<td>(0.0466)</td>
<td>(0.0015)</td>
<td>(0.0918)</td>
<td>(0.0096)</td>
<td>(0.0414)</td>
<td>(0.0011)</td>
<td>(0.0029)</td>
<td>(0.0029)</td>
</tr>
</tbody>
</table>
Effects on Children’s Health

- **National Survey of Children’s Health**
  - Conducted by the NCHS
  - 250,000+ observations

- Match average MW and policy measures over the child’s lifetime
Results: Children 0-17

- Reduce overweight status: 2 pct. pts.
- Reduce:
  - Emotional problems
  - Mental health visits
  - Learning disability
  - Asthma
  - Child is unhappy 4 pct. pts.
- Reduce:
  - Missing school > 5 days 2.6 pct. pts.
- Improve:
  - Maternal general health 1.7%
  - Paternal general health 1.3%
Channels? Time-Use? (ATUS)

- Increase in primary childcare (particularly for married women)

- Increase in secondary childcare (this is time spent on childcare while performing some other primary activity) for both married men and women

- Among married households, an increase in the MW tends to reduce hours worked by mothers (but not the dads)
Future Work

• Alternate identification strategies
  ◦ Synthetic controls
  ◦ Contiguous counties
  ◦ Maternal fixed effects
  ◦ City-level data

• Channels / Mechanisms
  ◦ Health behaviors
  ◦ Program participation

• Pinpoint who exactly is being affected
Summary

• Provide one of the first analysis of how the MW affects infant and child health

• Small, significant and beneficial effect of a minimum wage increase on BW
  ◦ Due to decrease in preterm birth & increase in fetal growth

• For mothers with a high school degree, estimates suggest that an increase in the MW that causes a $1000 increase in annual household income is associated with a 12 gram (0.4% relative to the mean) increase in birth weight and 0.2 percentage point (2.8%) decrease in low birth weight

• Broadly consistent with estimates of the effect of the EITC on infant health, which is another policy that affects incomes of low-wage workers
Conclusion

- Add to the growing body of evidence that labor market policies that enhance wages can affect wellbeing in broader ways than often considered.

- These “other” effects of the minimum wage should enter the debate over its merits.

- Estimates based on the range of the MW observed in the U.S. ($3.35 - $9.04)
  - Non-linearities
  - May not carry over to large increases beyond this range.

- Raising the federal MW from $7.25 to $10 would:
  - Reduce prevalence of low BW by up to 0.6 pct. pt. (6.7%)
  - Reduce prevalence of preterm birth by up to 0.9 pct. pt. (7.2%) among low-educated mothers.
Thank You

Comments most welcome
ddave@bentley.edu
Federal Nominal & Real (in 2012$) MW
State smoking prevalence

Smoking prevalence among adults

Note: Data based on people who have smoked 100 cigarettes or more during their lifetime and currently smoke every day or some days
Source: Centers for Disease Control and Prevention