II. Labour Demand

2. Effect of Minimum Wages on Employment

   1. Overview: Perfect Competition vs. Monopsony

   2. DID Estimates

   3. Time-Series/Cross-Jurisdictional Studies
3.1. Overview

- The textbook model, due to Stigler (1946), of the impact of minimum wages applies to a market for homogeneous workers, which coincides with the entire labour market.

- Assume that this competitive labour market is initially at the equilibrium \((w^*, E^*)\). When the minimum wage is set at \(\bar{w} > w^*\) above the equilibrium wage, firms move up the demand curve and employment falls to \(\bar{E}\).

- As a result of this wage floor, some workers \((E^* - \bar{E})\) are displaced from their current jobs and become unemployed.

- The assumption here is that in the short-run, it may be difficulty for firms to substitute away from the higher priced labour that receives the minimum wage.

- In the long run, the minimum wage increase should induce firms to substitute away from minimum wage workers into using more of other inputs including capital and even higher priced labour that does not receive the minimum wage increase.
• For example: self-service gasoline stations with credit card payment systems have substituted away from low-wage attendants who pump gas.

• Why then introduce a minimum wage in the first place if unemployment increase?

• It is possible that total worker earnings increase: \( \bar{w}\bar{E} \preceq w^*E^* \). If proportional increase in wages is larger than (induced) proportional decline in employment, then the wage bill will increase, even if employment falls.

• In addition, the higher wage encourages additional persons to enter the labour market.

• If \((E_s - E^*)\) additional workers enter the labour market, but cannot find jobs at the minimum wage, this creates more unemployment \((E_s - \bar{E})\) than is caused by the workers’ initial displacement.

• More generally, the unemployment rate is larger the more elastic the demand \((E^* - \bar{E})\) and supply \((E_s - E^*)\) curves and the higher the minimum wage.
Some of the main purposes of minimum wages, as espoused in the literature, are not concerned only with labour market consequences:

1) Alleviate poverty
2) Reduce wage inequality
3) Put a floor below which transactions are not allowed to occur
4) Eliminate low-wage jobs and encourage movement up the value-added chain
5) Provide an incentive to leave income maintenance programs
6) Prevent employers from exploiting earnings supplement programs (WITB, EITC)
7) Increase aggregate demand with associated multiplier effects
8) Help pay for rising tuition fees
9) Protect unprotected workers who have little individual or collective bargaining power
10) Protect protected workers by reducing low-wage competition
11) Reduce the need for unions, and
12) Provide a model for emulation by others.
• In Canada, the federal government sets the minimum wage in the federal jurisdiction (employees of the federal government and businesses operating across provincial or international borders (banking, transportation and telecommunications services, uranium mining and processing, etc.));

• This represents approximately 6% of the Canadian workforce For the remaining 94% of workers, the governments of the provinces and territories have jurisdiction over the minimum wage

• In the United States, the federal government sets a federal minimum wage

• But when the level of federal minimum wage (fixed in nominal term) was eroded by inflation, many high wage states began to set their minimum wage level above the federal minimum wage, which then became the effective minimum wage in these states

• In recent years, with the $15/hour minimum wage movement, several municipal governments have entered the minimum wage scene and introduced their own minimum wage

• The changes over time in the jurisdiction level of minimum wage imposition is an interesting development.
Minimum Wages in Canada


For the other provinces and recent increases, see http://srv116.services.gc.ca/dimt-wid/sm-mw/rpt2.aspx?lang=eng&dec=5
Real and Nominal U.S. Minimum Wage

source: http://www.bls.gov/cpi/

Nominal

Real
Figure A1: The Ratio of Minimum Wages to Average Wages, Canada and the United States, 1975-2010

Source: Lemieux (2011)
Figure 1a. Density of U.S. Women’s Wages and Minimum Wages (Vertical Lines)

Source: DiNardo, Fortin and Lemieux (1996)
Figure 2b. Density of Women's Real Wages in 1979 and 1988

Source: DiNardo, Fortin and Lemieux (1996)
There are many reasons to believe that the real world does not conform to the textbook model.

- **Incomplete coverage** (including informal sector)
- **Monopsony**

  - Offsetting factors in the employment of low wage workers
    - Fringe benefits, working conditions and training
    - Changes in hours of work, e.g. tighter management of offered hours (see Horton, 2017)
    - Train or upgrade existing personnel, i.e. increase their productivity
    - Replace existing personnel by more productive workers drawn into the labour market by the higher wages

  - Minimum wage increases are often an *endogenous* response to labour market conditions in low-wage sectors
    - as shown by reluctance to raise minimum wages when low-wage employment is already under jeopardy.

- Fairness and spill-over issues

- Aggregate demand and multiplier effects
• The impact of minimum wages also depends on the extent of the **coverage** of the minimum wage.

• If there is a **sizeable informal employment sector** (as in many Latin American countries, or with illegal immigrants in the United States), there might be many employers who do not comply with minimum wage laws and the adverse employment effects of minimum wages will be moderated by less-than-universal coverage.

• Assume again that the equilibrium wage is \( w^* \), once a minimum wage \( \bar{w} \) is imposed in the covered sector, \((E_C - \bar{E})\) workers are displaced from the covered sector.

• Some of these displaced workers might move to the uncovered sector, shifting the supply curve in the uncovered sector to \( S_U' \). As a result the uncovered sector wage declines and the number of workers employed in the uncovered sector increases from \( E_U \) to \( E_U' \).

• Alternatively, some workers from the uncovered sector (could be low amenity sector) may decide to move to covered sector, perhaps as unemployed workers for a while. Migration between the sectors would continue as long as workers expected one of the sectors to offer a higher wage.
Another important model that does not predict adverse employment effects of minimum wages is the case of a **non-discriminating monopsonist**.
- an employer whose employment decisions affect the wage rate paid.

The non-discriminating monopsonist pays the **same wage** to all its workers, regardless of the worker’s reservation wage. This contrasts with the case of the discriminating monopsonist who can pay each worker her/his reservation wage.
- the firm’s own labor demand changes the market wage.

The monopsonist maximize

$$\pi(L) = pF(L) - W(L)L$$

where $F_L > 0, F_{LL} < 0, W_L > 0$

$W(L)$ is the wage necessary to “call forth” $L$ workers.

So that the FOC condition is

$$pF_L(L) = W(L) + W_L(L)L$$

$$VPM_L(L) = MC_L(L)$$

The labour supply curve for a monopolist is upward sloping $W_L > 0$, whereas in the competitive market $W_L = 0$. To get one more worker, the monopolist must raise the wage by a small amount.
• Assuming that all workers receive the same pay (i.e., the late-comers don’t get paid more), then the marginal cost of the next worker is not simply her wage but the wage increase given to all of the other (‘infra-marginal’) workers.

• Hence, the marginal labor cost curve $MC_L(L)$ for this firm is even more upward sloping. The additional cost for each worker is given by the higher wage of that worker and by the increase in wage given to the entire pool of workers.

• Rearranging the FOC,

$$W(L) = pF_L(L) - W_L(L)L$$

$$1 = \frac{W(L)}{W(L)} - \frac{\partial W}{\partial L} L$$

$$1 = \frac{VPM_{L}}{W(L)} - \frac{1}{\eta} \Rightarrow W^M = \frac{VPM_{L}}{1+\frac{1}{\eta}} = \frac{\eta}{1+\eta} VPM_{L}$$

• Given that $0 < \frac{\eta}{1+\eta} < 1$, the wage chosen by the monopsonist is lower than the competitive wage the more elastic labour supply is.

• Thus the number of workers $L^M$ he employs is determined by the intersection of his marginal cost curve $MC_L$ and his demand curve $VPM_L$, but the wage he pays $W^M$ is determined by the supply curve.
• The non-discriminating monopsonist employs fewer workers than the competitive level \((L^M < L^*)\) and pays them less \((W^M < W^*)\).

• Thus the imposition of a minimum wage on a monopsonistic market can increase both wages and employment.

• Suppose that the non-discriminating monopsonist is in equilibrium at point A, hiring \(L^M\) at a wage of \(W^M\) and suppose that the government imposes a wage floor of \(\bar{W}\).

• Now the monopsonist can hire up to \(\bar{L}\) workers at the minimum wage (these workers are actually willing to work for less than the minimum wage). But if the monopsonist want to hire more workers (and pay all workers the same wage), then the marginal cost reverts back to its old level.

• This suggests that increasing the minimum wage up to \(W^*\) would do even better at increasing employment.

• However, setting the minimum wage above point A will raise wages but reduce employment.
• A well-designed minimum wage could therefore eliminate the market power of monopsonists and prevent the exploitation of workers.

• Where could we expect to find a monopsony?
  o Company towns
  o If skills are very specific, e.g. Boeing 737 repair technicians
  o ‘Captive’ labour markets, O.R. nurses in towns with single hospital, illegal immigrants in some small labour markets.
  o Fast food restaurants located in nearby towns in NJ and PA?

• The case of fast-food establishments (Card and Krueger, 1994) increasing their employment following the 1992 increase in the minimum wage has been interpreted as evidence that the fast-food industry is a monopsony in terms of employing unskilled teenage workers. Although no direct evidence of supply constraints has been found.
3.3. *DID Estimates*

- For the minimum wage to have any adverse employment effects, it needs to be above the equilibrium wage. So the level of the minimum wage with respect to the average wage (or median wage), it’s “bite” crucial to predict any adverse impact.

- Since this is likely to be the case only for low skilled workers, empirical studies of the impact of the minimum wage have focused on **teens** and **young workers**, and more recently married women.

- Over the 1950s, 60s and 70s, the consensus, based mainly on time series studies was that a 10% increase in the minimum wage led to a 1% - 3% reduction in employment of teens.

- The later studies in Table 5.3 also generally found mild negative disemployment effects of the minimum wage.

- But the landmark study of Card and Krueger (1994) found positive employment effects of increases in the minimum wage, focusing on minimum wage workers.

- This paper is a widely cited study of the impact of the minimum wage on employment levels.
• This study created huge controversy among economists and arguably caused millions of workers to get a raise from the Clinton administration in 1995.

• The quasi-experiment:
  o April 1, 1992: in New Jersey the minimum wage rose from $4.25 to $5.05 per hour (this is a sizable increase)
  o Eastern Pennsylvania (bordering NJ) didn’t raise the minimum wage. Maintained the Federal minimum wage of $4.25 per hour.

• Card and Krueger collected data on employment, starting wages, prices, and other store characteristics for 410 fast-food restaurants in New Jersey and Pennsylvania by phoning managers and assistant managers a few months before and after the change in the minimum wage.

• The timing of the experiment is actually the following:
  o Before: Feb-Mar 1992
  o After: Nov-Dec 1992
• The setup:

<table>
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<tr>
<th></th>
<th>Before</th>
<th>After</th>
<th>Δ</th>
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<tbody>
<tr>
<td>1) NJ</td>
<td>$Y_{n0,b}$</td>
<td>$Y_{n1,a}$</td>
<td>$\Delta Y_n$</td>
</tr>
<tr>
<td>2) PA</td>
<td>$Y_{p0,b}$</td>
<td>$Y_{p0,a}$</td>
<td>$\Delta Y_p$</td>
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DD: $\hat{T} = \Delta Y_n - \Delta Y_p$

• Table 3 in the paper shows "Per store employment"

<table>
<thead>
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<tbody>
<tr>
<td>1) NJ</td>
<td>20.44</td>
<td>21.03</td>
<td>+0.59</td>
</tr>
<tr>
<td>2) PA</td>
<td>23.33</td>
<td>21.37</td>
<td>-2.16</td>
</tr>
</tbody>
</table>

DD: $\hat{T} = \Delta Y_n - \Delta Y_p = 0.59 - (-2.16) = 2.76$

• So, the basic result, with s.e. = 1.36 is statistically significant at the 5% level, corresponds to a whooping 13.5% increase in employment in NJ relative to PA.

• The paper contains many more tests and reduced form estimation of the DD.
• It also started one of the great data “war” in the labour literature.

• Neumark and Wascher (2000) argue that Card and Krueger’s results are an artifact of the survey data they used.
  o They collect payroll data from fast-food restaurants in the same states for the same time-periods and found that the survey data exhibited much more employment variability than did the payroll data (causing them to question the accuracy of the survey data).
  
  o They find that the payroll data imply that a 10% increase in the minimum wage would reduce employment by 1 -2.5% which is almost exactly equal to the earlier consensus estimates of 1 -3%, although their results are often statistically insignificant.

• Card and Krueger (2000) reply by collecting another set of data which they think is more representative of the fast-food industry in the two states than the Neumark-Wascher-data.

• The new Card and Krueger (2000) estimates moved away from their earlier ones of often finding statistically significant positive employment effects, closer to ones that find no employment effect, and this seems their “preferred interpretation”.
Beyond data issues, there are alternative interpretations of the Card-Krueger results:
1. Monopsony
2. Motivational effects
3. Confounding variables (shocks to PA that are not accounted for in the test)
4. Wrong venue (why did they study fast food?)

3. Time-Series/Cross-Jurisdictional Studies

- Dube, Lester and Reich (2010) essentially replicated Card and Krueger's New Jersey-Pennsylvania experiment thousands of times, by comparing employment differences across contiguous U.S. counties with different levels of the minimum wage.

- They constructed a data set of restaurant employment in every quarter between 1990 and 2006 in the 1,381 counties in the United States for which data were available continuously over the full period.

- Matching with the relevant the federal or state minimum wage (whichever was higher) in the county in each quarter of each year in the sample, they were able to compare restaurant employment outcomes across a subset of 318 pairs of bordering counties with different minimum wage levels.
This provided substantially more experimental variation than in the New Jersey-Pennsylvania (and many similar) studies.

- Their preferred strategy exploits variation between contiguous counties straddling a common state boundary and uses the sample with all such contiguous border county-pairs, where $y_{ipt}$ and $e_{ipt}$ denote counties repeated for all pairs:

$$\ln(y_{ipt}) = \alpha + \eta \ln(w_{it}^M) + \delta \ln(y_{it}^{TOT}) + \gamma \ln(pop_{it}) + \phi_i + \tau_{pt} + \varepsilon_{ipt}$$

where $\phi_i$ represents county-fixed effects and $\tau_{pt}$ pair-specific time effects.

- Their identifying assumption in this case is that $E[\ln(w_{it}^M), \varepsilon_{ipt}] = 0$, that is that minimum wage differences within the pair are uncorrelated with the differences in residual employment (or earnings) in either county.

- Since they followed counties over a 16-year period, the researchers were also able to test for the possibility of longer-term effects.

- They “...find strong earnings effects and no employment effects of minimum wage increases.”
• Dube, Lester, and Reich (2010) also identified an important flaw in much of the earlier minimum-wage research based on the analysis of state-level employment patterns:
  ➢ Not controlling for growth in state employment, which is negative correlated with the level of minimum wages at the state level, could lead to substantial bias
  ➢ "The large negative elasticities in the traditional specification are generated primarily by regional and local differences in employment trends that are unrelated to minimum wage policies.”

• Allegretto, Dube, and Reich (2011) analyzed data on teenagers taken from the Current Population Survey (CPS) for the years 1990 through 2009, tracking teen employment at the state level because of smaller sample sizes.
  ➢ When they use standard statistical analyses, they found results similar to those found in that earlier research (a 10 percent increase in the minimum wage reduces teen employment slightly more than 1 percent).
  ➢ But, once they controlled for different regional trends, the estimated employment effects of the minimum wage disappeared, turning slightly positive, but not statistically significantly different from zero.

• Hirsch, Kaufman, and Zelenska (2011) studied the impact of the 2007-2009 increases in the federal minimum wage on a sample of 81 fast-food restaurants in Georgia and Alabama.
  ➢ Including electronic payroll data obtained from the three owners of the 81 establishments.
• They found: "...in line with other recent studies, that the measured employment impact is variable across establishments, but overall not statistically distinguishable from zero."

• The also report that
  “even large increases in minimum wages are modest in comparison to other increases in cost that business owners must routinely absorb or offset. .. managers regard changes in employment or hours as relatively costly and perhaps counter-productive in comparison to other modes of adjustment”

• Addison, Blackburn, and Cotti (2013) use three different data sets: Census of Employment and Wages (QCEW), the Current Population Survey (CPS) and the American Community Survey (ACS)

• To address the above criticisms, they directly incorporate geographic-specific linear trends and also focus on county-border pairs
  ➢ Find limited evidence of overall disemployment effects, but stronger evidence in states with higher unemployment rates

• They also concluded that the standard state panel-data techniques that have typically yielded negative employment effects of the minimum wage appear to be biased toward finding that result.
• Doucouliagos and Stanley (2009) conducted a meta-study of 64 minimum-wage studies published between 1972 and 2007 measuring the impact of minimum wages on teenage employment in the United States and found that most estimates were clustered at zero employment.

• Overall, it is extremely difficult to summarize the empirical evidence on the employment effect of minimum wages.
  o The results vary by methodology, specification and group being examined
  o There is no longer a consensus on the impact
  o The earlier consensus range on the effect of a 10% increase in the minimum wage has likely widened to a “more fragile consensus” range of 0 – 3%.

• Other channels of adjustments (see Schmitt, 2013 for evidence):
  1. Reduction in hours worked
  2. Reductions in non-wage benefits
  3. Reductions in training
  4. Changes in employment composition
  5. Higher prices
  6. Improvements in efficiency
  7. “Efficiency wage” responses from workers
  8. Wage compression
9. Reduction in profits
10. Increases in demand (minimum wage as stimulus)
11. Reduced turnover
Basic readings:
