Empirical Minimum Wage Effects

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Monopsony and the Min

- A binding minimum wage ...
  - (either) moves us back along downward sloping demand
  - (or) takes rents from empowered capitalists and gives them to workers, while possibly *raising* employment
- Minimum wage effects are therefore taken as a litmus test for whether the labor market is competitive
- Some say "most employers are small, and so must pay the going wage." Others note the pervasive presence of recruiting bonuses and the like. Such marginal non-wage inducements to potential job applicants are the Red Badge of Market Power
- Modern evidence on the min comes from diffs-in-diffs style analyses; we'll look briefly at a classic and a modern event-study seeking to gauge effects of higher minimum wages
  - The min debate continues at maximum intensity: see contributions by Neumark and Wascher (2014), Cengiz, et al (2020), Derenoncourt, et al (2022), Ashenfelter and Jurajda (2022), among others. Much of this debate revolves around the relevant control group, the robustness of diffs-in-diffs estimates to group-specific trends, and the power of various research designs to detect plausible effects

Jersey Boys

- The Card and Krueger (1994) study is a landmark of empirical labor economics. CK noticed a brewing debate in the NJ state house over possibly raising the state minimum wage. They set out to survey fast food establishments in NJ and PA, just in case . . .
- The first survey, in Feb 1992, predates the min hike — which indeed happened in April 92. They followed up with a second survey in November 1992

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- This leads to a simple 2*2 differences-in-differences setup, the design of which has since been challenged (by CK 2000, among others)

The Min Happens in Hungary

- Harasztosi and Lindner (2019) exploits a dramatic 2001 increase in the Hungarian minimum wage, examining this with the aid of detailed, high-quality data on firm-level employment, revenues, and factor costs
- This study uses a generalized DD setup based on firm-level "fraction affected", similar to Card (1992); these estimates sail through DD placebo tests
- The results show modest employment effects–who then pays for the sharp rise in labor cost induced by the higher min? Consumers!
- This study neatly estimates substitution and scale effects in a Hicks-Marshall-inspired analysis

Minimum Wages Raise McWages and Big Mac Prices

- Ashenfelter and Jurajda (2022) surveyed 10000+ McDonalds, many affected by city, county, or state minimum wages above the federal minimum
- This study shows
    1. Minimum wages boost wages for all McDonalds restaurants regardless of whether minimum wage changes are binding
    2. Minimum wage changes appear unrelated to adoption of labor-saving touchscreen technology
    3. Minimum wages pass through to Big Mac prices: consumers foot most of the minimum bill

MHE chpt 5

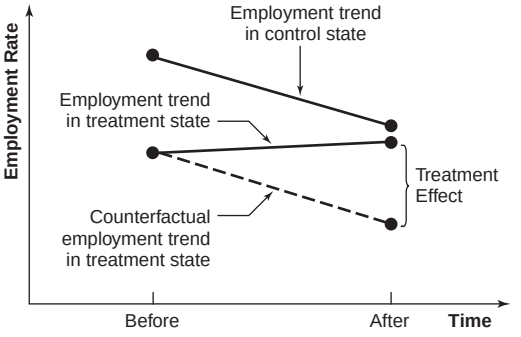


Figure 5.2.1 Causal effects in the DD model.

The common trends assumption can be investigated using data on multiple periods. In an update of their original minimum wage study, Card and Krueger (2000) obtained administrative payroll data for restaurants in New Jersey and a number of Pennsylvania counties. These data are shown here in figure 5.2.2, similar to figure 2 in their follow-up study. The vertical lines indicate the dates when the original Card and Krueger surveys were conducted, and the third vertical line indicates the October 1996 increase in the federal minimum wage to $4.75, which affected Pennsylvania but not New Jersey. These data give us an opportunity to look at a new minimum wage experiment.

TABLE 2—MEANS OF KEY VARIABLES

Variable	Stores in: NJ	PA	t^a
1. *Distribution of Store Types (percentages):*			
a. Burger King	41.1	44.3	−0.5
b. KFC	20.5	15.2	1.2
c. Roy Rogers	24.8	21.5	0.6
d. Wendy's	13.6	19.0	−1.1
e. Company-owned	34.1	35.4	−0.2
2. *Means in Wave 1:*			
a. FTE employment	20.4 (0.51)	23.3 (1.35)	−2.0
b. Percentage full-time employees	32.8 (1.3)	35.0 (2.7)	−0.7
c. Starting wage	4.61 (0.02)	4.63 (0.04)	−0.4
d. Wage = $4.25 (percentage)	30.5 (2.5)	32.9 (5.3)	−0.4
e. Price of full meal	3.35 (0.04)	3.04 (0.07)	4.0
f. Hours open (weekday)	14.4 (0.2)	14.5 (0.3)	−0.3
g. Recruiting bonus	23.6 (2.3)	29.1 (5.1)	−1.0
3. *Means in Wave 2:*			
a. FTE employment	21.0 (0.52)	21.2 (0.94)	−0.2
b. Percentage full-time employees	35.9 (1.4)	30.4 (2.8)	1.8
c. Starting wage	5.08 (0.01)	4.62 (0.04)	10.8
d. Wage = $4.25 (percentage)	0.0	25.3 (4.9)	—
e. Wage = $5.05 (percentage)	85.2 (2.0)	1.3 (1.3)	36.1
f. Price of full meal	3.41 (0.04)	3.03 (0.07)	5.0
g. Hours open (weekday)	14.4 (0.2)	14.7 (0.3)	−0.8
h. Recruiting bonus	20.3 (2.3)	23.4 (4.9)	−0.6

Notes: See text for definitions. Standard errors are given in parentheses.
[a]Test of equality of means in New Jersey and Pennsylvania.

restaurants in New Jersey that had been paying less than $5.05 per hour reported a starting wage equal to the new rate. Interestingly, the minimum-wage increase had no apparent "spillover" on higher-wage restaurants in the state: the mean percentage wage change for these stores was −3.1 percent.

Despite the increase in wages, full-time-equivalent employment *increased* in New Jersey relative to Pennsylvania. Whereas New Jersey stores were initially smaller, employment gains in New Jersey coupled with losses in Pennsylvania led to a small and statistically insignificant interstate

largely unaffected by the new minimum wage, this comparison provides a specification test of the validity of the Pennsylvania control group. The test is clearly passed. Regardless of whether the affected stores are compared to stores in Pennsylvania or high-wage stores in New Jersey, the estimated employment effect of the minimum wage is similar.

The results in Table 3 suggest that employment contracted between February and November of 1992 at fast-food stores that were unaffected by the rise in the minimum wage (stores in Pennsylvania and stores in New Jersey paying $5.00 per hour or more in wave 1). We suspect that the reason for this contraction was the continued worsening of the economies of the middle-Atlantic states during 1992.[13] Unemployment rates in New Jersey, Pennsylvania, and New York all trended upward between 1991 and 1993, with a larger increase in New Jersey than Pennsylvania during 1992. Since sales of franchised fast-food restaurants are procyclical, the rise in unemployment would be expected to lower fast-food employment in the absence of other factors.[14]

B. *Regression-Adjusted Models*

The comparisons in Table 3 make no allowance for other sources of variation in employment growth, such as differences across chains. These are incorporated in the estimates in Table 4. The entries in this table are regression coefficients from models of the form:

$$(1a) \qquad \Delta E_i = a + \mathbf{b}\mathbf{X}_i + c\,\mathrm{NJ}_i + \varepsilon_i$$

or

$$(1b) \qquad \Delta E_i = a' + \mathbf{b}'\mathbf{X}_i + c'\,\mathrm{GAP}_i + \varepsilon_i'$$

where ΔE_i is the change in employment from wave 1 to wave 2 at store i, $\mathbf{X}_i$ is a set of characteristics of store i, and NJ_i is a dummy variable that equals 1 for stores in New Jersey. GAP_i is an alternative measure of the impact of the minimum wage at store i based on the initial wage at that store (W_{1i}):

$$\begin{aligned}
\mathrm{GAP}_i &= 0 \qquad \text{for stores in Pennsylvania} \\
&= 0 \qquad \text{for stores in New Jersey with } W_{1i} \geq \$5.05 \\
&= (5.05 - W_{1i}) / W_{1i} \qquad \text{for other stores in New Jersey.}
\end{aligned}$$

GAP_i is the proportional increase in wages at store i necessary to meet the new minimum rate. Variation in GAP_i reflects both the New Jersey–Pennsylvania contrast and differences within New Jersey based on reported starting wages in wave 1. Indeed, the value of GAP_i is a strong predictor of the actual proportional wage change between waves 1 and 2 ($R^2 = 0.75$), and conditional on GAP_i there is no difference in wage behavior between stores in New Jersey and Pennsylvania.[15]

TABLE 3—AVERAGE EMPLOYMENT PER STORE BEFORE AND AFTER THE RISE IN NEW JERSEY MINIMUM WAGE

Variable	Stores by state			Stores in New Jersey[a]			Differences within NJ[b]	
	PA (i)	NJ (ii)	Difference, NJ − PA (iii)	Wage = $4.25 (iv)	Wage = $4.26–$4.99 (v)	Wage ≥ $5.00 (vi)	Low–high (vii)	Midrange–high (viii)
1. FTE employment before, all available observations	23.33 (1.35)	20.44 (0.51)	−2.89 (1.44)	19.56 (0.77)	20.08 (0.84)	22.25 (1.14)	−2.69 (1.37)	−2.17 (1.41)
2. FTE employment after, all available observations	21.17 (0.94)	21.03 (0.52)	−0.14 (1.07)	20.88 (1.01)	20.96 (0.76)	20.21 (1.03)	0.67 (1.44)	0.75 (1.27)
3. Change in mean FTE employment	−2.16 (1.25)	0.59 (0.54)	2.76 (1.36)	1.32 (0.95)	0.87 (0.84)	−2.04 (1.14)	3.36 (1.48)	2.91 (1.41)
4. Change in mean FTE employment, balanced sample of stores[c]	−2.28 (1.25)	0.47 (0.48)	2.75 (1.34)	1.21 (0.82)	0.71 (0.69)	−2.16 (1.01)	3.36 (1.30)	2.87 (1.22)
5. Change in mean FTE employment, setting FTE at temporarily closed stores to 0[d]	−2.28 (1.25)	0.23 (0.49)	2.51 (1.35)	0.90 (0.87)	0.49 (0.69)	−2.39 (1.02)	3.29 (1.34)	2.88 (1.23)

Notes: Standard errors are shown in parentheses. The sample consists of all stores with available data on employment. FTE (full-time-equivalent) employment counts each part-time worker as half a full-time worker. Employment at six closed stores is set to zero. Employment at four temporarily closed stores is treated as missing.

[a]Stores in New Jersey were classified by whether starting wage in wave 1 equals $4.25 per hour ($N = 101$), is between $4.26 and $4.99 per hour ($N = 140$), or is $5.00 per hour or higher ($N = 73$).

[b]Difference in employment between low-wage ($4.25 per hour) and high-wage (≥ $5.00 per hour) stores; and difference in employment between midrange ($4.26–$4.99 per hour) and high-wage stores.

[c]Subset of stores with available employment data in wave 1 and wave 2.

[d]In this row only, wave-2 employment at four temporarily closed stores is set to 0. Employment changes are based on the subset of stores with available employment data in wave 1 and wave 2.

TABLE 4—REDUCED-FORM MODELS FOR CHANGE IN EMPLOYMENT

Independent variable	Model (i)	(ii)	(iii)	(iv)	(v)
1. New Jersey dummy	2.33 (1.19)	2.30 (1.20)	—	—	—
2. Initial wage gap[a]	—	—	15.65 (6.08)	14.92 (6.21)	11.91 (7.39)
3. Controls for chain and ownership[b]	no	yes	no	yes	yes
4. Controls for region[c]	no	no	no	no	yes
5. Standard error of regression	8.79	8.78	8.76	8.76	8.75
6. Probability value for controls[d]	—	0.34	—	0.44	0.40

Notes: Standard errors are given in parentheses. The sample consists of 357 stores with available data on employment and starting wages in waves 1 and 2. The dependent variable in all models is change in FTE employment. The mean and standard deviation of the dependent variable are −0.237 and 8.825, respectively. All models include an unrestricted constant (not reported).

[a]Proportional increase in starting wage necessary to raise starting wage to new minimum rate. For stores in Pennsylvania the wage gap is 0.

[b]Three dummy variables for chain type and whether or not the store is company-owned are included.

[c]Dummy variables for two regions of New Jersey and two regions of eastern Pennsylvania are included.

[d]Probability value of joint F test for exclusion of all control variables.

Parallel trends ?

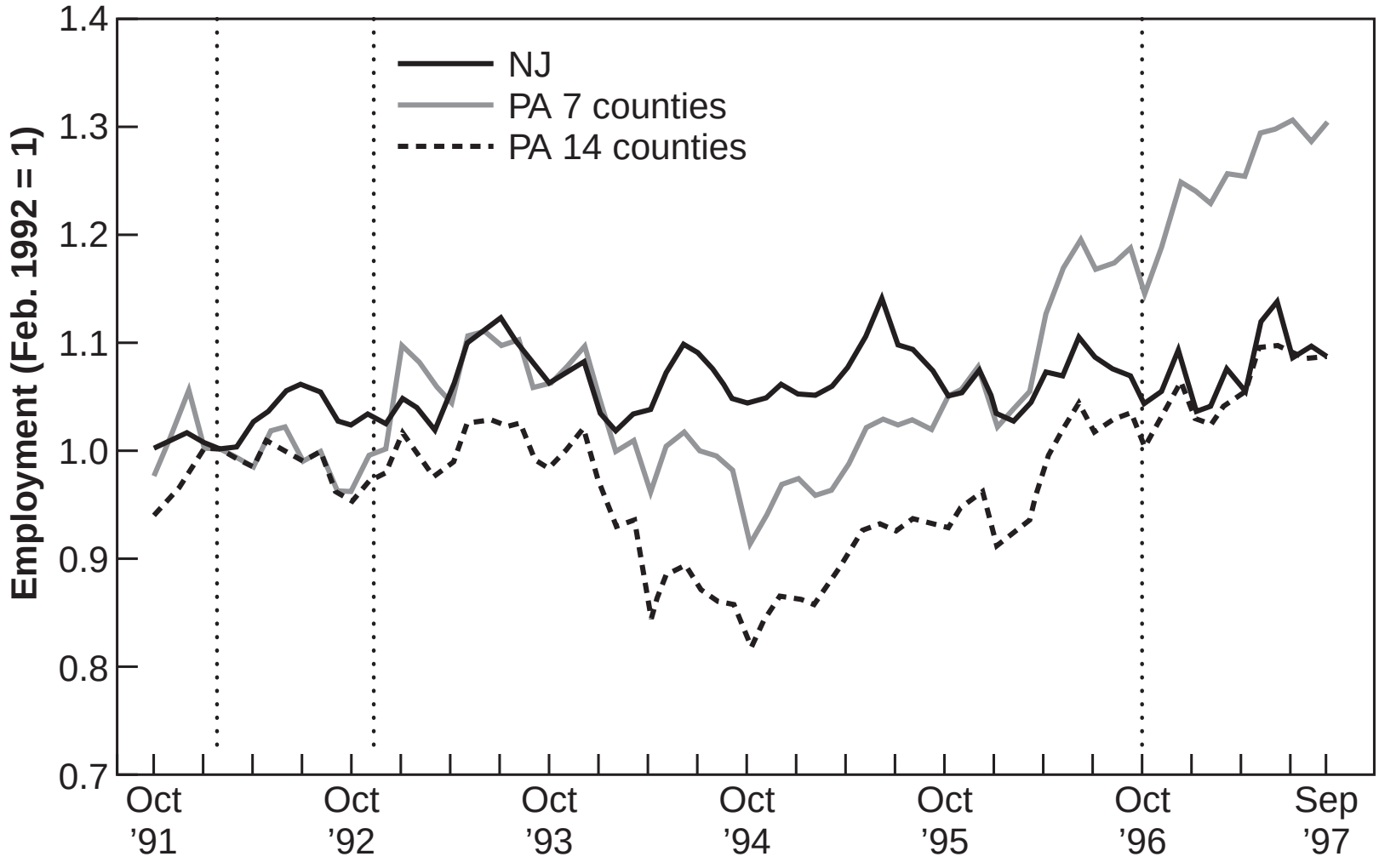
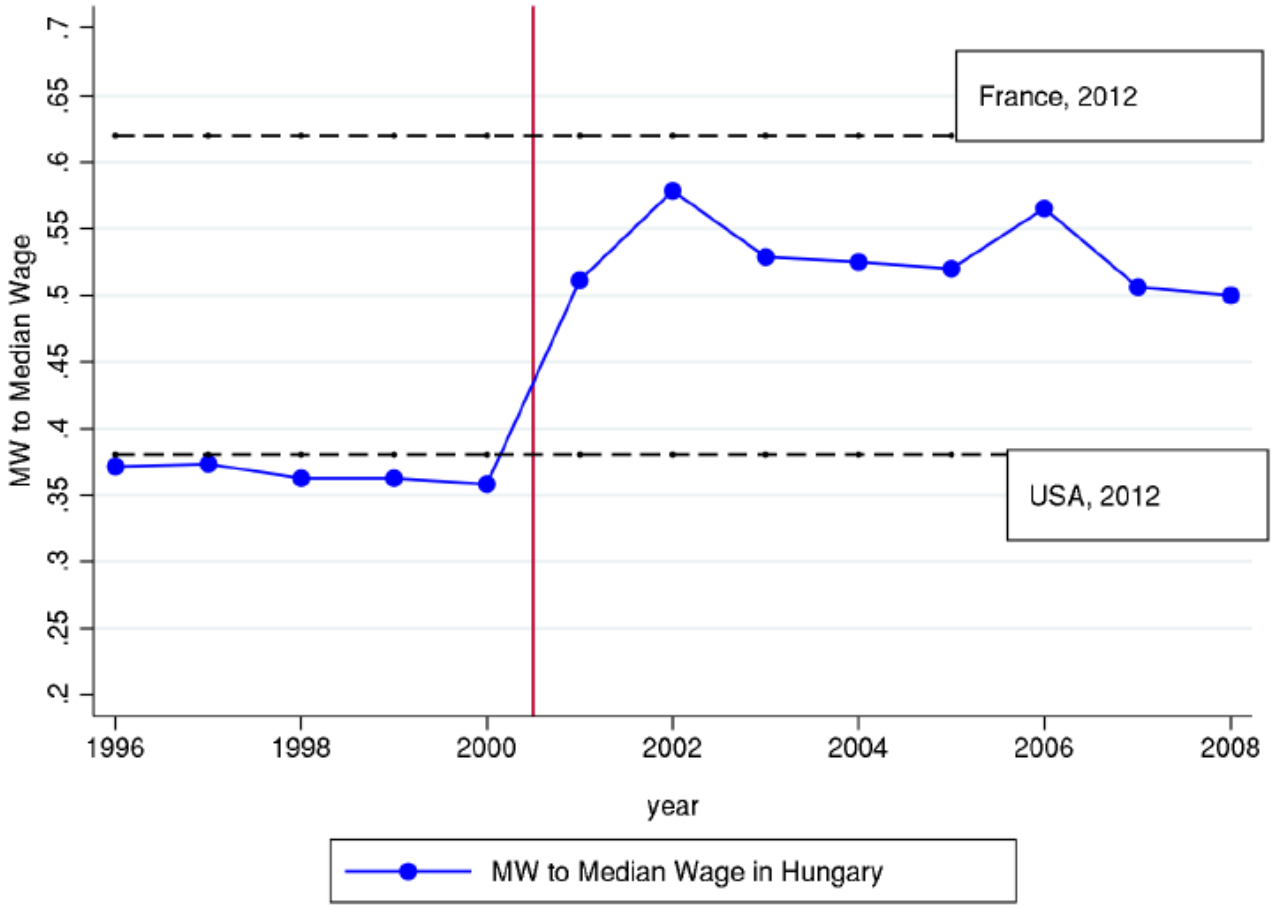


Figure 5.2.2 Employment in New Jersey and Pennsylvania fast food restaurants, October 1991 to September 1997 (from Card and Krueger 2000). Vertical lines indicate dates of the original Card and Krueger (1994) survey and the October 1996 federal minimum wage increase.

Harasztosi and Lindner (2019)

- US minimum wage variation tends to be small and short run in nature
- Hungary experienced a large (60%) and persistent (8 years) increase in minimum wage in 2001
- Use firm level exposure design to infer MW effects
- Findings:
  - Small disemployment effects; e.g., 1% wage increase leads to firms cutting back employment by -0.2%
  - Substantial cost pass-through to consumers: e.g., 1% wage increase leads firms to raise prices by 0.3%
  - Who Pays for the Minimum Wage? Consumers, while low-wage workers benefit

Large MW increase



II. Employment Effects of the Minimum Wage

Identification Strategy.—We estimate the employment effects of the minimum wage by comparing the evolution of key outcome variables at firms with many workers affected by the minimum wage increase to those firms with few affected workers. We closely follow Machin, Manning, and Rahman (2003) and Draca, Machin, and Van Reenen (2011) and estimate regression models of the following form:

$$\frac{y_{it} - y_{i2000}}{y_{i2000}} = \alpha_t + \beta_t FA_i + \gamma_t X_{it} + \varepsilon_{it}\,, \tag{1}$$

where the left-hand side is the percentage change in outcome y between year 2000, the final full calendar year before the minimum wage increase, and year t.[10] This specification allows time effects and the impact of firm characteristics, γ_t, to vary flexibly over time.

Table 2—Employment and Wage Effects

	Main changes between 2000 and 2002		Main changes between 2000 and 2004		Placebo changes between 2000 and 1998	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Change in firm-level employment						
Fraction affected	−0.078	−0.076	−0.093	−0.100	−0.003	0.002
	(0.008)	(0.010)	(0.012)	(0.012)	(0.008)	(0.009)
Constant	−0.050		−0.105		0.046	
	(0.005)		(0.007)		(0.005)	
Observations	19,485	19,485	19,485	19,485	19,485	19,485
Employment elasticity with respect to *MW* (directly affected)	−0.11	−0.10	−0.15	−0.15		
	(0.01)	(0.01)	(0.02)	(0.02)		
Panel B. Change in firm-level average wage						
Fraction affected	0.53	0.58	0.48	0.54	−0.02	−0.03
	(0.01)	(0.01)	(0.01)	(0.01)	(0.003)	(0.01)
Constant	0.08		0.16		−0.08	
	(0.002)		(0.01)		(0.001)	
Observations	18,415	18,415	16,980	16,980	19,485	19,485
Employment elasticity with respect to wage	−0.15	−0.13	−0.20	−0.18		
	(0.02)	(0.02)	(0.03)	(0.03)		
Panel C. Change in firm-level average cost of labor						
Fraction affected	0.47	0.49	0.41	0.43	−0.03	−0.04
	(0.01)	(0.01)	(0.01)	(0.01)	(0.003)	(0.01)
Constant	0.04		0.10		−0.04	
	(0.001)		(0.002)		(0.001)	
Observations	18,415	18,415	16,980	16,980	19,485	19,485
Employment elasticity with respect to cost of labor	−0.17	−0.16	−0.22	−0.23		
	(0.02)	(0.02)	(0.03)	(0.03)		
Controls	No	Yes	No	Yes	No	Yes

Notes: This table shows the firm-level relationship between the fraction of workers exposed to the minimum wage and the change in employment (panel A), the change in average wage (panel B), and the change in average cost of labor (panel C). The cost of labor includes wages, social security contributions, and non-wage labor expenses. The estimates are based on equation (1). The employment changes include both extensive margin (closing) and intensive margin (layoff) decisions. Columns 1 and 2 show the short-term effects (the change between 2000 and 2002), columns 3 and 4 the medium-term changes (changes between 2000 and 2004). Columns 5 and 6 test for the presence of preexisting trends by looking at the effect on "placebo" changes, which equal to the year 1998 outcome minus the year 2000 outcome. Columns 1, 3, and 5 show the raw correlations, while columns 2, 4, and 6 show the

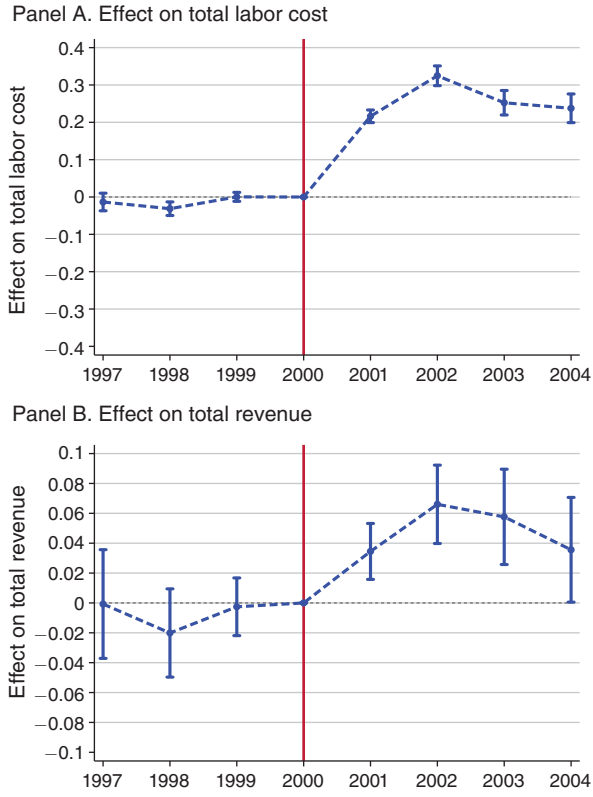
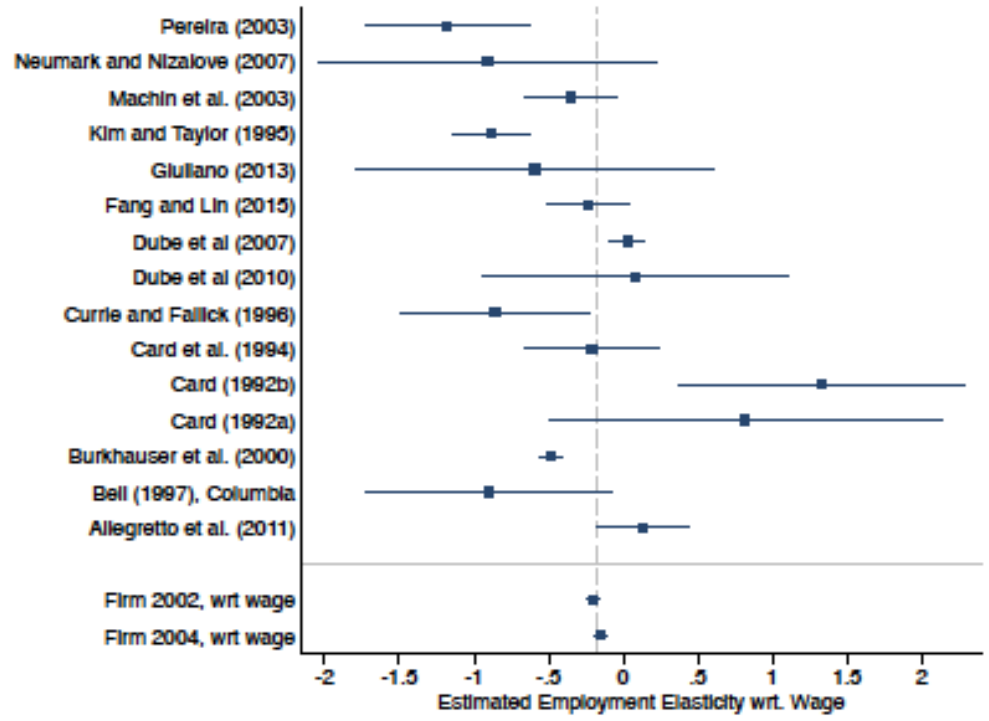


FIGURE 3. EFFECT ON TOTAL LABOR COST AND ON REVENUE

Notes: This figure shows the relationship between changes in different outcome variables and the fraction of workers affected by the minimum wage hike over time (beta coefficients with its 95 percent confidence intervals from equation (1)). Panel A shows the effects on changes in total labor cost, while panel B on changes in total revenue. Both panel A and panel B show regression results which include firms' extensive (firm closure) and intensive margin responses. Controls are also included in the regressions.

Figure 4: Employment Elasticity in the Literature and in this Paper



Notes: This figure summarizes the estimated employment elasticity with respect to wage and compares it to the previous estimates in the literature. The dashed vertical line show our preferred estimate for the employment elasticity, which is -0.2. In cases where the standard errors of the labor demand elasticity was not directly reported by the authors we used the delta method to obtain the standard errors (see the details in the Online Appendix).

Table 4
ln(*BigMacPrice*) and Instrumented McWages, 2016–20

	(1)	(2)	(3)	(4)
Instrumented ln(*McWage*)	.202***	.194***	.200***	.186***
	(.043)	(.057)	(.057)	(.073)
Affected by *MW* increase			−.051	−.049
			(.024)	(.047)
Instrumented ln(*McWage*) affected			.022	.022
			(.020)	(.020)
Observation level	Restaurant	County	Restaurant	County
Fixed effects	Restaurant and year	County and year	Restaurant and year	County and year
Observations	52,281	2,658	40,739	2,273

NOTE.—Standard errors are shown in parentheses. The first stage for ln(*McWages*) is presented in table 2. Significance is based on errors clustered at the state level. We use county-level aggregates only when there are at least five restaurant observations per county and year.
*** Significant at the 1% level.

of the minimum wage price pass-through literature—the reduced-form relationship between prices and minimum wages:

$$\ln(BigMacPrice_{it}) = \alpha + \beta \ln(MW_{it}) + \delta_i + \varphi_t + \varepsilon_{it}. \quad (3)$$

The fact that restaurants, which already paid a wage rate above the newly increased minimum wage level, increase their wages similarly to restaurants that were paying below the new minimum wage level in the previous year is consistent with the lack of an interaction with being affected estimated in

Ashenfelter and Jurajda

Table 5
ln(*BigMacPrice*) and Minimum Wages, 2016–20

	(1)	(2)	(3)	(4)
ln(*MW*)	.138***	.124***	.131***	.127***
	(.031)	(.042)	(.041)	(.052)
Affected by *MW* increase			−.042	−.043
			(.027)	(.033)
ln(*MW*) affected			.017	.017
			(.011)	(.014)
Observation level	Restaurant	County	Restaurant	County
Fixed effects	Restaurant and year	County and year	Restaurant and year	County and year
Observations	52,281	2,659	40,739	2,273

NOTE.—Standard errors are shown in parentheses. Significance is based on errors clustered at the state level. We use county-level aggregates only when there are at least five restaurant observations per county and year.

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