

14.03/14.003 Fall 2015

Slides to accompany  
Card and Krueger, 1994

# Diff-in-Diff Setting

	Before	After	$\Delta$
NJ	$Y_{n0}$	$Y_{n1}$	$\Delta Y_n$
PA	$Y_{p0}$	$Y_{p1}$	$\Delta Y_p$

$$\hat{T} = \Delta Y_n - \Delta Y_p$$

# Card & Krueger Table 3

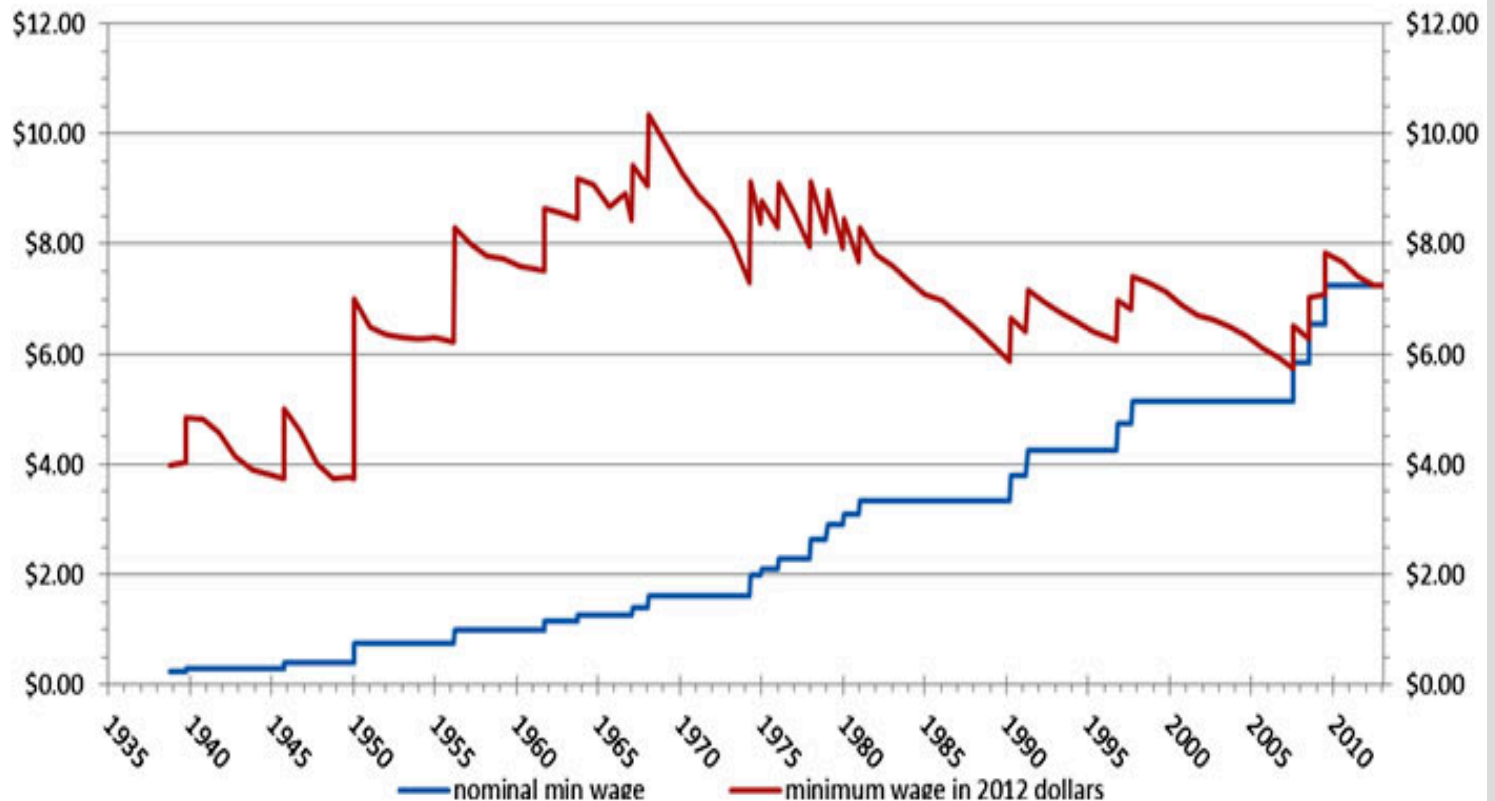
## Per-Store (FTE) Employment:

	Before	After	$\Delta$
NJ	20.44	21.03	$\Delta Y_n = 0.59$
PA	23.33	21.37	$\Delta Y_p = -2.16$

$$\hat{T} = 0.59 - (-2.16) = 2.76$$

# Nominal and Inflation Adjusted U.S. Minimum Wage, 1938 to 2012

**Minimum wage from 1938 to 2012**  
in nominal dollars and inflation-adjusted 2012 dollars



[View the minimum wage from 1938 to 2012 data](#)

Source: U.S. Department of Labor, Wage & Hour Division, [www.dol.gov/whd/minwage/chart.htm](http://www.dol.gov/whd/minwage/chart.htm)

<sup>1</sup>Inflation adjusted using CPI-W, annual averages 1938 to 2012, [bls.gov/cpi](http://bls.gov/cpi)



TABLE 1—SAMPLE DESIGN AND RESPONSE RATES

		Stores in:	
	All	NJ	PA
<i>Wave 1, February 15 – March 4, 1992:</i>			
Number of stores in sample frame: <sup>a</sup>	473	364	109
Number of refusals:	63	33	30
Number interviewed:	410	331	79
Response rate (percentage):	86.7	90.9	72.5

*Wave 2, November 5 – December 31, 1992:*

Number of stores in sample frame:	410	331	79
Number closed:	6	5	1
Number under renovation:	2	2	0
Number temporarily closed: <sup>b</sup>	2	2	0
Number of refusals:	1	1	0
Number interviewed: <sup>c</sup>	399	321	78

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TABLE 2—MEANS OF KEY VARIABLES

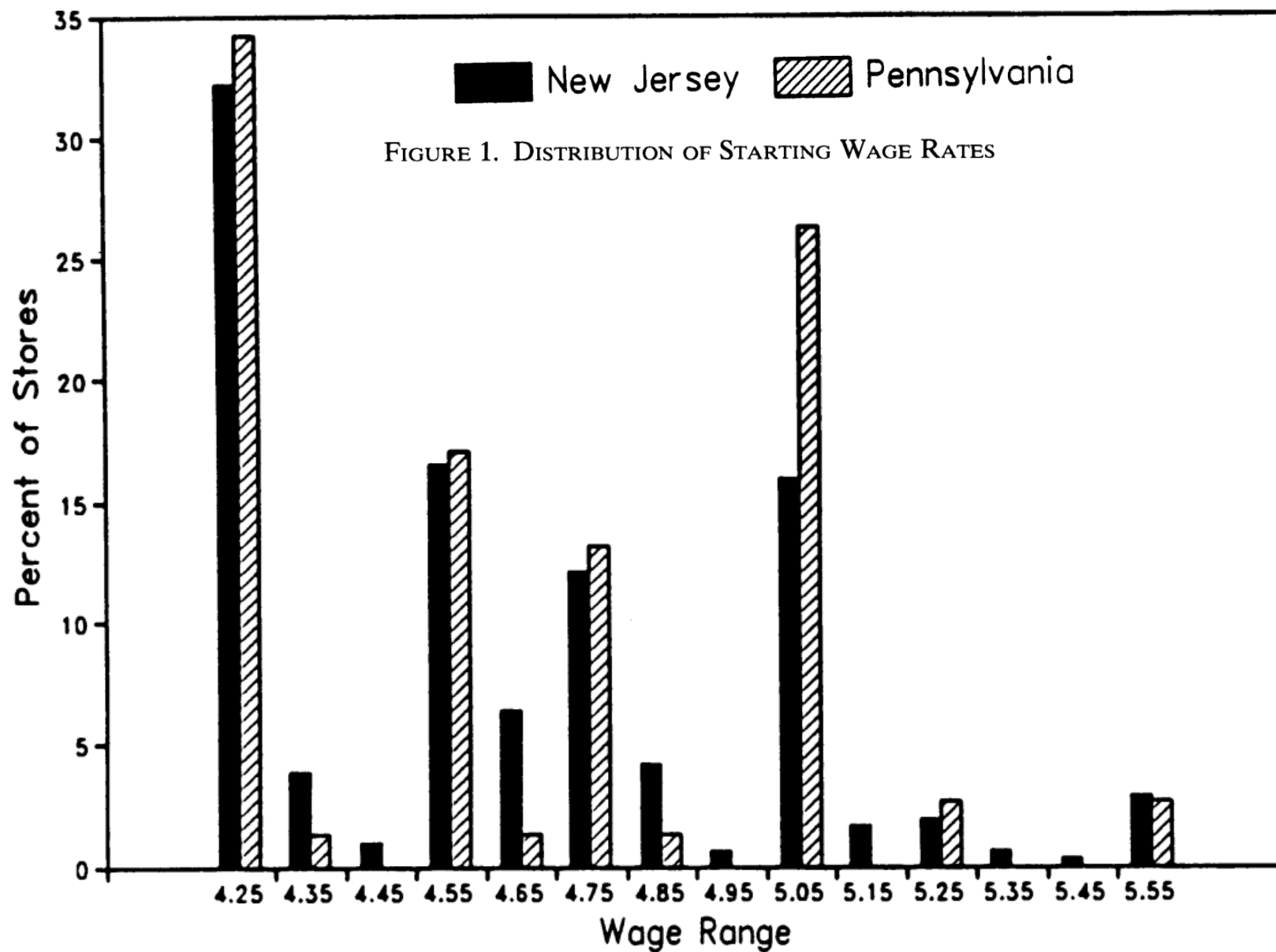
Variable	Stores in:		<i>t</i> <sup>a</sup>
	NJ	PA	
1. <i>Distribution of Store Types (percentages):</i>			
a. Burger King	41.1	44.3	− 0.5
b. KFC	20.5	15.2	1.2
c. Roy Rogers	24.8	21.5	0.6
d. Wendy's	13.6	19.0	− 1.1
e. Company-owned	34.1	35.4	− 0.2
2. <i>Means in Wave 1:</i>			
a. FTE employment	20.4 (0.51)	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



TABLE 2—MEANS OF KEY VARIABLES

Variable	Stores in:		<i>t</i> <sup>a</sup>
	NJ	PA	
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

February 1992



November 1992

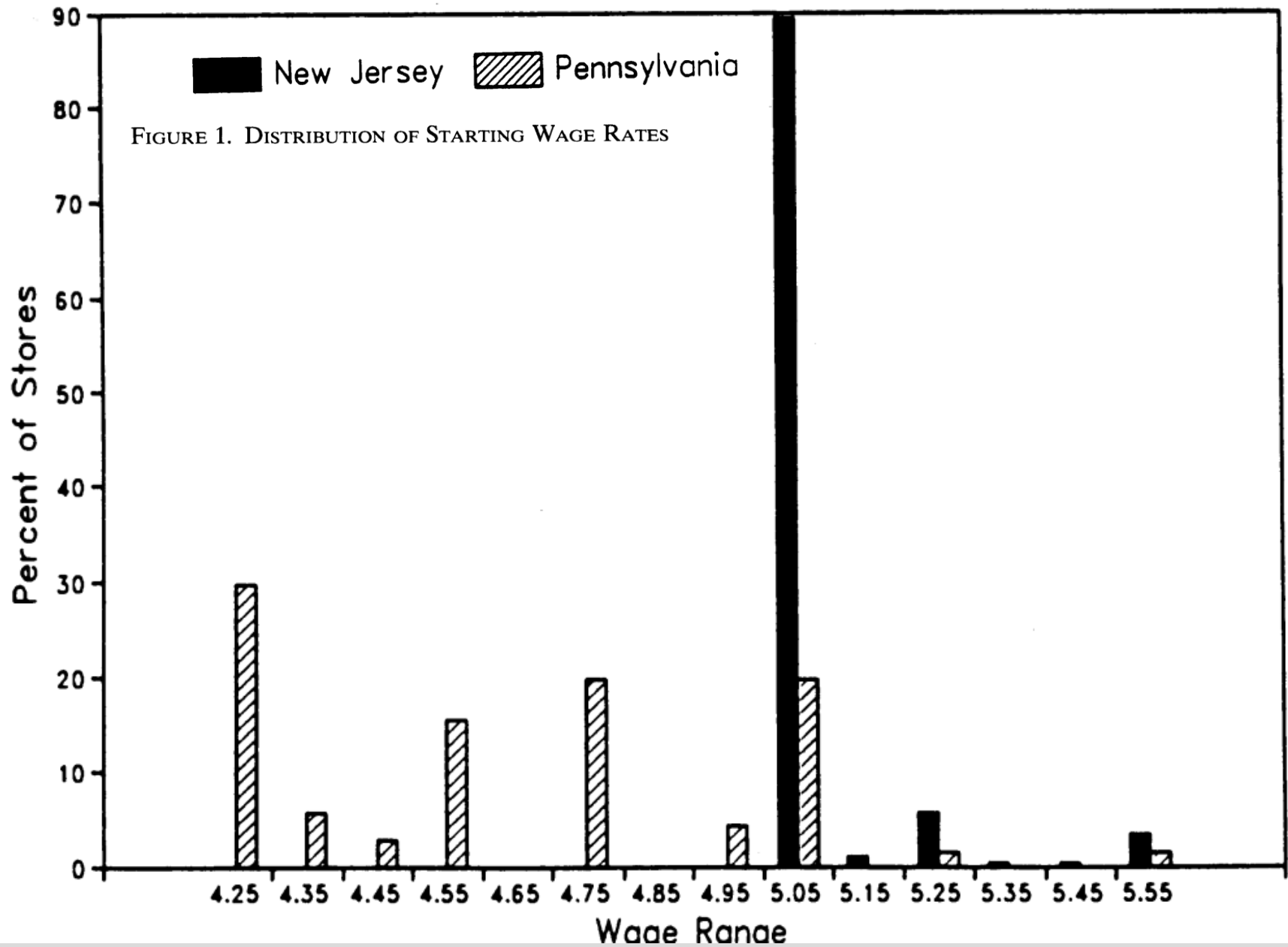


TABLE 3—AVERAGE EMPLOYMENT PER STORE BEFORE AND AFTER THE RISE  
IN NEW JERSEY MINIMUM WAGE

Variable	Stores by state		
	PA (i)	NJ (ii)	Difference, NJ – PA (iii)
1. FTE employment before, all available observations	23.33 (1.35)	20.44 (0.51)	– 2.89 (1.44)
2. FTE employment after, all available observations	21.17 (0.94)	21.03 (0.52)	– 0.14 (1.07)
3. Change in mean FTE employment	– 2.16 (1.25)	0.59 (0.54)	2.76 (1.36)

TABLE 3—AVERAGE EMPLOYMENT PER STORE BEFORE AND AFTER THE RISE  
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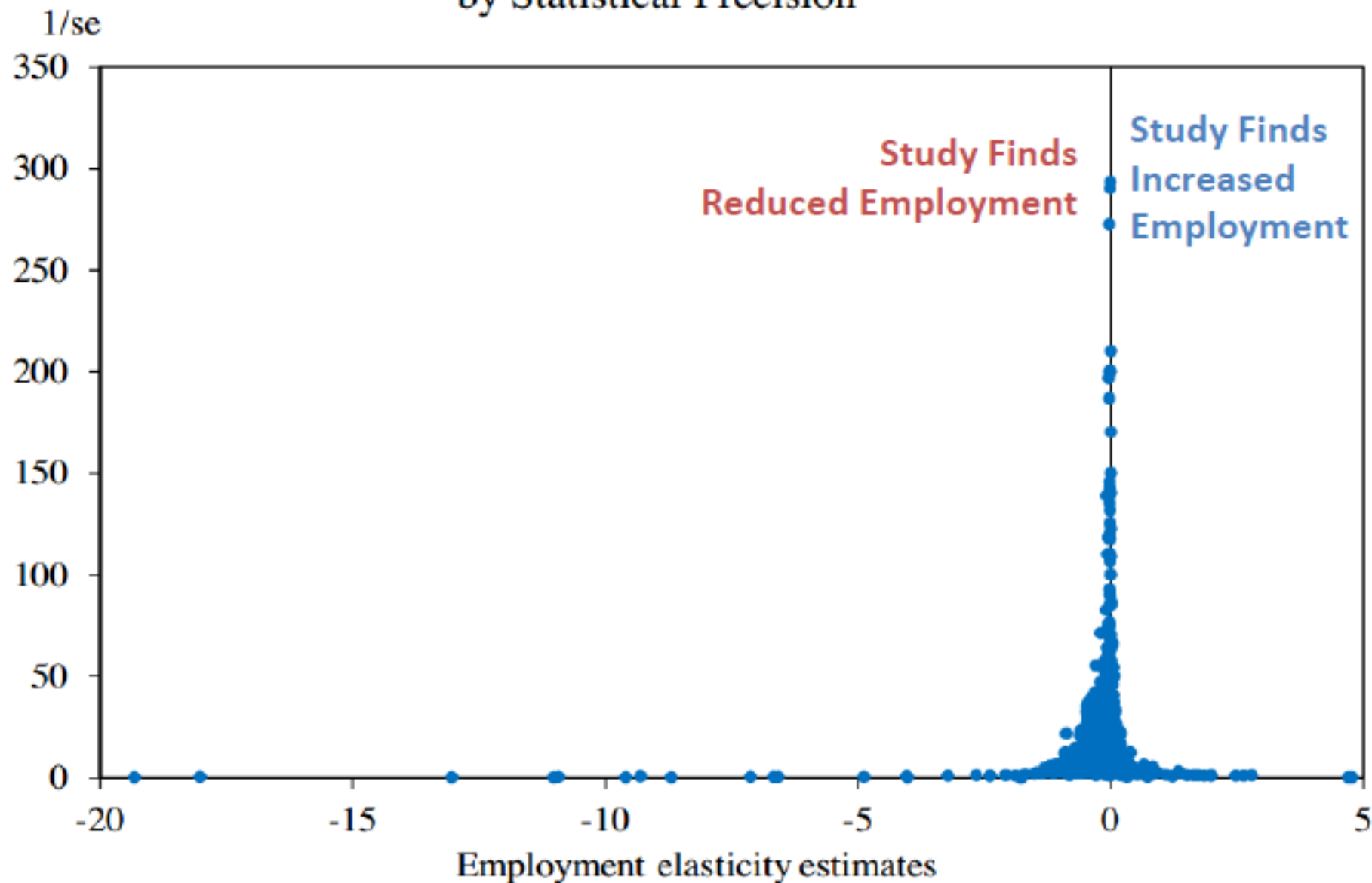
Variable	Stores in New Jersey <sup>a</sup>		
	Wage = \$4.25 (iv)	Wage = \$4.26–\$4.99 (v)	Wage ≥ \$5.00 (vi)
1. FTE employment before, all available observations	19.56 (0.77)	20.08 (0.84)	22.25 (1.14)
2. FTE employment after, all available observations	20.88 (1.01)	20.96 (0.76)	20.21 (1.03)
3. Change in mean FTE employment	1.32 (0.95)	0.87 (0.84)	–2.04 (1.14)

TABLE 4—REDUCED-FORM MODELS FOR CHANGE IN EMPLOYMENT

Independent variable	(i)	(ii)
1. New Jersey dummy	2.33 (1.19)	2.30 (1.20)
2. Initial wage gap <sup>a</sup>	—	—
3. Controls for chain and ownership <sup>b</sup>	no	yes
4. Controls for region <sup>c</sup>	no	no

Specification	Change in employment
	NJ dummy (i)
1. Base specification	2.30 (1.19)
2. Treat four temporarily closed stores as permanently closed <sup>a</sup>	2.20 (1.21)
3. Exclude managers in employment count <sup>b</sup>	2.34 (1.17)
4. Weight part-time as $0.4 \times$ full-time <sup>c</sup>	2.34 (1.20)
5. Weight part-time as $0.6 \times$ full-time <sup>d</sup>	2.27 (1.21)
6. Exclude stores in NJ shore area <sup>e</sup>	2.58 (1.19)
7. Add controls for wave-2 interview date <sup>f</sup>	2.27 (1.20)
8. Exclude stores called more than twice in wave 1 <sup>g</sup>	2.41 (1.28)

# Estimates of the Effect of Minimum Wage on Employment by Statistical Precision



Note: "SE" refers to the standard error.

Source: Doucouliagos and Stanley (2009); data provided by John Schmitt.



## **Key findings from decades of research on minimum wage**

### **1. Increases worker productivity:**

- Greater motivation, perception of fairness (e.g., Bewley 1999; Mas 2006).
- Increased morale, raises productivity. Workers monitor each other when fair wages; culture of hard work, less supervising (Akerlof 1986; Akerlof 2012).
- Improved focus on job. Help in maintaining a better physical & mental health, relieve “decision fatigue” (Mani, et al 2013; Shah et al, 2012).

### **2. Reduces turnover, save in recruiting/training costs.**

(Dube, Reich, and Naidu 2005; Dube, Lester, and Reich 2013).

### **3. Reduces absenteeism, increasing productivity**

(Allen 1983; Mefford 1986; Pfeifer 2010; Zhang 2013).