

# **A Literature Review of Minimum Wages**

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## 1. Introduction

The minimum wage has been a core element of public policy for more than a century. Originating in the 1890s in New Zealand and Australia, minimum wages spread to the U.K. in 1909 and to nearly one-third of U.S. states during the next twenty years (Neumark and Wascher 2009). In 1938, the U.S. Congress passed a federal minimum wage law as part of the Fair Labor Standards Act (FLSA). Since that time, minimum wages have been introduced in some form or another in numerous other industrialized countries, as well as in some developing countries. As a result, by the 1990s, minimum wages existed in over on hundred countries from all parts of the world, and the International Labour Organization (ILO) has designed the minimum wage as an international labor standard (International Labour Organization 2006).

Despite that the goals<sup>1</sup> associated with the minimum wage are widely accepted as right and proper, however, there is much less agreement about whether the minimum wage is effective at attaining these goals. Although overwhelmingly popular with the public in the United States, the minimum wage has, from the time of its introduction, been highly controversial in the political arena. In addition, minimum wages have typically received less support from economists, who from the very beginning of the minimum wage debate pointed to the potential loss of jobs stemming from a wage floor. Despite decades of economic research, policy debates about the costs and benefits of minimum wages continue to the present day.

Based on their comprehensive reading of the evidence, Neumark and Wascher (2009) argue that minimum wages do not achieve the main goals set forth by their supporters. Here are the main findings in the literature:

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<sup>1</sup> Such as combat the proliferation of so-called sweatshops in manufacturing industries, ensure that the workers receive a “fair” wage for their work, help individuals or families achieve self-sufficiency, etc.

First, minimum wages reduce employment opportunities for less-skilled workers, especially those who are most directly affected by the minimum wage. Second, although minimum wages compress the wage distribution, because of employment and hours declines among those whose wages are most affected by minimum wage increase, a higher minimum wage tends to reduce rather than to increase the earnings of the lowest-skilled individuals. Third, minimum wages do not, on net, reduce poverty or otherwise help low-income families, but primarily redistribute income among low-income families and may increase poverty. Fourth, minimum wages appear to have adverse longer-run effects on wages and earnings, in part because they hinder the acquisition of human capital. Fifth, in comparison with the vast literature on the effects of the minimum wage on employment and wages, research on the influence of minimum wages on firm profits has been relatively little.

Note that these findings come largely from U.S. evidence; correspondingly, these conclusions apply most strongly to the evaluation of minimum wage policies in the United States. Compared to the abundant minimum wage research in the literature, studies on minimum wages in China are relatively sparse. Therefore, this gives us a great opportunity to think about: In China, what minimum wage questions can we study? What the effects of minimum wages will be? Do the effects similar to those in the literature, and why? And most important of all, what are the implications to policymakers?

This document summarizes the findings of minimum wages from many aspects in the economics literature and we hope it can provide a good starting point for researchers who are interested in the minimum wage study in China.

## **2. A Brief History of the Minimum Wage**

### *New Zealand*

Although the majority of research on the effects of the minimum wage has focused on the United States, the first minimum wage laws were enacted in New Zealand in 1894 and in Australia in 1896. In New Zealand, the minimum wage was a by-product of the Industrial Conciliation and Arbitration Act, which established District Conciliation Boards to arbitrate industrial labor disputes (Neumark and Wascher 2009). In 1899, New Zealand set a nationwide minimum wage, which was primarily intended to prevent employers from hiring children, or apprentices at no pay.

### *Australia*

In contrast, minimum wages in Australia were determined at the state level and took two basic forms. In 1896, the state of Victoria established a set of “wage boards”, each of which consisted of equal numbers of employee and employer representatives from a particular trade, and was chaired by an impartial third party. These boards would meet to determine the appropriate minimum wage rate for that trade, and the agreed-upon wage would then become binding for all employers in that trade in the state. This form was subsequently followed by South Australia in 1900, Queensland in 1908 and Tasmania in 1910. Other states copied the original New Zealand form, such as New South Wales in 1901 and Western Australia in 1902, in which minimum wages could be set as part of compulsory arbitration between employer associations and unions (Neumark and Wascher 2009).

### *England*

England adopted the Victorian wages boards form in 1909, but initially applied it to only four “sweating”<sup>2</sup> industries. As in most parts of Australia, the trade boards in England consisted of equal numbers of representatives from employers and employees, as well as appointees not associated with either group. Minimum wages in England covered both men and women, and varied by industry, sex, age, and experience.

### *United States*

There were also widespread concerns in the early 1900s about sweatshops in the United States, especially about the working conditions of women and children. As a result, interest in the minimum wage quickly spread to the other side of the Atlantic. In 1912, Massachusetts took the first steps toward introducing the minimum wage to the United States. Other states soon followed, and by 1923 fifteen states, the District of Columbia, and Puerto Rico had their minimum wage legislations enacted (Prasch 1999; Walterman 2000). In many respects, these U.S. state minimum wage laws followed the broad outlines of those in Australia and England.

The economic problems of the Great Depression were stimulating interest in minimum wage legislation at the federal level. In 1933, President Roosevelt, as part of the New Deal, signed the National Industrial Recovery Act (NIRA), which, among other things, pressured employers to agree “to a workweek between 35 and 40 hours and minimum wage of \$12 to \$15 a week” (Grossman 1978). In 1935, however, the Supreme Court declared the NIRA unconstitutional. This decision led many employers to retreat from the wage and hours practices that they had agreed to under the NIRA.

Following his reelection in November 1936, Roosevelt renewed his efforts to implement a federal minimum wage. After several failed legislative efforts, a compromise bill was approved

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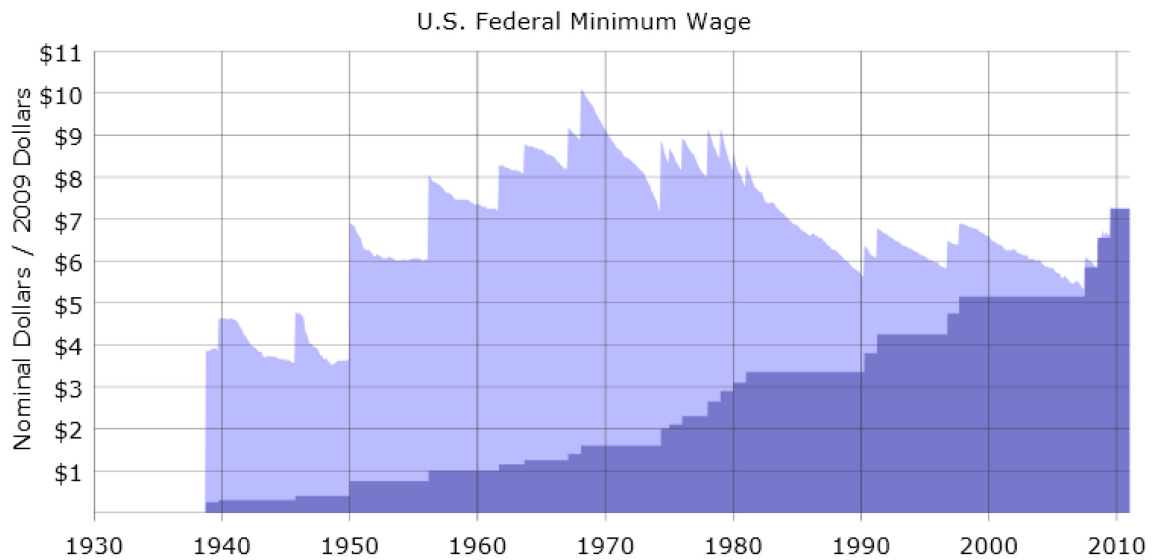
<sup>2</sup> The British Board of Trade defined these employment conditions as unusually low wage rates, excessive hours of labor, and /or unsanitary workplaces.

by the Congress and signed by Roosevelt in June 1938. The FLSA provided for an initial minimum wage of 25 cents per hour, with an increase to 30 cents in the second year and a minimum wage of at least 40 cents per hour by 1945. The evolution of the minimum wage under the FLSA is shown in Table 1.

**Table 1 History of the U.S Federal Minimum Wage Legislation**

Year	Wage	Year	Wage
Oct.24, 1938	\$0.25	Jan.1, 1978	\$2.65
Oct.24, 1939	\$0.30	Jan.1, 1979	\$2.90
Oct.24,1945	\$0.40	Jan.1, 1980	\$3.10
Jan.25, 1950	\$0.75	Jan.1, 1981	\$3.35
Mar.1, 1956	\$1.00	Apr.1, 1990	\$3.80
Sep.3, 1961	\$1.15	Apr.1, 1991	\$4.25
Sep.3, 1963	\$1.25	Oct.1, 1996	\$4.75
Feb.1, 1967	\$1.40	Sep.1, 1997	\$5.15
Feb.1, 1968	\$1.60	Jul.24, 2007	\$5.85
May 1, 1974	\$2.00	Jul.24, 2008	\$6.55
Jan.1, 1975	\$2.10	Jul.24, 2009 – Current	\$7.25
Jan.1, 1976	\$2.30		

Source: United States Department of Labor: <http://www.dol.gov/esa/minwage>



**Table 2 History of the U.S Federal Minimum Wage**

Note: the dark area is the nominal minimum wage, and the light area is the real minimum wage.

Source: United States Department of Labor.



### **3. The Effects of Minimum Wages on Employment**

How minimum wages affect employment has been the most prominent issue with respect to the evaluation of minimum wage policies, and indeed one of the most researched topics in economics. The question is clearly important from a policy perspective, as any potential benefits of the minimum wage in terms of higher earnings are offset by adverse employment effects that may result. But the employment effects of minimum wages are also significant to economists because they provide a means of testing alternative models of the labor market.

The most ambitious effort to study the employment effects of the minimum wage was launched in 1977, with the creation of the Minimum Wage Study Commission. The “consensus” view of economists on the employment effects of the minimum wage—that the elasticity of teenage employment with respect to the minimum wage ranges from  $-0.1$  to  $-0.3$ . In table 2, we show a table which is summarized by Neumark and Wascher (2007).

#### *3.1. Summary of the Effects*

Study	Minimum wage variation	Group	Data	Estimated elasticities (or other effects), comments on methods	Criticisms
<i>Aggregate Panel Data Studies</i>					
Neumark and Wascher (1992)	Federal and state	Teenagers and young adults	CPS, 1973-1989	Teenagers: $-.1$ to $-.2$ Young adults: $-.15$ to $-.2$	For teens, significant negative effects only when enrollment is included; enrollment rate too narrow
Williams (1993)	Federal and state	Teenagers	CPS, 1977-89	Difference coefficients in across different regions: ranging from $.09$ (New England) to $-.62$ (Pacific)	
<b>Neumark and Wascher (1994)</b>	Federal and state	Teenagers and 16-24 year olds	CPS, 1973-1989	<b>IV for enrollment in some specifications: Teenagers: <math>-.17</math> to <math>-.39</math> Youth: <math>-.12</math> to <math>-.16</math></b>	
Evans and Turner (1995)	Federal and state	Teenagers and 16-24 year olds	CPS, 1978-1989	Teens: $-.09$ Youth: $-.04$ Not significant	Mixes October employment data with May minimum wage data
Neumark and Wascher (1995a)	Federal and state	Teenagers	CPS, 1977-1989	Conditional logit analysis: Non-employed and enrolled: $-.13$ Employed and enrolled: $-.40$ Employed and not enrolled: $.28$ Idle: $.64$	
Neumark and Wascher (1995b)	Federal and state	Teenagers	Matched CPS, 1979-1992	Multinomial logit analysis: increase in probability that teens leave school to work; increase in probability that teens leave school to become idle; increase in probability that employed low-wage teens become idle	
Neumark and Wascher (1996a)	Federal and state	Teenagers and young adults	October CPS, 1980-1989	Teenagers: $-.22$ Young adults: $-.14$ ; significant	
<b>Abowd et al. (2000b)</b>	Change in real federal and state minimum wages	Low-wage workers affected by a change in the real minimum wage relative to those marginally above them	Matched CPS, 1981-82 to 1990-91	<b>Many results reported for exit and entry elasticities; generally small (of both signs) and not significant</b>	
<b>Burkhauser et al. (2000a)</b>	Federal and state	Teenagers	CPS, 1979-1997; monthly data	<b>1979-1997: <math>0</math> to <math>-.35</math> 1979-1991: <math>-.22</math> to <math>-.6</math> 1996-1997: <math>-.17</math> to <math>-.27</math> Estimates generally significant in specifications excluding year effects</b>	Estimates excluding year effects less convincing

Study	Minimum wage variation	Group	Data	Estimated elasticities (or other effects), comments on methods	Criticisms
<b>Burkhauser et al. (2000b)</b>	Federal and state	Teenagers and young adults, by race and educational attainment	CPS, 1979-1997; SIPP, 1990-1992; monthly data	<b>Teens: <math>-.3</math> to <math>-.6</math></b> <b>Youths: <math>-.20</math> to <math>-.25</math> Black youths: <math>-.85</math> Nonblack youths: <math>-.18</math> High school dropouts (20-24): <math>-.85</math> High school grads (20-24): <math>-.16</math></b>	Estimates excluding year effects less convincing
<b>Zavodny (2000)</b>	Federal and state	Teenagers	CPS, 1979-1993 Matched CPS, 1979-80 to 1992-93	<i>Aggregate results</i> <b>Employment: <math>-.02</math> to <math>-.12</math>;</b> <b>Total hours: <math>.24</math> to <math>-.11</math> Individual results</b> <b>Employment: <math>-.08</math> to <math>-.10</math> Total hours: positive but not significant</b>	
Couch and Wittenburg (2001)	Federal and state	Teenagers	CPS, 1979-1992	Employment: $-.41$ to $-.58$ Total hours: $-.48$ to $-.77$ Estimates significant	Excludes year effects
Turner and Demiralp (2001)	Federal minimum wage increase in April 1991	Teenagers by race and location (city versus non-city)	CPS, Jan-April 1991 to Jan-April 1992	Multinomial logit analysis: increase in overall teen employment; sizable negative effects for black and Hispanic teens and for teens in a central city	
<b>Keil et al. (2001)</b>	Federal and state	Aggregate and youth employment (not defined)	CPS, 1977-1995	<b>Dynamic model: Aggregate: <math>-.11</math> (short-run); <math>-.19</math> (long-run) Youths: <math>-.37</math> (short-run); <math>-.69</math> (long-run)</b>	
Pabilonia (2002)	State	14-16 year olds	NLSY97; data for 1996	Cross-section probit analysis: Males: $-.6$ Females: $-1.3$ Some estimates significant	
Neumark and Wascher (2002)	Federal and state	16-24 year olds in the binding regime	CPS; 1973-1989	Switching regressions with state-year panel: $-.13$ to $-.21$ ; significant	
<b>Neumark and Wascher (2003)</b>	Federal and state	Teenagers	October CPS, 1980-1998	<b>Non-employed and enrolled: <math>-.11</math></b> <b>Employed and enrolled: <math>-.09</math> Employed and not enrolled: <math>.41</math> Idle: <math>.18</math></b>	
Bazen and Le Gallo (2006)	Federal and state	Teenagers	CPS; 1984-1992 and 1992-1998	$0$ to $-.45$ ; significant effects only evident for federal minimum wage increases	Excludes year effects in specifications showing significant negative effects; no test of lagged effects

Study	Minimum wage variation	Group	Data	Estimated elasticities (or other effects), comments on methods	Criticisms
<b>Sabia (2006)</b>	1. State	Teen employment and hours in retail and at small businesses (100 or fewer in firm)	CPS ORG's, 1979-2004 (retail); March CPS files, 1989-2004 (small businesses)	Share of 16-64 year-olds employed in retail: $-.09$ to $-.29$ Share of 16-64 year-olds employed in small businesses: $-.08$ to $-.12$ Share of teens employed in retail sector: $-.27$ to $-.43$ Average retail hours worked by teens: $-.53$ Average retail hours worked by employed teens: $-.05$ to $-.28$ Share of teens employed in small businesses: $-.46$ to $-.89$ Average small business hours worked by teens: $-.48$ to $-.88$ Average small business hours worked by employed teens: $-.54$ to $-.70$	Focus on teen employment in low-wage sectors generates ambiguous results; declines do not imply overall declines in these sectors
	2. State	Teen employment and hours in retail and at small businesses (100 or fewer in firm)	CPS ORG's, 1979-2004	<b>Teen employment: <math>-.18</math> to <math>-.33</math> Average hours worked by teens: <math>-.37</math> to <math>-.45</math> Average hours worked by employed teens: <math>-.01</math> to <math>-.29</math>; almost all estimates significant</b>	
<i>Federal Variation</i>					
Card (1992a)	1990 federal minimum wage increase	Teenagers	CPS, 1989-1990	$-.06$ to $.19$ ; not significant	No allowance for lagged effects
Deere, Murphy, and Welch (1995)	1990 and 1991 federal minimum wage increases	Teens and adult high school dropouts by sex and race	CPS, 1985-1992	Male teens: $-.27$ to $-.36$ Female teens: $-.42$ to $-.49$ Black teens: $-.37$ to $-.56$ Adult high school dropouts: $-.11$ to $-.33$	Indicator variables may pick up other influences
Bernstein and Schmitt (2000)	Federal	Teens and young adult high school dropouts	CPS ORG's 1995-1998	Teens: $-1.0$ (significant) for 1995-1996, $-.1$ to $-.4$ for other intervals, not significant; smaller when sample begins in 1994 20-54 year-old high school dropouts: estimates variable, non-robust, of varying sign	Excessive disaggregation by year likely contributes to non-robustness and statistical insignificance
Bernstein and Schmitt (1998)	1. Federal	Teens and young adult high school dropouts	CPS ORG's, 1995-1998	Many estimates, roughly centered on zero; large positive elasticities for minority females, sometimes significant; large negative estimates for minority males, insignificant	Ignores state variation in minimum wages
	2. 1996 and 1997 federal minimum wage increases	Teens	CPS ORG's, 1991-1998	Deere et al., specification: Male teens: $-.45$ to $-.61$ ; estimates sometimes significant Female teens: $.32$ to $.86$	Ignores state variation in minimum wages; differences from Deere et al., results not explored

Study	Minimum wage variation	Group	Data	Estimated elasticities (or other effects), comments on methods	Criticisms
<b>Neumark (2001)</b>	Cross-state variation generated by 1996 and 1997 federal minimum wage increases	Teens, young adults (16-24), non-enrolled young adults and 20-24 year-olds with high school education or less, and with less than a high school education	October-December CPS files, 1995-1998	<b>Teenagers: centered on zero 16-24 year-olds: <math>-.02</math> to <math>-.22</math>; insignificant Non-enrolled, 16-24, high school or less: <math>-.11</math> to <math>-.53</math>; significant Non-enrolled, 20-24, high school or less: <math>-.09</math> to <math>-.15</math>; sometimes significant Non-enrolled, 16-24, less than high school: <math>-.21</math>; significant Non-enrolled, 20-24, less than high school: <math>-.11</math> to <math>-.12</math>; insignificant</b>	Limited period and small number of minimum wage increases
<i>State Increases</i>					
Chapman (2004)	Cross-state variation in share between 100 and 120% of state minimum in 2003	Total workforce	Payroll Survey	N/A; estimated effect of $-.01$ , insignificant	Regression does not test effect of minimum wage on employment; focuses on total employment rather than low-skilled group
Fiscal Policy Institute (2004)	State minimum wage increases after 1997	Overall employment, and employment in retail, in small businesses, and in small retail businesses	Payroll Survey, County Business Patterns	Simple comparisons of employment growth: N/A; higher growth for all four measures in states that raised their minimums, but not for retail, small business, or small retail employment growth relative to total employment growth, for which simple difference-in-difference estimates are centered on zero	Ignores variation in timing of state minimum wage increases; no controls for other factors affecting employment growth
Reich and Hall (2001)	California minimum wage increases, 1996-1998	Various groups	CPS, 1994-1999	Teen employment rate rose, but by much less than for other age groups; retail and restaurant employment growth increased by more than manufacturing and construction employment growth, but some comparisons suggest that employment growth fell in retail and restaurant sectors relative to manufacturing and construction	Absence of comparison groups or problematic comparison groups
Orazem and Mattila (2002)	1990-1992 increases in Iowa minimum wage	Retail and non-professional services	QCEW; Establishment UI records and author survey, 1989-1992	<i>County level</i> Employment: $-.06$ to $-.12$ ; mostly significant <i>Firm level</i> Employment: $-.22$ to $-.85$ Hours: $-1.01$ to $-1.50$ All estimates significant	
<i>City Increases</i>					
<b>Yelowitz (2005)</b>	Introduction of Santa Fe minimum wage	Total, and more-versus less-educated	CPS, 2003-2005	<b>Employment effects near zero and insignificant; significant negative hours effects workers with 12 or fewer years of education, elasticity of <math>-.12</math></b>	

Study	Minimum wage variation	Group	Data	Estimated elasticities (or other effects), comments on methods	Criticisms
Potter (2006)	Introduction of Santa Fe minimum wage	Total, construction, health care, retail, and accommodations and food	ES-202 data for Santa Fe and Albuquerque	Difference-in-difference-in-differences estimates: $-.015$ (all industries); $-.16$ (construction); $-.009$ (retail); $-.03$ (health care); $-.009$ (accommodations and food); significant only for construction	Control city of Albuquerque may have been chosen to minimize minimum wage effects
See also Dube et al. (forthcoming)					
<i>Aggregate Time-Series Studies</i>					
Wellington (1991)	Federal	Teenagers and 2024 year olds	1954-1986	Teenagers: $-.05$ to $-.09$ 20-24 year olds: $.002$ to $-.02$	
Card and Krueger (1995a)	Federal	Teenagers	1954-1993	$-.050$ to $-.087$ ; only a few significant	
Bernstein and Schmitt (2000)	Federal	Teenagers	Data from Card and Krueger (1995), 1954 - 1993, updated through 2001:Q1	Teenagers: $-.001$ to $-.06$	
<b>Williams and Mills (2001)</b>	Federal	Teenagers	Data from Card and Krueger (1995), 1954-1993	<b>Teenagers: <math>-.3</math> to <math>-.5</math> after two years</b>	
<b>Bazen and Marimoutou (2002)</b>	Federal	Teenagers	Data from Card and Krueger (1995), 1954-1993, updated through 1999:Q2	<b>Teenagers: <math>-.11</math> (short-run), <math>-.27</math> (long-run), significant, and similar estimates for subperiods</b>	
Wolfson and Belman (2001 and 2004)	Federal	Low-wage industries and industries employment large share of young adults	BLS payroll survey, various years through 1997	Pooled time-series estimates by industry: Employment elasticities vary across industries, with many insignificant; of significant estimates of effects of legislated increases, most are negative; effects of real declines in minimum are of unexpected sign in one-half of cases; no more evidence of disemployment effects in industries where minimum wages increased average wages more	Theory does not predict employment declines in all industries; industries with larger wage increases may be those with less ability to substitute away from low-wage labor toward non-labor inputs, or greater ability to substitute towards more-skilled labor
<i>Studies Focused on the Least Skilled</i>					
Currie and Fallick (1996)	1980-81 increases in federal minimum wage	Workers with initial wage between old and new minimum	NLS, 1979-1987	$-.19$ to $-.24$ ; significant	Control group includes all workers above minimum wage

Study	Minimum wage variation	Group	Data	Estimated elasticities (or other effects), comments on methods	Criticisms
Abowd et al. (1999)	Change in real federal minimum wage	Low-wage workers (ages 16-60) freed by decline in real minimum wage relative to those marginally above	Matched CPS, 1981-82 to 1986-87	Varies by age Male average: $-.42$ Female average: $-1.57$ (conditional on employment in $t+1$ )	No actual change in minimum wage
Abowd et al. (2000a)	Change in real federal minimum wage	Low-wage young workers (ages 16-30) freed by decline in real minimum wage relative to those marginally above	Matched CPS, 1981-82 to 1986-87	Varies by age Male average: $-2.23$ Female average: $-1.87$ (conditional on employment in $t+1$ )	No actual change in minimum wage
<b>Neumark et al. (2004)</b>	Federal and state	Workers at different points in the wage distribution	Matched CPS, 1979-80 to 1996-97	<b>Employment: <math>-.06</math> to <math>-.15</math> for workers between 1 and 1.3 times the old minimum wage Hours: <math>-.3</math> for workers between 1 and 1.2 times the old minimum wage</b>	

Study	Minimum wage variation	Group	Data	Estimated elasticities (or other effects), comments on methods	Criticisms
Katz and Krueger (1992)	1991 federal minimum wage increase	Fast-food employment in Texas	Survey of restaurants in December 1990 and July 1991	1.7 to 2.65; significant	Potentially large amount of measurement error
Card (1992b)	1988 California minimum wage increase	Teen employment and retail trade employment	CPS; QCEW	Teens: .35; significant Retail trade: .04; not significant Eating and drinking: -.07; not significant	Questionable control groups
Spriggs and Klein (1994)	1991 federal minimum wage increase	Fast-food employment in Mississippi and North Carolina	Survey of restaurants in March 1991 and April 1991	Estimates centered on zero, not significant	Potentially large amount of measurement error; short period over which to observe effects
Card and Krueger (1994)	1992 New Jersey minimum wage increase	Fast-food employment in New Jersey and Pennsylvania	Survey of restaurants in February 1992 and November 1992	FTEs: .63 to .73; some estimates significant	Potentially large amount of measurement error
Kim and Taylor (1995)	1988 California minimum wage increase	Retail trade employment	QCEW	-.15 to -.2; some estimates significant	No direct measure of hourly wages
Partridge and Partridge (1999)	Federal and state	Retail trade employment	CPS and BLS establishment survey; 1984-1989	Retail: -.08 to -.25 Eating and drinking: -.05 to -.2 Other retail: -.09 to -.26 Total nonfarm: -.10 to -.21 Teens: -.23 to -.72	
<b>Neumark and Wascher (2000)</b>	1992 New Jersey minimum wage increase	Fast-food employment in New Jersey and Pennsylvania	Payroll data collected from establishments	<b>FTEs: -.1 to -.25; some estimates significant</b>	
<b>Card and Krueger (2000)</b>	1992 New Jersey minimum wage increase	Fast-food employment in New Jersey and Pennsylvania	BLS establishment-level data	<b>FTEs: .005 to .15; not significant</b>	
Michl (2000)	1992 New Jersey minimum wage increase	Fast-food employment in New Jersey and Pennsylvania	Neumark-Wascher payroll data (subsample of observations reporting employment)	Employment: .044 Total hours: -.018 Hours per worker: -.062	Small sample



Study	Minimum wage variation	Group	Data	Estimated elasticities (or other effects), comments on methods	Criticisms
<b>Singell and Terborg (2006)</b>	Oregon and Washington minimum wage increases at different times	Eating and drinking workers; hotel and lodging workers	BLS monthly employment data, 1997-2001; help-wanted ads, 1994-2001	<b>Eating and drinking employment: <math>-.2</math>; significant</b> <b>Hotel and lodging employment: <math>.15</math> to <math>.16</math>; significant</b> <b>Want-ads: negative and significant for all restaurant jobs except cooks, and for hotel housekeepers</b>	Want-ad specifications different from industry employment specifications
<b>Dube et al. (2006)</b>	Introduction of San Francisco minimum wage	Restaurant employment in mid-size establishments	Survey data	<b><math>.01</math> to <math>.12</math>; not significant</b>	Low survey response rate; short-term effects only; exclusion of larger restaurants

See also Reich and Hall (2001); Sabia (2006)

Study	Minimum wage variation	Group	Data	Estimated elasticities (or other effects), comments on methods	Criticisms
<i>Panel Studies</i>					
OECD (1998)	Time-series variation across countries	Teens (15-19), young adults (20-24), and adults (25-54)	National sources	Teens: $-.07$ to $-.41$ 20-24: $-.03$ to $-.10$ 25-54: $0$ to $.02$ Estimates for teens mostly significant	
<b>Neumark and Wascher (2004)</b>	Time-series variation across countries	Teens (15-19) and youths (15-24)	OECD and various sources, mid-1970s through 2000 (varies by country)	<b>Employment</b> <b>Standard models: teens, <math>-.18</math> to <math>-.24</math> to; youths, <math>-.13</math> to <math>-.16</math> Less negative with youth subminimum, with bargained minimum, with greater employment protection, and with more active labor market policies; more negative with stronger labor standards (working time rules, less flexible contracts) and higher union density</b>	
<i>Canada</i>					
<b>Baker et al. (1999)</b>	Across provinces and over time	Teenagers (15-19)	Special tabulations from Statistics Canada, 1979-1993	<b>Panel data analysis, with attention to frequency domain: Within-group: <math>-.27</math> (<math>-.47</math> with one lag) First difference: <math>.07</math> (<math>-.23</math> with one lag) Second difference: <math>-.13</math> Third difference: <math>-.31</math> Fourth difference: <math>-.40</math> Within-group estimates and longer-difference estimates significant; similar result reflected in lower-frequency filters</b>	
Yuen (2003)	Across provinces and over time	Teenagers (16-19) and young adults (20-24)	Labor Market Activity Survey, 1988-1990	Permanent low-wage teen workers: $-.86$ (significant) Permanent low-wage young adult workers: $-1.15$ (significant) Transitory low-wage teen workers: $1.18$ (insignificant) Transitory low-wage young adult workers: $.31$ (insignificant)	
Campolieti et al. (2005a)	Provincial	Teenagers	Survey of Labour and Income Dynamics (1993-1999)	Multinomial logit analysis: Non-employed and enrolled: $.72$ Employed and enrolled: $-.57$ Employed and not enrolled: $-1.92$ Idle: $.02$ Net employment: $-2.49$ ; significant Net school enrollment: $0.15$ ; not significant	

Study	Minimum wage variation	Group	Data	Estimated elasticities (or other effects), comments on methods	Criticisms
<b>Campolieti et al. (2005b)</b>	Provincial	Youths (16-24)	Survey of Labour and Income Dynamics (1993-1999)	<b>-.33 to -.54</b>	
<b>Campolieti et al. (2006)</b>	Provincial	16-19, 20-24, and 16-24 year-olds, including full-time versus part-time and non-enrolled	April Labor Force Surveys, 1981-1997	<b>Teens: -.17 to -.44</b> <b>20-24 year-olds: -.14 to -.43</b> 16-24 year-olds: -.17 to -.44	
<i>Sweden</i>					
Skedinger (2006)	Union negotiated minimum wages in hotels and restaurants	All workers	Surveys from Confederation of Swedish Enterprise, 1979-1999	Job separations in response to minimum wage increases: elasticity .58 overall; .36 to 1.00 for 20-65 year-olds; .77 to .80 for teenagers (although -.12 to -.14 and insignificant for the 1993-1998 subperiod) Job accessions in response to minimum wage decreases: .84 overall; .45 to .55 for teenagers	Wage floors vary by worker characteristics, so may not be applicable to uniform minimum wages
<i>United Kingdom</i>					
Machin and Manning (1994); Dickens et al. (1999)	Wages Councils	All workers in covered (lowwage) industries	New Earnings Survey, Employment Gazette, 1978-1992	.05 to .43	Change in institutional setting of minimum wages in 1986 is ignored; questions about exogeneity of minimum wages
Dolado et al. (1996)	Abolition of Wages Councils	Workers in Council and non-Council sectors	Quarterly Labour Force Survey Micro Data	Relative increases in hiring rate and employment in Council sector after Councils abolished	Questions about exogeneity of minimum wage Increases chosen by Wages Councils, and hence of variation created by abolition of Wages Councils
<b>Machin et al. (1999)</b>	Introduction of national minimum wage in 1999	Workers in residential care homes	Labor Force Survey, 1994-2001, and authors' survey of residential care homes	<b>Employment and hours fell more where initial proportion of minimum wage workers or wage gap higher; implied elasticities for employment -.08 to -.38, for hours -.15 to -.39</b>	

Study	Minimum wage variation	Group	Data	Estimated elasticities (or other effects), comments on methods	Criticisms
Stewart (2002)	Variation across local areas in effect of imposition of national minimum wage in 1999	All workers and various lower skill groups	New Earnings Survey, 1998, 2000; Labour Force Survey Local Areas Data, Annual Business Inquiry, 1998-1999	Wide variety of estimates, and not easily translated into elasticities given that estimates are for introduction of new minimum wage; many positive and many negative estimates, none significant	Ignores possible workings of youth subminimums; many estimates for all workers rather than young workers; analysis of less-skilled individuals does not provide information on wage effects
Stewart (2004a)	Variation across workers at different points of the wage distribution	Adult men and women (aged 22 and over), and young men and women aged (18-21)	Matched Labor Force Survey, March 1997-March 2000; British Household Panel Survey, Fall 1994-Fall 1999; New Earnings Survey, April 1994-April 1999	Elasticities for transitions to non-employment almost always insignificant, more likely positive than negative	Focus is on short-run effects, and no evidence on lagged effects
<b>Stewart and Swaffield (2006)</b>	Variation across workers at different points of the wage distribution	Adult men and women	Matched Labor Force Survey, March 1997-September 2000; New Earnings Survey, April 1994-April 2000	<b>Weekly hours of employed workers decline by 1 to 2 hours, with the reduction occurring at a lag of approximately one year</b>	No parallel evidence on employment, despite suggestion of lagged hours reductions
<b>Galinda-Rueda and Pereira (2004)</b>	1. Variation across firms in exposure to higher minimum based on matched worker data	All	Annual Business Inquiry and New Earnings Survey, 1994-2001	Manufacturing and services: small disemployment effects, insignificant	Highly non-random sample because of worker-firm match, and potential measurement error in exposure to minimum wage
	2. Variation across region-sector cells in fraction below new minimum wage, as of 1998	All	Annual Business Inquiry and New Earnings Survey, 1997-2001	<b>No disemployment effects in manufacturing; in services, 1 percentage point higher fraction affected leads to .06 to .12 percent lower employment</b>	
	3. Variation across regions in fraction below by region	All	Office of National Statistics, 1998-2001	<b>Significant disemployment effects in four of eight low-wage sectors, negative estimates in seven of eight; evidence that effects stem in part from slower job creation through firm entry in low-wage sectors</b>	

Study	Minimum wage variation	Group	Data	Estimated elasticities (or other effects), comments on methods	Criticisms
<i>Australia</i>					
Leigh (2004a)	Minimum wage increases in Western Australia relatively to rest of country	Aggregate, and disaggregated by age and sex	Labour Force Survey, 1994-2001	Aggregate: $-.25$ to $-.40$ 15-24: $-1.01$ 15-24, male: $-.68$ 15-24, female: $-1.44$ Older groups: $-.03$ to $-.14$ (mostly insignificant)	Very large elasticities for aggregate employment and for 15-24 year-olds
Harding and Harding (2004)	State minimum wage increases	Minimum wage workers	Survey of employers, 2003	$-.2$	Employer attributions of employment changes to minimum wage increases unlikely to be reliable
Mangan and Johnston (1999)	State minimum wage differences (over time and cross-sectionally)	15-19 year-olds	Panel analysis: Australian Bureau of Statistics annual data, 1980-1995 Cross-section analysis: unit record census data, year unspecified	Panel analysis: $-.21$ to $.08$ , almost all estimates negative, none significant Cross-section analysis: full-time, $-.05$ to $-.31$ , generally significant	Source of minimum wage variation unclear; model should include non-teen minimum wage
Junankar et al. (2000)	Time-series variation in youth minimum wages	16-20 year-olds	Quarterly data, 1987-1997 (source unspecified)	Time-series regressions by industry, age, and sex: Effects insignificant and often positive, except for retail where there is some evidence of disemployment effects; elasticities for retail range from $-1.6$ to $-23.1$	Absurdly large elasticity estimates; likely weak identification given short time-series; model should include non-teen minimum wage
<i>New Zealand</i>					
Maloney (1995, 1997)	National minimum wage for workers 20 and over, and introduction of teen minimum wage	Young adults (20-24) and teenagers (15-19)	Household Labour Force Survey (HLFS), 1985-1996	Effect of adult minimum: 20-24: $-.1$ to $-.4$ 15-19: $-.1$ to $.4$ No effect of introduction of teen minimum on teen employment	Teen minimum omitted from young adult equation, could bias estimates of teen and young adult effects
Chapple (1997)	National minimum wage for workers 20 and over	Young adults (20-24)	Time-series: HLSF, 1985-1997 Cross-industry: Labour and Employment Gazette and Statistics New Zealand Quarterly Employment Survey, 1980-1997	Time-series: 20-24: $-.17$ to $-.34$ Cross-industry: $-.06$ to $-.10$ Separate time-series by industry: estimates centered on zero	Ignores introduction of teen minimum wage in time-series analysis; in cross-industry analysis year effects omitted, and effects very sensitive; separate time-series by industry have few degrees of freedom

Study	Minimum wage variation	Group	Data	Estimated elasticities (or other effects), comments on methods	Criticisms
Hyslop and Stillman (2004)	Introduction of higher minimums for 16-17 and 18-19 year-olds	Teens, 20-21, and 20-25 year-olds	HLSF, 1997-2003	Employment of 16-17 and 18-19 year-olds rose relative to 20-25 year-olds, but fell relative to 20-21 year-olds in years corresponding to largest minimum wage increases	Inspection of graphs and regressions give some suggestion of negative employment effects
<i>France</i>					
Dolado et al. (1996)	1. Higher national minimum wage increases in early 1980s than late 1980s	All	Enquête Emploi, 1981-1989	Weak evidence that low-wage groups suffered larger employment losses in period when national minimum increased more sharply	No wage impact, so no employment impact expected
	2. Differential impact of national minimum wage increases across regions with varying initial wages	All	Declaration Annuelle de Salaires, 1967-1992	Regions with low initial wages experienced greater employment growth	Fluctuation in labor demand could explain results; not restricted to low-skill workers
Bazen and Skourias (1997)	National minimum wage increases across sectors with different percentages of minimum wage workers	Youths (under age 25)	French Labor Force Survey, 1980-1984	Youth employment fell more in sectors where minimum wage was more binding	Questions about specification
<b>Abowd et al. (1999)</b>	Differences between workers caught by national minimum wage increases and workers with slightly higher wages	Various ages	Enquête Emploi, 1982-1989	<b>Large disemployment effects for workers newly constrained by minimum relative to those with marginally higher wages, especially those just above age 24 not protected by employment promotion contracts: Men, 25-30: -4.6 Women, 25-30: -1.38 Men, 20-24: -.77 Women, 20-24: -1.21 Men, 16-19: -.08 Women, 16-19: .46</b>	
<i>Netherlands</i>					
Dolado et al. (1996)	Declines in youth subminimums relative to adult minimum in 1981 and 1983	Youths (17-22)	Labor Market Survey, 1979-1985	Youth employment fell by less or rose over this period in occupations most intensive in use of young, unskilled workers, relative to overall changes in youth employment	

Study	Minimum wage variation	Group	Data	Estimated elasticities (or other effects), comments on methods	Criticisms
<i>Spain</i>					
<b>Dolado et al. (1996)</b>	1. National minimum wage, and variation in effects across industries where minimum wage more or less binding	Teens (16-19)	Contalilidad Nacional Sectorial	Teens: $-.15$ , stronger in industries where minimum wage more binding	Specifications exclude year effects
	2. Sharp increases in minimum for 16 year-olds and more modest increase for 17 year-olds in 1990	Teens (16-19)	Contalilidad Nacional Sectorial	<b>Negative relationship across regions between change in teenage employment rate and share initially low-paid, but not for 20-24 year-olds</b>	
<i>Portugal</i>					
<b>Pereira (2003)</b>	<b>Abolition of teenage subminimum wage in 1987</b>	<b>18-19 and 20-25 year-olds</b>	<b>Quadros de Pessoal, 1986-1989</b>	<b>Teen employment (and hours) declined relative to employment of 30-35 year-olds, with elasticity of <math>-.2</math> to <math>-.4</math>; substitution towards 20-25 year-olds</b>	
Portugal and Cardoso (2006)	Abolition of teenage subminimum wage in 1987	16-65 year-olds	Quadros de Pessoal, 1986-1989; Labor Force Survey, 1986-1989	Overall teen employment grew faster than employment of 20-25 year-olds or older workers following minimum wage increase; main results concern effects of minimum wage on accessions and separations	No regression analysis of net employment effects or evidence of failure to replicate Pereira's results (although focus of paper is not on net employment effects)
<i>Greece</i>					
Karageorgiou (2004)	Variation in teen and young adult minimum wages relative to average adult wages	15-19 and 20-24	Labor Force Survey, Statistical Yearbooks of National Statistical Service of Greece, United Nations Educational Scientific and Cultural Organization, OECD: 1974-2001 for young adults; 1981-2000 for teens	Teens: $.22$ to $.63$ (larger estimates significant) Young adults: $-.05$ to $-.12$ (insignificant)	Little real time-series variation, unexpected results for other controls, failure to account for minimum wages for other groups

Study	Minimum wage variation	Group	Data	Estimated elasticities (or other effects), comments on methods	Criticisms
<i>Brazil</i>					
Fajnzylber (2001)	Largely time-series variation	All, but effects differ based on initial wage	Brazilian Monthly Employment Survey, 1982-1997	Backed out from estimates of effects of minimum wages on income throughout the wage distribution: Formal sector, below and near minimum wage: $-.05$ to $-.08$ Informal sector, below and near minimum wage: $-.05$ to $-.15$	Stronger results for informal sector unexpected
Lemos (2004, 2006, forthcoming)	Largely time-series variation, with different impact across regions based on different wage levels	All ages, many other comparisons (public versus private, less- versus more-educated, formal versus informal sector)	Brazilian Monthly Employment Survey, 1982-2000	Aggregate employment: centered on zero for hours and employment Employment, formal sector: 0 Hours, formal sector: $-.02$ Employment, informal sector: $-.02$ Hours, informal sector: $.02$ Employment, private sector: 0 Hours, private sector: $.01$ Employment, public sector: $.03$ Hours, public sector: $-.09$ More evidence of negative effects (still insignificant) in low-inflation periods, and for less-educated	Some differences in estimates difficult to explain or reconcile
Lemos (2005)	Largely time-series variation, with different impact across regions based on different wage levels	All ages	Brazilian Monthly Employment Survey, 1982-2000	Instruments for minimum wage variables with political variables: OLS: $-.12$ to $.02$ (most negative) IV: large number of estimates, ranging from $-.29$ to $.12$ (most negative)	Political variables may influence other labor market policies as well
Neumark et al. (2006)	Largely time-series variation, with different impact across regions based on different wage levels	All ages	Brazilian Monthly Employment Survey, 1996-2001	Household heads: $-.07$ (significant); positive for other family members	



Study	Minimum wage variation	Group	Data	Estimated elasticities (or other effects), comments on methods	Criticisms
<i>Mexico/Colombia</i>					
<b>Bell (1997)</b>	Mexico: minimum wages set by region, consolidated into fewer regions over time Colombia: minimum wages by large/small cities until 1984, then a national minimum wage implemented	Firms in the formal/informal sectors with information broken down by skilled/ unskilled workers	Mexico: Annual Industrial Survey (1984-1990); National Minimum Wage Commission Statistical Reports (1984-1990); Mexican Encuesta Nacional de Empleo (1988 only); time-series data source not specified Colombia: Annual Industrial Survey (1980-1987); National Minimum Wage Commission (1980-1987)	<b>Time series: Mexico, <math>-.18</math> (insignificant), for Colombia, <math>-.34</math> (significant) Panel data, fixed effects: for Mexico skilled, <math>-.01</math> to <math>.05</math>, and unskilled, <math>-.03</math> to <math>.03</math> (insignificant); for Colombia skilled, <math>-.03</math> to <math>-.24</math>, and unskilled, <math>-.15</math> to <math>-.33</math> (significant)</b>	
<i>Mexico</i>					
<b>Feliciano (1998)</b>	Sharp consolidation of regional minimum wages and decline in average minimum wage	Males and females, all ages	Mexican Census of Population, 1970,1980, and 1990; National Minimum Wage Commission Statistical Reports; Encuesta Nacional de Empleo Urbana	<b>Males: <math>.005</math> to <math>.01</math> (<math>-.002</math> to <math>.04</math> by age group) Females: <math>-.43</math> to <math>-.58</math> (<math>-.41</math> to <math>-.76</math> by age group)</b>	
<i>Colombia</i>					
Maloney and Nuñez Mendez (2001)	Two federal minimum wage increases during 1997-1999	Men working 30 50 hours per week	National Household Survey, 1997-1999	Uses self-employed as control group: Employment elasticity: $-.15$ ; stronger effects near minimum wage but effects also present higher in wage distribution	Select group of workers
<i>Chile</i>					
Montenegro and Pagés (2004)	Time-series variation in real minimum wage, and variation in teen relative to adult minimum wage	All, with effects differentiated by age, sex, and skill	Household survey for Santiago, Chile, 1960-1998	Minimum wages reduce relative employment of young, unskilled workers, but increase relative employment of women	Tenuous evidence on overall employment effects
<i>Costa Rica</i>					
<b>Gindling and Terrell (2004)</b>	Sharp consolidation of occupation-skill-specific minimum wages	All	Household Surveys for Multiple Purposes, industry data from Costa Rican Central Bank, 1988-2000	<b>Covered-sector employment: <math>-.11</math> Covered-sector hours of employed: <math>-.06</math></b>	

Study	Minimum wage variation	Group	Data	Estimated elasticities (or other effects), comments on methods	Criticisms
<i>Trinidad and Tobago</i>					
Strobl and Walsh (2001)	Implementation of national minimum wage in 1998	Females and males working in small (fewer than 10 employees) and large firms	Continuous Sample Survey of Population (CSSP) 1996-1998	Difference-in-differences in job loss between those bound and those not bound by new minimum wage: Males bound by new minimum more likely to lose job by 9 percentage points; females by 2.3 percentage points (insignificant), although more in large firms	Short time horizon after minimum wage increase and potential difficulties controlling for aggregate trends for comparable workers
<i>Puerto Rico</i>					
Castillo-Freeman and Freeman (1992)	U.S. federal minimum wage as applied to Puerto Rico, as well as cross-industry variation	Puerto Rican manufacturing, workers working over 20 hours per week	Puerto Rican Census, and the Puerto Rican Survey of Manufacturing, supplemented by data from the Departamento del Trabajo and Recursos Humanos, U.S. Department of Labor and U.S. Department of Commerce	Elasticities of employment, time-series: $-.11$ to $-.15$ ; panel: $-.54$ for full sample period, $.20$ before 1974; $-.91$ after 1974 (when U.S. law generated increases)	Krueger (1995) shows that results are fragile
<i>Indonesia</i>					
Rama (2001)	Cross-province variation in minimum wage changes over the early 1990s	Urban workers	Indonesia's 1993 Labor Force Survey; data for years 1988-1994 from multiple sources: national accounts, the labor force survey, the wage survey, the survey of large manufacturing establishments and the survey of small scale manufacturing industries	Elasticity for aggregate urban employment using the log of the minimum wage, $-.04$ ; using the minimum over labor productivity measures, $-.04$ to $.00$ ; for ages 15-24: using log of the minimum wage, $.02$ ; using the minimum over labor productivity measures, $-.25$ to $.09$ (all insignificant) Large firms: log of minimum, $.20$ ; minimum over productivity measures, $.02$ to $.13$ (all insignificant) Small firms: log of the minimum $-1.30$ (significant); minimum over labor productivity measures, $-.77$ to $-.82$ (insignificant)	Strength of identifying information is unclear, given apparent lack of enforcement of provincial minimum wages as of 1989
Suryahadi et al. (2003)	Cross-province variation in minimum wage changes over the early 1990s	Urban workers	Indonesia's 1993 Labor Force Survey; data for years 1988-2000	Elasticity for aggregate urban employment, $-.06$ (significant); males, $-.05$ ; females, $-.16$ (significant); adults, $-.04$ ; youths, $-.12$ ; educated, $-.03$ ; less-educated, $-.09$ (significant); white-collar, $1.00$ ; blue-collar, $-.07$ ; full-time, $-.06$ (significant); part-time, $-.11$	

Study	Minimum wage variation	Group	Data	Estimated elasticities (or other effects), comments on methods	Criticisms
<b>Harrison and Scorse (2005)</b>	District level differences in the minimum wage, within the same province	Manufacturing firms overall and sub-group of textiles, apparel, and footwear factories	Indonesia's Annual Survey of Manufacturing Firms (1990-1996)	<b>Difference-in-differences, elasticity for manufacturing employment, <math>-.05</math> for all firms; <math>-.05</math> for balanced panel Other specifications, <math>-.12</math> to <math>-.18</math> (all significant); insignificant only when done separately for small firms, <math>-.02</math></b>	
<b>Alatas and Cameron (2003)</b>	Differences in minimum wage changes between a province, Jakarta, and a grouping of districts, Botabek, across the border between adjacent provinces	Manufacturing sector, Greater Jakarta area	Indonesia's Annual Survey of Manufacturing Firms (1990-1996); Indonesian Labor Force Survey (1990-1996)	<b>Significant negative employment effect only for small domestic firms: 41% (16%) relative employment loss from 1991 (1992) to 1996 in Botabek, which experienced sharper minimum wage increase; effect no longer significant when restricted to a narrow strip along the border; large foreign firms show insignificant negative effects; large domestic firm estimates are insignificant and inconclusive</b>	

### *3.2. Conclusions*

Overall sense of the literature is that the preponderance of evidence supports the view that minimum wages reduce the employment of low-wage workers. Some other general themes also emerge from the literature. First, the majority of the U.S. studies that found zero or positive effects of the minimum wage on low-skill employment were either short panel data studies or case studies of the effects of a state-specific change in the minimum wage on a particular industry. In contrast, longer panel studies that incorporate both state and time variation in minimum wages tend, on the whole, to find negative and statistically significant employment effects from minimum wage increases.

Second, the concerns raised in the literature about the case study approach seem especially cogent. Even aside from the question of whether the surveys conducted by the authors of these studies provide accurate estimates of employment and other indicators, the doubts expressed about the adequacy of the so-called natural experiments used in the case study approach, along with the fact that the standard competitive model provides little guidance as to the expected sign of the employment effects of the minimum wage in the narrow industries usually considered in these studies, makes the results from them difficult to interpret. As a result, it is not clear to us that these studies have much to say either about the adequacy of the neoclassical model or about the broader implications of changes in either the federal minimum wage or state minimum wages.

Third, even aside from the estimates of the effects of the minimum wage on low-skilled individuals as a whole, there seems to be substantial evidence of labor-labor substitution within low-skill groups. Some of the more recent literature has attempted to identify these substitution effects more directly or has focused more specifically on those individuals whose wages and employment opportunities are most likely to be affected by the minimum wage, and the

estimates from this line of research tend to support the notion that employers replace their lowest-skilled labor with close substitutes in response to an increase in the wage floor. As a result, minimum wages may harm the least-skilled workers more than is suggested by the net disemployment effects estimated in many studies.

In sum, we view the literature—when read broadly and critically— as largely solidifying the view that minimum wages reduce employment of low-skilled workers, and as suggesting that the low-wage labor market can be reasonably approximated by the neoclassical competitive model.

#### **4. The Effects of Minimum Wages on the Wage and Earnings Distribution**

The previous section reviewed the extensive literature on the employment effects of minimum wages, highlighting along the way research that focuses on the workers most directly affected by changes in the wage floor. This section examines how minimum wage changes affect wages and earnings, both for low-wage workers and for workers higher in the wage distribution.

##### *4.1. How do minimum wages affect the wage distribution? (from Neumark and Wascher 2007)*

Assuming reasonable levels of enforcement and compliance, the most obvious effect is to truncate or thin out the lower tail of the wage distribution (below the minimum) and to create a spike at the minimum. However, an increase in the minimum wage can also lead to changes in wages higher up in the wage distribution. These “spillovers” or “ripple effects” may arise for two main reasons.

First, if employers substitute away from the lowest-skilled workers and toward workers with somewhat higher skills in response to an increase in the wage floor then wages of workers earning above the minimum wage may be pushed up by the increase in demand for their services.

Alternatively, if employers maintain wage differentials between their lowest-skilled workers and higher-skilled workers in order to create behavioral incentives, then a minimum wage

increase may raise wages for higher-skilled workers as well. The potential for such ripple effects is often cited by proponents of minimum wage increases as a way to raise the incomes of low-wage workers earning a little more than the minimum.

In addition, the influence of minimum wages on the wage distribution, coupled with the longer-run decline in the real value of the minimum wage, has spurred debate about the contribution of the minimum wage to the rise in wage inequality in the past few decades.

## *4.2. Theory*

Pettengill (1981) develops a model in which there is a continuous distribution of worker skills and a labor market equilibrium characterized by an upward-sloping “wage curve” that relates wages to skill. Manning (2003) shows that in equilibrium search models in which monopsony power is generated by non-pecuniary firm characteristics, the spillover effects of a minimum wage increase should be concentrated among jobs paying just above the minimum. Flinn (2002) develops a structural search model that incorporates wage bargaining, and also generates both a spike in the wage distribution at the minimum and spillover effects to wages above the minimum. Grossman (1983) developed the simplest type of model.

## *4.3. Empirical Evidence*

### *4.3.1. Effects of Minimum Wages on the Wage Distribution*

#### *a. Effects on Low-Wage Workers, and Spikes in the Wage Distribution*

Neumark and Wascher (1992) present evidence of spikes corresponding to state minimum wages and subminimum wages for teenagers in the United States. Card and Krueger (1995a, chapter 9) illustrate how spikes in the wage distribution followed increases in the federal minimum wage in 1990 and 1991. Baker, Benjamin, and Stanger (1999) document the existence of spikes at provincial minimum wages in Canada for fifteen- to nineteen-year-olds. DiNardo,

Fortin, and Lemieux (1996) present nonparametric kernel estimates of the density of hourly wages for men and women in the United States from 1973 to 1992, a period in which there were numerous increases in the federal minimum wage. Lee (1999) presents similar evidence for the 1980s, noting that the decline in the value of the minimum during that decade was associated with an increase in the dispersion of wages. Dickens and Manning (2004a) examine Labour Force Survey (LFS) data on adults aged twenty-two and older subject to the minimum wage introduced in the United Kingdom in 1999 (a lower minimum wage was introduced for eighteen-to twenty-one-year olds). Stewart and Swaffield (2002) examine data from the British Household Panel Survey (BHPS) and also find that the introduction of the minimum wage in the United Kingdom resulted in a spike at that point in the wage distribution. Harrison and Scorse (2005) study of Indonesia finds that minimum wages boost wages of the unskilled, the authors also report that increases in the statutory minimum wage during the mid-1980s through the 1990s were accompanied by declines in the proportion of plants paying at least the minimum wage. Gindling and Terrell (2005, 2007b) generally find spikes in the wage distribution generated by minimum wages in the covered sector in both Costa Rica and Honduras, but not in the uncovered sector.

### *b. Spillovers*

Grossman (1983) appears to have been the first to attempt to directly estimate the spillover effects of minimum wages. In particular, she uses data from BLS Area Wage Surveys (AWS) to examine the influence of increases in the federal minimum wage on wages in low wage occupations that nonetheless pay above the minimum wage. Card and Krueger (1995a, chapter 9) focus on the effects of the 1990 and 1991 increases in the federal minimum wage on the 5th and 10th percentiles of the wage distribution. Lee (1999) presents a method using the gap between

the 10th and 50th percentile of the wage distribution. Manning (2003) shows how Lee's model, with additional assumptions, can be parameterized to characterize spillover effects more generally. Dickens and Manning (2004b) use U.K. data to implement a procedure very similar to Manning (2003) analysis of the U.S. data. Lemos (2004a) reports positive effects of the minimum wage on wages at the median of the distribution for Brazil. Fajnzylber (2001) uses the approach of Neumark, Schweitzer, and Wascher 2004 and reports even larger effects, with significant spillover effects from minimum wage increases evident for those earning as much as forty times the minimum wage. Neumark, Cunningham, and Siga (2006) revisit the Brazilian case using data beginning only in 1996—after the country's hyperinflation ended—and find no evidence of positive effects on wages above the 10th percentile in the formal sector or above the 20th percentile when the two sectors are combined.

*c. The Contribution of Minimum Wages to Increases in Wage Inequality in the United States*

Blackburn, Bloom, and Freeman (1990), Bound and Johnson (1992), Katz and Murphy (1992), Juhn, Murphy, and Pierce (1993), and Levy and Murnane (1992). The consensus in most of this early literature was that the changes in wage inequality were driven primarily by increased demand for skilled workers (on both observed dimensions of skill, such as schooling, as well as on unobserved dimensions of skill). DiNardo, Fortin, and Lemieux (1996) used non-parametric density estimation of wage distributions to decompose changes in various measures of between-group and within group wage inequality into the portions associated with changes in the minimum wage, changes in unionization, changes in individual attributes, supply and demand influences, and a residual category not explained by any of these factors. Lee (1999) shows that minimum wages were central to the changes in wage inequality over the 1980s. Autor, Katz, and Kearney (2005) take strong issue both with Card and DiNardo's claims (2002) about



the weakness of the evidence in favor of the SBTC hypothesis and with their emphasis on the importance of the minimum wage.

#### *4.3.2. Effects of Minimum Wages on Earnings*

To this point, we have discussed the effects of minimum wages on the wage distribution without considering the consequences of the changes in wages that are induced by changes in the minimum for the quantities of labor employed and hours worked or the combined consequences of the wage, employment, and hours changes for labor income. In this section, we describe evidence on the effects of minimum wages on these various margins of adjustment to minimum wages.

An earlier attempt to estimate the effects of minimum wages on wages, employment, hours, and income is a study by Linneman (1982) using data from the Panel Study of Income Dynamics (PSID) for the mid-1970s. His findings indicated hours (and to a lesser extent employment) reductions among workers directly constrained by minimum wage increases, and employment reductions but hours increase for those just above the minimum (in all cases relative to those well above the minimum). His wage, employment, and hours effects imply a negative effect on incomes of workers whose wages are constrained by the minimum wage.

Neumark, Schweitzer, and Wascher (2004) estimate wage, hours, employment, and total earnings effects independently, using state variation in minimum wages to obtain treatment and control groups.

#### *4.4. Conclusions*

The evidence presented in this section clearly indicates that minimum wages affect the wage distribution. For industrialized countries, the minimum wage creates a spike in the wage distribution and appears to provide some boost to wages for workers who previously earned

somewhat more than the minimum wage. The preferred estimates suggest that spillovers extend to wages about 20 percent above the minimum, with elasticities around 0.4 near the minimum and 0.2 above it.

Based on the estimated effects of minimum wages on the wage distribution, most economists believe that it was a factor contributing to the rise in wage inequality in the United States over the last few decades—especially in the 1980s, when the real value of the federal minimum declined sharply.

Finally, the evidence suggests that higher minimum wages tend, on average, to reduce the economic well-being of affected workers. Evidence regarding the effects on workers initially paid at or just above the minimum suggests that their labor income declines as a result of minimum wage increases, reflecting negative effects of minimum wages on employment and hours.

## **5. The Effects of Minimum Wages on the Income Distribution**

As the massive number of studies on the employment effects of minimum wages indicates, much of the debate about minimum wages centers on their employment effects. In contrast, policymakers tend to focus much more on distributional goals in advocating minimum wages.

### *5.1. Minimum Wage Workers, the Family Income Distribution, and Poverty*

The first study to explore the link between low-wage work and poverty was by Gramlich (1976), who documented, in data from the early 1970s, that many low-wage workers were members of higher-income families. Card and Krueger (1995a, 285) on employment effects of minimum wages is frequently cited by minimum wage advocates, acknowledge that “the minimum wage is evidently a ‘blunt instrument’ for redistributing income to the poorest families”.

### *5.1.1. Simulating the Effects of a Minimum Wage Increase*

A number of other papers presented more sophisticated analyses based on simulation methods (e.g., Johnson and Browning 1983; Burkhauser and Finegan 1989; and Horrigan and Mincy 1993). Horrigan and Mincy attribute their conclusion to the fact that “minimum-wage workers live in families that are more or less evenly placed along the entire distribution of family incomes” (1993, 252). Card and Krueger (1995a) question this conclusion. Burkhauser, Couch, and Wittenburg (1996) show that workers affected by the minimum wage are in fact rather evenly distributed across the family income distribution, consistent with the assumption used by Horrigan and Mincy. The most recent study of the effects of minimum wages on the income distribution using simulation methods is by Burkhauser and Sabia (2007), who compare simulations of the effect of the federal minimum wage increases in 1996 and 1997 (based on income data for 1995) with more recent simulations of an increase to \$7.25 (based on income data for 2003).

### *5.1.2. Problems with Simulation Studies of the Distributional Effects of Minimum Wages*

The calculations from these simulation exercises are subject to a number of criticisms. First, the assumptions about employment effects may be incorrect or overly simplistic. In addition, no study appears to allow for the possibility that the employment effects may be different for low-wage workers at different parts of the family income distribution. Finally, as Addison and Blackburn (1999) point out, a number of other possible responses that are ignored in the simulations could also influence how minimum wages affect the distribution of family incomes.

## *5.2. The Effects of Minimum Wages on the Distribution of Family*

The fact that many minimum wage workers are not in poor families makes it more difficult for minimum wages to have beneficial distributional effects (which we take as redistribution of

income toward lower-income families). The evidence summarized in the previous chapter (from Neumark, Schweitzer, and Wascher 2004), indicating that minimum wages tend to lower earnings of low-wage workers rather than raising them, also militates against beneficial distributional effects.

### *5.2.1. Regression Estimates of Effects of Minimum Wages on Poverty*

Card and Krueger (1995a) estimate the effect of the minimum wage on state poverty rates, using regressions of changes in state poverty rates from 1989 to 1991 on the fraction of workers in the state affected by the 1990 and 1991 increases in the federal minimum wage and various other controls. The critique of Burkhauser, Couch, and Wittenburg (1996) regarding the use of family earnings without any relation to needs applies here, and, depending on the question, it may be preferable to study total family income (which includes transfers). Burkhauser and Sabia (2007) update the Card and Krueger analysis to include data from 1988 through 2003. Their conclusions are similar. Addison and Blackburn (1999) used a similar state-level panel data regression analysis to estimate the effect of the minimum wage on state-level poverty rates, using March CPS data from 1983 to 1996. Sabia (2006b) notes that with the advent of welfare reform in 1996, which created strong incentives for single mothers to work (and/or to leave the welfare rolls), policymakers have frequently invoked the goal of helping single mothers escape poverty in arguing for a higher minimum wage. Burkhauser and Sabia (2007) extend this analysis to include all single female heads of household aged eighteen to sixty-four, using a state level analysis covering a slightly different period (1988–2003). Neumark and Wascher 2007b note that, even if, on net, minimum wages reduce employment of less-skilled workers, they may increase employment (and earnings) for individuals for whom the wage is initially below their reservation wage, but rises above their reservation wage as a result of a minimum wage increase. Gunderson

and Ziliak (2004) study the determinants of poverty rates for all families as well as for a number of subgroups (female-headed, married couples, and white and black families), using state-level poverty measures for 1981 to 2000 calculated from March CPS files.

### *5.2.2. The Effects of Minimum Wages on Transitions into and out of Poverty*

Neumark and Wascher 2002b use matched March CPS files from 1986 to 1995 to study how changes in minimum wages affect families' transitions into and out of different parts of the income-to-needs distribution.

### *5.2.3. International Evidence*

There is very little evidence on the distributional effects of minimum wages from other countries. And what evidence there is comes from developing countries, where the distributional effects may be quite different than in the United States. The World Bank report (2006) reviews a few studies, along with some evidence of its own, and concludes that the distributional effects are ambiguous. In particular, the report concludes that minimum wages tend to have no effect on the poverty rate, but effects on incomes of the poor that vary by country. Neumark, Cunningham, and Siga (2006) study the case of Brazil, which is of interest because it has one of the highest levels of inequality in the world, has historically used the minimum wage as a tool of social policy, and raised its minimum wage substantially in recent years. Gindling and Terrell (2007c) study the distributional effects of the minimum wage in Honduras. They use the same data source discussed in section 3, but for a shorter sample period (2001–2004) for which data on family poverty status is available. Research for Colombia (Arango and Pacho'n 2004) uses an identification strategy relatively similar to that used for Brazil by Neumark, Cunningham, and Siga 2006. The authors report a number of dynamic panel specifications that require use of lagged minimum wages as instruments.

### *5.3. Conclusion*

The combined evidence is best summarized as indicating that an increase in the minimum wage largely results in a redistribution of income among low-income families, with some gaining as a result of the higher minimum wage and others losing as a result of diminished employment opportunities or reduced hours, and some likelihood that, on net, poor or low-income families are made worse off.

## **6. The Effects of Minimum Wages on Skills**

Most research on minimum wages, and much of the research focuses on the employment and wage effects of minimum wages. However, this focus provides too narrow a basis for policy evaluation. The previous two sections discussed this limitation with respect to distributional effects, arguing that from a policy standpoint, the distributional consequences of minimum wages—especially for family incomes—are more important than its effects on employment and wages. But even this broader focus misses another potentially important dimension of the effects of minimum wages.

In particular, minimum wages may affect the acquisition of skills and hence earnings for workers who do not experience disemployment effects, as well as for those who do experience these effects. And because the effects on skill acquisition are likely to be manifested over the longer term, they likely continue to influence earnings beyond the typical age ranges (sixteen to twenty-four) for which economists have studied the employment effects of minimum wages.

The effects of minimum wages on skill formation can be emphasized on on-the-job training and schooling. Firstly, a higher minimum wage could lead to greater training for some workers, on the other hand, lost opportunities for on-the-job training are, of course, a cost of the disemployment effects of minimum wages. Secondly, minimum wages can also affect schooling

decisions. A higher minimum could induce some individuals to leave school for work, but it could also induce others to stay in school to increase their human capital in order to raise their productivity to a level that exceeds the higher minimum.

## *6.1. Minimum Wages and Training*

### *6.1.1. Theory*

The potential adverse effects of minimum wages on on-the-job training were originally discussed by Rosen (1972), Feldstein (1973), and Welch (1978). Acemoglu and Pischke (2003) show that minimum wages can create an extreme form of this wage compression that may induce employers to invest in general training.

### *6.1.2. Evidence*

Hashimoto (1982) presents some indirect evidence indicating that time-series increases in the minimum wage are associated with flatter wage profiles in panel data. Leighton and Mincer (1981) present similar indirect evidence, as do Grossberg and Sicilian (1999), somewhat later. However, this evidence is potentially problematic. As pointed out by Lazear and Miller (1981), lower wage growth associated with minimum wage effects need not reflect reductions in training generated by a higher minimum wage. Instead, in a model like that in Lazear 1979, a higher minimum wage can increase the value of the job to a worker, reducing the need for a rising wage profile, which has the same effect. Leighton and Mincer (1981) study evidence on direct training measures from the PSID and the National Longitudinal Survey of Young Men for black and white men. All of the evidence points to negative effects of a higher minimum wage, but the evidence is statistically significant only for an on-the-job training measure from the PSID. Schiller (1994) studies individuals entering the labor market (in the NLSY79) in 1980, classified by whether their wage was above the federal minimum. Acemoglu and Pischke (2003) rightly

criticize this study as probably uninformative about the effects of minimum wages on training. Grossberg and Sicilian (1999) revisit the earlier studies, using data from the 1982 Employment Opportunities Pilot Project (EOPP) to study the relationship between the minimum wage, wage growth, and training. Neumark and Wascher (2001b) improve on the earlier analyses in two ways. First, they used state variation in minimum wages to identify the effects of minimum wages. Second, they controlled for state-level differences in training that may be driven by factors other than minimum wages, but are nonetheless correlated with minimum wages. Acemoglu and Pischke (2003) also present evidence on the effect of minimum wages on training. Using data from the NLSY79 for the years 1987–1992, they report estimates for a sample restricted to those with twelve years of education or less. Fairris and Pedace (2004) exploit state minimum wage variation in 1996 to examine the effect of minimum wages on training reported by establishments in the 1997 National Establishment Survey (NES). Arulampalam, Booth, and Bryan (2004a) study the effect on training of the imposition of the new minimum wage in the United Kingdom in 1999, using data from the BHPS. Baker (2003) reports evidence on the effects of training in Canada, using cross-province variation in the minimum wage and data on seventeen- to twenty-four-year-olds from three years of the Adult Education and Training Surveys (AETS).

### *6.1.3. Conclusion*

Summing up all of the evidence on training, we can only conclude that the evidence is mixed.



## *6.2. Minimum Wages and Schooling*

### *6.2.1. Theory*

Theoretical models of how minimum wages might affect schooling decisions have quite a few layers of complexity and provide no clear predictions. Starting from research on this subject is by Cunningham (1981), Ehrenberg and Marcus (1980) and Ehrenberg and Marcus (1982).

### *6.2.2. Evidence*

Matilla (1978, 1982) tended to find positive effects of the minimum wage on school enrollment—in particular, for eighteen- to twenty-one-year-olds. In contrast, Ehrenberg and Marcus looked at cross-sectional data on white male and female teenagers from 1970 and found little, if any, effect of the minimum wage on school enrollment. Cunningham (1981), using data from the 1960 and 1970 Census, reports a negative enrollment effect for male and female white teenagers, but the opposite result for black female teenagers and black male teenagers and young adults. There was little subsequent work on this topic until the 1990s. One of the first new studies was Card's paper in the 1992 ILRR symposium (1992b). In this paper, he reports a significant negative difference-in-differences estimate of the California minimum wage increase in 1988 on the teenage enrollment rate, both with and without demographic controls. Neumark and Wascher (1992, 1994) show interest in the effects of minimum wages on school enrollment originally stemmed from an effort to better understand the employment effects of the minimum wage. Neumark and Wascher (1995a) estimated a model of minimum wage effects on employment as well as enrollment. Neumark and Wascher (2003) updated their study also reports robust evidence of negative effects of minimum wages on teenage enrollments, with elasticities in the range of -0.06 to -0.33, depending on the exact data used, the measure of enrollment, and the estimator. Similar results are reported in Chaplin, Turner, and Pape (2003),

based on data on the entire population of public schools in the United States. Turner and Demiralp (2001) use an approach similar to that of Neumark and Wascher (1995b) with data from the 1991 and 1992 waves of the Survey of Income and Program Participation (SIPP). Neumark and Nizalova (2007) also points to negative effects of minimum wages on schooling. Campolieti, Fang, and Gunderson (2005b) examined longitudinal data for Canada from 1993 to 1999 using an approach similar to that in our 1995b paper, and found little evidence of an effect of the minimum wage on school enrollment. In a pooled cross-section time-series analysis of Canadian provinces covering a longer period (1983–2000), Baker (2003) finds similarly weak evidence. Landon (1997) used data for a subset of provinces over an earlier period (1975–1989) and found rather strong evidence of negative enrollment effects for sixteen- to seventeen-year-olds (with the exception of sixteen-year-old females). Hyslop and Stillman (2007) estimate the effects of increases in youth subminimum wages in New Zealand on school enrollment rates and rates of idleness. Pacheco and Cruickshank (2007) conduct a similar analysis of sixteen- to twenty-four-year-olds and sixteen- to nineteen-year-olds using a longer sample period, and more important, using an enrollment measure that is independent of employment status—whereas the measure used by Hyslop and Stillman cannot capture any school enrollment of those who work more than two hours per week and are out of secondary school. Pacheco and Cruickshank find that the introduction of the teen minimum wage in 1994 appears to have increased enrollment of sixteen- to nineteen-year olds, but that subsequent increases in the teen minimum over their sample period reduced enrollment. Rice (2006) considers the effect of the extension of the national minimum wage in the United Kingdom to sixteen- to seventeen-year-olds in 2004, based on a model relating wages to education and employment choices.

### *6.2.3. Conclusion*

Overall, the evidence for the United States indicates that higher minimum wages lead to lower school enrollment rates and lower completed schooling, although the limited evidence for other countries is clearly weaker. In any event, the evidence that minimum wages reduce skill acquisition along this dimension is considerably stronger than it is with respect to training.

### *6.3. Conclusion*

The research on training points to some evidence of negative effects, but it would be difficult to argue that this evidence is conclusive. With respect to schooling, the evidence is stronger, with most of the research for the United States pointing to negative effects and the limited international evidence (mainly for Canada) less robust.

## **7. The Effects of Minimum Wages on Prices**

There are reasons to be interested in the price effects of minimum wages. First, although the direct effect of a minimum wage increase would be to raise the relative prices of goods produced with minimum wage labor, opponents of minimum wages have frequently pointed to the potential consequences for aggregate inflation from an increase in the wage floor. Second, even if minimum wages do not result in a persistent increase in inflation, one-time changes in prices and profits have potential welfare consequences for society.

Given the lower and more stable inflation environment in the United States and Europe during the past two decades, the newer research on industrialized countries has focused less on the potential effects of minimum wage increases on aggregate inflation. However, there has been some research in recent years that analyzes the relationship between minimum wages and inflation in Latin American countries.

### *7.1. Theoretical Considerations*

Card and Krueger (1995a) and Aaronson and French (2007) note, the details differ in the case of monopolistic competition in product markets, but the basic results are similar under the assumption that firms face a constant elasticity of output demand. However, other models of the labor market can lead to a very different relationship between minimum wages and prices. For example, in the textbook monopsony model suggested by Stigler (1946), an increase in the minimum wage can cause a decline in prices if the size of the minimum wage hike is not too large. Burdett and Mortensen (1998) develop a search model in which there are many firms but workers have incomplete information about the full range of job opportunities available to them. Bhaskar and To (1999) and Dickens, Machin, and Manning (1999), have shown that employment and price effects similar to those derived from the pure monopsony model also hold in the short run under monopsonistic competition in the labor market. Efficiency wage models that relate effort to wages imply that an increase in the minimum wage can influence worker productivity, which would tend to mitigate the increases in marginal costs and prices associated with the higher minimum wage. Moreover, in some versions of this model (e.g., Rebitzer and Taylor 1995), employment does not fall or can even rise, which, given the increase in productivity, leads to an increase in output and a decline in prices.

In the “hungry teenagers” model resurrected by Kennan (1995), a higher minimum wage leads to changes in the distribution of consumer demand toward products produced with minimum-wage labor. In this model, employment can either increase or decrease, but prices rise because of the outward shift in product demand.

### *7.1.1. Conclusion*

In sum, the theoretical link between the minimum wage and prices is ambiguous and depends crucially on the degree of competition in labor and product markets. Moreover, even in the case of competitive labor markets, for which the theory predicts that minimum wages will raise prices, the size of the cost shock associated with a rise in the minimum wage depends on a number of factors, and the propagation of that shock depends on how expectations are formed. As a result, the effect of the minimum wage on prices and inflation is largely an empirical question.

### *7.2. Macroeconomic Studies of the Effects of Minimum Wages on Prices*

Although opponents of minimum wages have often highlighted the potential adverse effects on prices and inflation as arguments against increasing the wage floor, there was, for a long time, little empirical evidence to support or refute these arguments. There are numerous examples of aggregate models of the inflation process that include a minimum wage variable, but three studies stand out because of their particular focus on the role of minimum wages.

The first, by Gramlich (1976), is noteworthy because it finds that a 10 percent increase in the minimum wage raised average wage growth by about 0.3 percentage point, twice as much as would be expected from the direct impact of the higher minimum on those workers whose wages were initially below the new minimum wage, suggesting that there were spillovers from the minimum wage into wages of higher paid workers.

Sellekaerts, in a paper included in the Minimum Wage Study Commission's report (1981), simulated a two-equation model of wage and price inflation to derive estimates of the effects of a 10 percent rise in the minimum wage. She found a somewhat larger effect on average wage

inflation—about 0.76 percentage point after six quarters—and reported an increase in consumer price inflation of about 0.15 percentage point.

Finally, Frye and Gordon (1981) included a minimum wage variable in a reduced-form model of price inflation and reported that a 10 percent rise in the minimum would boost price inflation by 0.2 percentage point.

Two studies in the commission report also attempted to build up estimates of the effect of minimum wages on prices using more detailed structural models. Cox and Oaxaca (1981a) derived and estimated a general equilibrium model of demand and supply for nine major sectors of the economy and reported, among other results, that the 1974–1978 increases in the federal minimum wage (which amounted to a cumulative increase of 65 percent) boosted prices by about 1.5 percent on average, with industry-specific effects ranging from less than 0.1 percent in mining to more than 3 percent in agriculture and services.

Wolff and Nadiri (1981) used a modified input-output framework at the industry level that allowed for substitution among inputs in response to a minimum wage increase. Simulating the model, they found that a 25 percent increase in the minimum wage would raise overall consumer prices by as much as 0.7 percent, with the increase concentrated in prices of household services.

### *7.2.1. Conclusion*

In general, the impact of the increases in the minimum wage on prices in the late 1970s and early 1980s was judged to be small relative to those stemming from other supply shocks at the time, such as the spikes in oil prices or the slowdown in productivity growth. Moreover, as inflation fell during the 1980s and 1990s, macroeconomists modified their models to include a greater role for forward-looking expectations, recognizing the important role that credible

monetary policy aimed at low inflation could play in mitigating the overall inflationary effects of cost shocks.

Linkages between minimum wage policy and inflation remain a concern in some lesser-developed countries where minimum wages have traditionally played a larger role in the wage-setting process.

### *7.3. Evidence from the New Minimum Wage Research*

Although concerns about the inflationary consequences of minimum wage policy in the United States diminished over time, growing interest emerged regarding the potential for using the estimated effects of minimum wages on prices to help distinguish among alternative models of the low-wage labor market.

#### *7.3.1. Case Studies*

Card (1992b) provides a very simple comparison of city-level data on changes in the CPI for food away from home from 1987 to 1989, the period surrounding the increase in California's minimum wage from \$3.35 per hour to \$4.25 per hour. Katz and Krueger (1992) include an analysis of the effect of the April 1991 federal minimum wage increase on prices at fast-food restaurants in Texas. Card and Krueger (1994) also look for price effects in their study of the increase in New Jersey's minimum wage in April 1992. Powers, Baiman, and Persky (2007) include some estimates of price effects in their study of minimum wage increases in Illinois.

#### *7.3.2. Panel Studies*

Card and Krueger (1995a) take an approach similar to that used in Card (1992b) to analyze the effects on prices of the 1990 and 1991 increases in the federal minimum wage. Aaronson (2001) extends this analysis from 1978 to 1995, using a metropolitan-level panel data approach similar to the state-level approach we used in our original study of the employment effects of

minimum wages (Neumark and Wascher 1992). Using a detailed input-output model for the retail food sector and assuming fixed factor inputs, Lee and O’Roark (1999) calculate that full pass-through of an increase in the minimum wage would imply an elasticity for prices at eating and drinking establishments of between 0.075 and 0.114; as they note, however, this estimate should be interpreted as an upper bound. MacDonald and Aaronson (2006) look more closely at how restaurants adjust prices in response to minimum wage increases. The authors use the micro level data that are collected by the BLS to form the CPI for food away from home. One study for the United Kingdom by Draca, Machin, and Van Reenan (2005) that weighs in on the effect on prices of that country’s reintroduction of a national minimum wage set to £3.60 per hour in April 1999.

### *7.3.3. Conclusion*

The more recent and more thorough research on the price effects of minimum wages in the United States most strongly supports the competitive model of low-wage labor markets. Indeed, the prevalence of positive estimates and the near-absence of any finding of a negative effect on prices would seem to argue strongly against noncompetitive interpretations of firm behavior in these markets.

### *7.4. Minimum Wages and Prices and Inflation in Developing Countries*

Lemos (2006b) focuses on the effects of changes in Brazil minimum wage on consumer prices from 1982 to 2000, a sample period that included sharp increases in the nominal minimum wage in a high inflation environment. Lemos (2004b) examines the welfare implications of these minimum-wage-induced price increases in Brazil. In particular, she estimates the same specification as above for three separate price indexes—a broad index based on a consumption bundle for all households, an index based on a consumption bundle purchased by middle-class



households, and an index intended to measure prices faced by households earning the minimum wage.

### *7.5. Conclusion*

Theoretical predictions for the effects of minimum wages on prices are ambiguous. The research in this area lags behind that discussed in most of the previous chapters, both in terms of its quantity and (in some cases) its quality.

Even if minimum wages boost prices in low-wage industries, the inflationary impact of modest minimum wage increases in the aggregate economy is unlikely to be important in industrialized countries. Both because of the relatively small share of production costs accounted for by minimum wage labor and because of the limited spillovers from a minimum wage increase to wages of other workers, the effect of a minimum wage increase on the overall price level is likely to be small. And, as a result, minimum wage increases probably have little, if any, measurable impact on inflation expectations.

In contrast, for developing countries, where inflation expectations are often less stable and the minimum wage is binding for many more workers, minimum wages could potentially have more adverse inflationary consequences, especially if they are indexed to prices or other wages.

## **8. The Effects of Minimum Wages on Firm Profits**

There are only a few empirical studies that examine the effects of the minimum wage on profits. Card and Krueger (1995a) include one such study in their book, in which they combine data on stock prices with news stories about the minimum wage to conduct an event study of the effects of changing expectations about future minimum wage increases on expected profits. Draca, Machin, and Van Reenan (2006) directly estimate the link between profits and the re-

introduction of the minimum wage in the United Kingdom using firm-level data on profit margins, rather than inferring the effect from investor returns.

Lin (2012) re-examines the questions in Card and Krueger (1995a) by decomposing excess returns. He found that the apparent lack of an effect is a consequence of two off-setting forces: (1) a negative effect arising from firm-specific traits (adverse information on minimum-wage worker employers) and (2) a positive effect arising from market performance. In other words, we show that while the aggregate effect of the 1989 minimum wage hike was neutral, there was a significant negative impact on firms that was neutralized by positive market performance.

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