

Explaining the Small Employment Effects of the Minimum Wage in the United States^{*}

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This paper reviews the most recent wave of research—roughly since 2000—on the employment effects of the U.S. minimum wage and concludes that the weight of evidence points to little or no employment response to modest increases. The paper then examines eleven possible adjustments to minimum-wage increases that may explain why the measured employment effects are consistently small. Given the relatively low cost to employers of modest increases in the minimum wage, these adjustment mechanisms appear to be sufficient to avoid employment losses, even for employers with a large share of low-wage workers.

Introduction

The employment effect of the minimum wage is one of the most studied topics in all of economics. This paper examines the most recent wave of this research—roughly since 2000—to determine the best current estimate of the impact of increases in the minimum wage on the employment prospects of low-wage workers in the United States. The weight of that evidence points to little or no employment response to modest increases in the minimum wage. The paper also reviews evidence on a range of possible adjustments to minimum-wage increases that may help to explain why the measured employment effects are consistently small.

Empirical Research on the Minimum Wage

The volume of research on the employment impact of the minimum wage is vast and a complete review is beyond the scope of this paper. Instead, I provide a quick summary of the state of the U.S. debate as of the early 2000s and then concentrate on the main developments over the last decade.

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Pre-2000s. In 1977, the Minimum Wage Study Commission (1981; hereafter MWSC) undertook a review of the existing research on the minimum wage in the United States (and Canada), with a particular focus on the likely impact of indexing the minimum wage to inflation and providing a separate, lower, minimum for younger workers. Four years and \$17 million later, the MWSC released a 250-page summary report and six additional volumes of related research papers.¹ In their independent summary of the research reviewed in the MWSC, Brown, Gilroy, and Kohen (1982), three economists who were involved in producing the MWSC report, distinguished between employment effects on: teenagers (ages 16–19), where they concluded that a 10 percent increase in the minimum wage reduced teen employment, most plausibly from between zero and 1.5 percent; young adults (ages 20–24), where they believed the employment impact is “negative and smaller than that for teenagers”; and adults, where the “direction of the effect . . . is uncertain in the empirical work as it is in the theory.”² Their summary of the theoretical and empirical research through the late 1970s suggested that any “disemployment” effects of the minimum wage were small and almost exclusively limited to teenagers and possibly other younger workers.³

For a decade, the MWSC’s conclusions remained the dominant view in the economics profession. By the early 1990s, however, several researchers had begun to take a fresh look at the minimum wage. The principal innovations of what came to be known as “the new minimum wage research” were the use of “natural experiments” and cross-state variation in the “bite” of the minimum wage.

Natural experiments sought to reproduce in the real world some of the features of a laboratory experiment. In the context of the minimum wage, these natural experiments typically measured the employment impact of a single instance of a policy change (an increase in a state or the federal minimum wage) by comparing a group of workers directly affected by the change (teenagers in a state where the minimum wage increased, for example) with a similar group that was not affected (teenagers in a neighboring state where the minimum did not change).

¹ For an overview of the workings of MWSC and a review of its main findings, see Eccles and Freeman (1982). For a lengthy review of the MWSC’s finding, prepared by three economists involved in preparation of the MWSC report, see Brown, Gilroy, and Kohen (1982).

² Brown, Gilroy, and Kohen (1982: 524). The employment impact on adults is uncertain in theory because an increase in the minimum wage might encourage employers to replace some (presumably lower productivity) teenagers with more (presumably higher productivity) adults.

³ Teens were a much larger share of the low-wage workforce in 1979 than they are in recent years (Schmitt and Jones 2012).

Without a doubt, the most influential of the studies using a natural experiment was Card and Krueger's (1994) paper on the impact on fast-food employment of the 1992 increase in the New Jersey state minimum wage.⁴ In advance of the 1992 increase in the New Jersey state minimum wage, Card and Krueger conducted their own telephone survey of fast-food restaurants in New Jersey and neighboring Pennsylvania. They repeated the survey after the increase had gone into effect and then compared the change in employment in New Jersey's restaurants (the minimum wage treatment group) with what happened in Pennsylvania (the control group). They found "no evidence that the rise in New Jersey's minimum wage reduced employment at fast-food restaurants in the state."⁵

The "new minimum wage" research also emphasized research methods based on important differences in the "bite" of the federal minimum across the states. Any given increase in the federal minimum, the thinking went, should have more impact in low-wage states, where many workers would be eligible for an increase, than it would in high-wage states, where a smaller share of the workforce would be affected. Card, for example, divided the U.S. states into three groups—low impact, medium impact, and high impact—according to the share of their teenage workforce that would be affected by the 1990 and 1991 increases in the federal minimum wage. His analysis concluded: "Comparisons of grouped and individual state data confirm that the rise in the minimum wage raised average teenage wages On the other hand, there is no evidence that the rise in the minimum wage significantly lowered teenage employment rates ..." (Card 1992b: 36)

Card and Krueger's (1995) book *Myth and Measurement: The New Economics of the Minimum Wage* is the best (though early) summary of these two strands of the "new minimum wage" research. Their detailed review of studies using a variety of methods and datasets to examine restaurant workers, retail employment, and teenagers, concludes: "The weight of this evidence suggests that it is very unlikely that the minimum wage has a large, negative employment effect" (Card and Krueger 1995: 389–90)

Myth and Measurement also inspired a considerable response from economists more critical of the minimum wage. Neumark and Wascher's (2008) book *Minimum Wages* brings together much of this critique, with an emphasis on their own work. In Neumark and Wascher's assessment, the most reliable recent research on

⁴ Other important studies along these lines include Card's (1992a) analysis of the impact of the 1988 increase in California's state minimum wage and Katz and Krueger's (1992) study of the impact of the 1990 and 1991 increases in the federal minimum wage.

⁵ Card and Krueger (1994: 792). Neumark and Wascher (2000) criticized Card and Krueger's study, arguing that the survey was poorly designed and implemented. Card and Krueger (2000) responded by confirming their original results using payroll records from a virtual census of fast-food restaurants in New Jersey and eastern Pennsylvania.

the minimum wage has built on the earlier time-series analysis that informed the main conclusions of the MWSC. This new generation of time-series analyses typically applies modern econometric techniques to state-level panel data on teenagers (and sometimes less educated workers). Neumark and Wascher's conclusion is that "the preponderance of evidence supports the view that minimum wages reduce the employment of low-wage workers" (2008: 104).

Since the early 2000s. At the turn of the century, the minimum-wage debate had two poles: On the one side, researchers broadly identified with the "new minimum-wage research" (though without Card and Krueger, who, since their 2000 re-analysis of their New Jersey fast-food study, have not returned to write on the minimum wage) and on the other, critics of the minimum wage and the new minimum-wage research, the most prolific of whom have been Neumark and Wascher. The last decade has seen a continued outpouring of research from both camps, and what Dube (2011) has called a "fourth generation" of research on the minimum wage that "tries to make sense of the sometimes contradictory evidence."⁶

In the next two sections of this article, I first summarize the findings of two statistical metastudies (studies of studies) as well as more qualitative, literature reviews of this research, and then take a closer look at several of the most important and influential studies published in the last decade.

Metastudies

Metastudies are "studies of studies" that use a set of statistical techniques to pool the results of a large number of separate analyses. Metastudy techniques are widely used in medicine and effectively increase the amount of data available for analysis, potentially providing a much sharper picture of statistical relationships than is possible in any individual study. Relative to more obviously subjective literature reviews, metastudy techniques offer a replicable set of criteria for weighting the individual findings of a diverse range of studies. Metastudies, nevertheless, present their own challenges. Belman and Wolfson (2014) highlight three main concerns in the context of the minimum wage.⁷

⁶ Dube (2011: 763) detects "... four generations of minimum wage research: The older time series literature, the first wave of the 'new minimum wage' research that featured both case study and state-panel approaches, a third generation of follow-up work largely based on these two methodologies, and a fourth generation of recent work that tries to make sense of the sometimes contradictory evidence."

⁷ In this regard, they also cite research by Stanley and various co-authors, including Stanley and Jarrell (1989), Stanley (2001), and Stanley and Doucouliagos (2012).

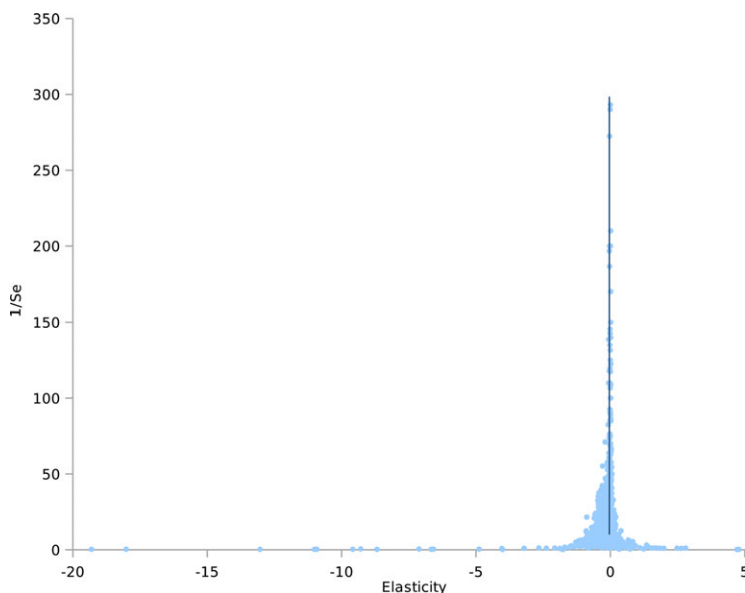
The first is publication bias (which, of course, is also a challenge for traditional literature reviews). If researchers or journals are less likely to publish results that suggest zero or positive employment effects of minimum-wage increases, meta-analyses would be biased toward finding negative results, unless they can control for this publication bias. Second is the question of how individual studies calculate the standard errors of their estimates. Given the relatively recent, but now widely accepted concerns about the accuracy of standard errors raised by Bertrand, Duflo, and Mullainathan (2004) and Donald and Lang (2007), many otherwise well-executed studies may not be providing an accurate picture of the reliability of their estimates.⁸ Third, even studies that are fairly narrowly focused (teenagers in the United States, for example) “may differ systematically because of differences in statistical framework, data source, data period” as well as “unknown and unrecognized actions of particular authors” (Belman and Wolfson 2014: 148).

Doucouliaos and Stanley (2009) conducted a metastudy of 64 studies published between 1972 and 2007 measuring the impact of minimum wages on teenage employment in the United States. Metaregression analysis of their selection of studies, which included 1474 separate estimates, found both clear evidence of publication bias and—after controlling for this publication bias—economically small and statistically insignificant employment effects for teenagers. Figure 1 presents a graphical summary of their findings. For each estimate in the 64 studies, the x-axis shows the elasticity of teen employment to the level of the minimum wage and the y-axis shows the “statistical precision” of the estimate, measured as the inverse of the standard error of the estimate (the farther from the x-axis, the smaller the standard error and, arguably, the more precise the corresponding estimate of the elasticity). The figure has several notable features. The most precise estimates are heavily clustered at or near zero employment effects (an elasticity of zero).⁹ But, the figure also shows a greater density of estimates to the left of zero than to the right of zero, which Doucouliagos and Stanley (2009) maintain is evidence of publication bias. By their reasoning, the true mean effect is close to zero, and estimates should be distributed randomly on both sides of that mean; that the

⁸ Belman and Wolfson (2014) emphasize this particular problem with standard errors, but their concern could be applied more generally to any statistical techniques that produce inconsistent estimates of coefficients or standard errors.

⁹ After their formal econometric analysis, they conclude: “A 10 per cent increase in the minimum wage reduces employment by about 0.10 per cent But even if this adverse employment effect were true, it would be of no practical relevance. An elasticity of -0.01 has no meaningful policy implications. If correct the minimum wage could be doubled and cause only a 1 per cent decrease in teenage employment” (pp. 415–16).

FIGURE 1
FUNNEL GRAPH OF ESTIMATED MINIMUM-WAGE EFFECTS (N = 1492)



SOURCE: Doucouliagos and Stanley (2009).

actual distribution of estimates is not symmetric is strongly suggestive of publication bias.

Doucouliagos and Stanley's (2009) results are robust to an extensive set of checks, including controlling for possible correlation of estimates within each study, controlling for possible correlation of estimates by each author involved in multiple studies, and limiting the analysis to what study authors' viewed as their best (usually of many) estimates of the employment impacts. They, however, do not directly address concerns raised by Belman and Wolfson (2014) about the use of biased standard errors, though some of Doucouliagos and Stanley's controls for author(s), modeling choices, and study may capture at least part of these effects. In their view: "Two scenarios are consistent with this empirical research record. First, minimum wages may simply have no effect on employment. . . . Second, minimum-wage effects might exist, but they may be too difficult to detect and/or are very small."¹⁰

¹⁰ Doucouliagos and Stanley (2009: 422). They also "find strong evidence of publication selection for significantly negative employment elasticities" and conclude: "Even under generous assumptions about what might constitute 'best practice' in this area of research, little or no evidence of an adverse employment effect remains in the empirical research record, once the effects of publication selection are removed" (p. 423).

Belman and Wolfson (2014) have carried out their own meta-analysis of the minimum wage, focusing on studies published only since 2000. They identified twenty-three minimum wage studies covering both teenagers and other kinds of workers in the United States and other countries, selected because they included the necessary elasticity estimates and corresponding standard errors for their metaregression analysis. Using the 439 estimates contained in these studies, Belman and Wolfson produced a range of meta-estimates, controlling for a variety of features of the underlying studies, including the type of worker analyzed (teens or restaurant workers), whether the analysis was based on a quasi-experiment or more conventional regression analysis, the authors of the study, and other characteristics. They were careful to distinguish between studies that calculate “reliable” and “unreliable” standard errors, based on the criteria of Bertrand, Duflo, and Mullainathan (2004) and Donald and Lang (2007), and to factor in the possibility of publication bias. When they restrict their analysis to the United States, Belman and Wolfson find that minimum wages in the range recently experienced in the United States “are not associated with reduced youth employment” and have “no effect” on employment in eating and drinking places (2014: 176).

Reviews

Neumark and Wascher (2006, 2008) conducted a qualitative review of the research since the early 1990s on the employment effects of the minimum wage in the United States, other OECD countries, several Latin American countries, and Indonesia.¹¹ In their summary remarks, focusing on the U.S. experience, they note:

What may be most striking to the reader who has managed to wade through our lengthy review of the new minimum wage research is the wide range of estimates of the effects of the minimum wage on employment, especially when compared to the review of the earlier literature by Brown et al. in 1982 [for the Minimum Wage Study Commission]. For example, few of the studies in the Brown et al. survey were outside of the consensus range of $-.1$ to $-.3$ for the elasticity of teenage employment with respect to the minimum wage. In contrast, even limiting the sample of studies to those focused on the effects of the minimum wage of teenagers in the United States, the range of

¹¹ An abbreviated version of their findings, with a few additional studies added, appears in chapter three of Neumark and Wascher (2008). For a critical review of Neumark and Wascher’s book, see Dube (2011).

studies comprising the new minimum wage research extends from well below -1 to well above zero. (Neumark and Wascher 2006: 120)

Based on their subjective weighting of the quality of the research and the reliability of the resulting estimates, Neumark and Wascher conclude:

Although the wide range of estimates is striking, the oft-stated assertion that the new minimum wage research fails to support the traditional view that the minimum wage reduces the employment of low-wage workers is clearly incorrect. Indeed, in our view, the preponderance of the evidence points to disemployment effects. (Neumark and Wascher 2006: 121)

By their calculations, of the thirty-three studies “providing the most credible evidence; 28 (85 percent) . . . point to negative employment effects” (Neumark and Wascher 2006: 121).

The Neumark and Wascher (2006) review, however, is more subjective and arguably less relevant to the United States than the two metastudies discussed earlier. Only 52 of the 102 studies reviewed by Neumark and Wascher analyzed U.S. data. Of these U.S. studies, Neumark and Wascher designated nineteen as “most credible,” five of which were their own studies.¹²

Belman and Wolfson (2014) also wrote an extensive qualitative review of minimum wage research since 2000, including a significant number of studies published too late for inclusion in Neumark and Wascher (2006, 2008). Their review focuses on methodological differences across the wide range of recent studies, emphasizing the strengths and especially the weaknesses of various strands of research. To sort out these conflicting findings, they appealed to their metastudy, which as noted earlier, concluded that there were no statistically and economically meaningful employment losses associated with minimum wages in the United States.

A Closer Look at Several Key Recent Studies

This section takes a closer look at several of the most important studies conducted over the last decade.

Dube, Lester, and Reich (2010). Probably the most important and influential paper written on the minimum wage in the last decade was Dube, Lester,

¹² Following the procedure that Neumark and Wascher appear to have used, I count one of their sources—Sabia (2006)—as two studies because it has two separate entries in their Table 1.

TABLE 1
TOTAL WAGE BILL IMPACT OF RECENT MINIMUM-WAGE INCREASES

Minimum wage (nominal dollars)	Legislated increase (percent)	Number of full-time workers affected	Share of all employees (percent)	Share of all hours worked (percent)	Avg hourly increase for workers receiving an increase (dollars)	Total annual cost of wage increase (billions of dollars)	Total annual wage bill, in sweep (billions of dollars)	Total annual wage bill, all workers (billions of dollars)	Total increase as share of wage bill, in sweep (percent)	Total increase as share of wage bill, all workers (percent)
1989	3.35									
1990	3.80	3,612,491	4.8	3.6	0.32	2.4	26.2	2,267.4	9.2	0.11
1991	4.25	4,199,152	5.6	4.2	0.34	3.0	34.2	2,369.0	8.7	0.13
1995	4.25									
1996	4.75	2,959,023	3.8	2.8	0.41	2.5	26.8	3,068.8	9.4	0.08
1997	5.15	4,902,738	6.0	4.5	0.26	2.7	49.9	3,242.7	5.3	0.08
2006	5.15									
2007	5.85	1,214,946	1.3	1.0	0.49	1.2	13.6	5,317.6	9.1	0.02
2008	6.55	1,936,789	2.1	1.6	0.45	1.8	24.5	5,536.5	7.4	0.03
2009	7.25	2,407,638	2.7	2.0	0.37	1.9	34.5	5,546.5	5.4	0.03

NOTE: Authors' analysis of Current Population Survey.

and Reich (2010)'s study (DLR, hereafter),¹³ which offered a comprehensive reappraisal of both the new minimum wage research and its critics. The study was built around a key methodological innovation, which generalized Card and Krueger's New Jersey study to make it nationally representative, and identified a significant weakness in much of the earlier minimum-wage research based on the analysis of state employment patterns, which had failed to control for regional differences in employment growth that were unrelated to the minimum wage.

The most convincing critique of Card and Krueger's (1994, 2000) study of the increase in the New Jersey minimum wage (relative to Pennsylvania, where the minimum wage did not go up) was that it is difficult to generalize from a single case study (Bertrand, Duflo, and Mullainathan 2004; Donald and Lang 2007). Card and Krueger's experiment could have been perfectly executed, but still represent only one result from a distribution of possible outcomes. Absent other information, the best estimate of the true effect of the minimum wage would be Card and Krueger's actual results, but we cannot convincingly rule out, based on that single case, that the true effects of a minimum wage might be different than what was observed in the case of New Jersey in 1992.

In recognition of this problem, DLR essentially replicated Card and Krueger's New Jersey–Pennsylvania experiment thousands of times, by comparing employment differences across contiguous U.S. counties with different levels of the minimum wage. DLR used data from the Quarterly Census of Employment and Wages (QCEW) to construct a dataset of restaurant employment in every quarter between 1990 and 2006 in the 1381 counties in the United States for which data were available continuously over the full period.¹⁴ DLR matched these employment data with the level of the federal or state minimum wage (whichever was higher) in every county in each quarter of each year in the sample. They then compared restaurant employment outcomes across a subset of 318 pairs of bordering counties where the prevailing minimum wage could differ, depending on the levels of the federal and state minimum wages.

Their methodology effectively generalizes the Card and Krueger New Jersey–Pennsylvania study, but with several advantages. First, the much larger number of cases allowed DLR to look at a much larger distribution of employment outcomes than was possible in the single case of the 1992 increase in the New Jersey minimum wage. Second, because DLR followed counties over a 16-year period, they were also able to test for the possibility of longer term

¹³ The paper first circulated in 2007.

¹⁴ The QCEW collects data from unemployment insurance records, a virtual census of employees in the United States. There were a total of 3081 counties in the United States over the period they analyzed.

effects. Finally, because the relative minimum wage varied across counties over time, the minimum wage in a particular county could, at different points in time, be lower than, identical to, or higher than the minimum wage in its pair, providing substantially more experimental variation than in the New Jersey–Pennsylvania (and many similar) studies. Using this large sample of border counties, and these statistical advantages over earlier research, DLR found “strong earnings effects and no employment effects of minimum wage increases” (p. 961).

DLR’s study also identified an important flaw in much of the earlier minimum-wage research based on the analysis of state-level employment patterns. They demonstrated that aggregate employment trends vary substantially across region, with *overall* employment generally growing rapidly in parts of the country where minimum wages are low (the South, for example) and growing more slowly in parts of the country where minimum wages tend to be higher (the Northeast, for example). Because few researchers believe that the minimum wage levels prevailing in the United States have had any impact on the *overall* level of employment,¹⁵ failure to control for these underlying differences in regional employment trends, DLR argued, can bias statistical analyses of the minimum wage. Standard statistical analyses that do not control for this “spatial correlation” in the minimum wage will attribute the better employment performance in low-minimum-wage states to the lower minimum wage, rather than to whatever is really driving the faster overall job growth in these states (good weather, for example). When DLR use a dataset of restaurant employment in all counties (for which they have continuous data from 1990 through 2006), not just those that lie along state borders, their results closely match earlier research that finds job losses associated with the minimum wage. But, once they control for region of the country, these same earlier statistical techniques show no employment losses. They conclude: “The large negative elasticities in the traditional specification are generated primarily by regional and local differences in employment trends that are unrelated to minimum wage policies.”¹⁶

Independent of DLR, Addison, Blackburn, and Cotti (2009, 2012; hereafter ABC) used similar county-level data for the retail (ABC 2009) and the restaurant-and-bar sector (ABC 2012) and also found no net employment effect of the minimum wage in these industries. More important, using reasoning similar to DLR, they also concluded that the standard state panel-data techniques

¹⁵ An exception is Meer and West (2013), which I consider below.

¹⁶ DLR, p. 962. Several prominent studies since 2000 that use state panel data and estimation techniques of this type do not control for or address the “spatial heterogeneity” identified by DLR. See, for example, Burkhauser, Couch, and Wittenburg (2000); Neumark and Wascher (2007); and Sabia (2009).

that have typically yielded negative employment effects of the minimum wage appear to be biased toward finding that result: “Our evidence does not suggest that minimum wages reduce employment once controls for trends in county-level sectoral employment are incorporated. Rather, employment appears to exhibit an independent downward trend in states that have increased their minimum wages relative to states that have not, thereby predisposing estimates towards reporting negative outcomes” (ABC 2012: 412).¹⁷

Neumark, Salas, and Wascher (2014; hereafter NSW) take issue with DLR for what they see as the overzealous use of geographic controls. According to NSW, the multistate regional controls or state-level time trends suggested by DLR as a remedy for spatial correlation across states remove too much of the identifying variation in the data and explain DLR’s inability to find well-defined negative employment effects. In NSW’s view: “out of concerns about avoiding minimum wage variation that is potentially confounded with other sources of employment change, [DLR] discard a great deal of valid identifying information—throwing out the identifying ‘baby’ along with, or worse yet instead of, the contaminated ‘bathwater’” (p. 644). In response, Allegretto, Dube, Reich, and Zipperer (2013; hereafter ADRZ) argue that DLR’s and their own expanded set of models preserve sufficient variation in the data to identify strong effects of the minimum wage on earnings of low-wage workers, suggesting that the small estimated employment effects using these same controls simply reflect the small employment impact of the minimum wage.¹⁸ ADRZ’s spatial controls also leave sufficient variation in the data to link increases in the minimum wage to sharp falls in labor-market flows, as do Dube, Lester, and Reich (2013) in a separate analysis; Dube (2013a), using similar spatial controls across states, is able to identify a statistically significant effect of the minimum wage on raising family incomes and reducing the incidence of poverty.¹⁹

¹⁷ ABC’s research first circulated in 2008, at about the same time that DLR’s work first appeared.

¹⁸ ADRZ write: “our consistent finding is that the inclusion of spatial controls does not attenuate the treatment effect on earnings but reduces the employment effect in magnitude and renders them statistically insignificant—regardless of the data used or the specific approach employed” (p. 3). ADRZ use three distinct methods for controlling for spatial correlation (“comparing across contiguous counties, comparing within commuting zones, and using within-region variation along with state-level trend controls”) across four data sets: the American Community Survey (ACS), the Current Population Survey (CPS), the Quarterly Workforce Indicators (QWI), and the Quarterly Census of Employment and Wages (QCEW).

¹⁹ Totty (2014) seeks to resolve the dispute between NSW and DLR by using factor model methods (Bai 2009; Pesaran 2006). He argues that factor model techniques control for spatial correlation without using the time trends and geographic controls that NSW criticize and without imposing the restrictions on the form of spatial correlation that are implicit in DLR’s estimation techniques. Totty finds in favor of DLR, with his results “suggest[ing] that any negative effects of minimum wages on employment are small” (p. 5).

Allegretto, Dube, and Reich (2011). Allegretto, Dube, and Reich (2011) (ADR, hereafter) applied the insights of DLR to data on teen employment over the period 1990–2009. ADR made at least two important contributions. First, they analyzed teen employment, rather than industry employment, making their results more directly comparable to the bulk of earlier research on the minimum wage. Second, they included data covering the deep recession that ran from December 2007 through June 2009, allowing them to measure any possible interactions between the minimum wage and strong economic downturns.²⁰

ADR analyzed data from the Current Population Survey (CPS) for the years 1990 through 2009.²¹ Because the CPS sample is smaller than the QCEW and does not reliably report data at the city or county level, ADR instead tracked teen employment at the state level. When they produced standard statistical analyses of the kind used in much of the research since the mid-1990s on teen employment, they found results similar to those found in that earlier research (a 10-percent increase in the minimum wage reduces teen employment slightly more than 1 percent). But, following DLR, once they controlled for different regional trends, the estimated employment effects of the minimum wage disappeared, turning slightly positive, but not statistically significantly different from zero. ADR also investigated whether the impact of the minimum wage is greater in economic downturns and “do not find evidence that the effects are systematically different in periods of high versus low overall unemployment”²² (p. 238).

Hirsch, Kaufman, and Zelenska (2011). Hirsch, Kaufman, and Zelenska (2011) (HKZ, hereafter) studied the impact of the 2007–2009 increases in the federal minimum wage on a sample of eighty-one fast-food restaurants in Georgia and Alabama. In principle, the size of the minimum-wage increase was identical across all the restaurants studied, but, in practice, the impact of the increase varied because there was significant variation in pay across the restaurants. The main contribution of the paper is to shift the discussion toward understanding why, in their words, “[d]espite decades of research, pinning-down the labor market effects of [the minimum wage] has proven elusive.”²³ In particular, they propose looking at a range of possible “channels

²⁰ DLR include data covering the recessions of 1990–1991 and 2001.

²¹ The detailed data on restaurant employment that DLR used do not contain information on workers’ characteristics such as age, but the CPS data used in ADR do.

²² For a discussion of NSW’s criticisms of ADR and ADR’s response, see the earlier discussion of DLR.

²³ HKZ, p. 1. As will be obvious later, this paper attempts to build on HKZ’s framework.

of adjustment” to minimum wage increases and examine evidence on some of these potential channels.

HKZ gathered two kinds of data. The first were electronic payroll records obtained from the three owners of the eighty-one establishments. The data covered a 3-year period from January 2007 through December 2009, which brackets the July 2007, July 2008, and July 2009 increases in the federal minimum wage. These data allowed the researchers to conduct before-and-after tests of changes in wages and employment at the restaurants. If the minimum wage had a negative effect on employment, they would expect to observe larger increases in wages at the lower wage restaurants, accompanied by bigger declines in employment. In fact, they found: “in line with other recent studies, that the measured employment impact is variable across establishments, but overall not statistically distinguishable from zero. The same absence of a significant negative effect is found for employee hours, even when examined over a three-year period” (HKZ, p. 32).

HKZ also collected data through separate interviews with managers and employees, using a survey designed to investigate channels of adjustment to the minimum wage other than changes in employment or hours.²⁴ The other channels considered included: price increases, changes to the internal wage structure (including slower pay increases for higher-wage workers), reductions in turnover, “operational and human resource efficiencies,” reductions in non-labor costs, reductions in customer service, and lower profits.

HKZ used the responses to their surveys to explain their finding of no systematic employment or hours responses to the higher federal minimum wage:

[O]ur study offers a new [three-part] explanation for the small and insignificant employment effects found in the [minimum wage] literature . . . first . . . is that even large increases in the [minimum wage] may be modest as compared to other cost increases that business owners must routinely offset or absorb. . . . The second is that a [minimum-wage] cost increase flows through more adjustment channels than economists have typically considered. And the third is that managers regard employment and hours cuts as a relatively costly and perhaps counter-productive option, regarding them as a last resort.” (p. 33)

HKZ’s empirical investigation of the wage, employment, and other impacts of the federal minimum wage is subject to a number of reasonable critiques. The most important of these (as was the case with Card and Krueger’s 1994

²⁴ In the summer of 2009, HKZ interviewed or surveyed sixty-six of the eighty-one managers and 1649 of the 2640 employees.

and 2000 New Jersey studies) is that it is difficult to generalize from only one minimum-wage experiment, particularly when the analysis is based on the experience of only eighty-one restaurants, all in the same chain, owned by only three franchisees in just two states. Nevertheless, the employment effects they find lie at the consensus estimate in the two most recent metastudies: little or no negative employment outcomes. The key contribution of this paper, however, is its focus on the wide range of ways that employers respond to minimum-wage increases other than adjusting employment or hours.

Sabia, Burkhauser, and Hansen (2012). Sabia, Burkhauser, and Hansen (2012; hereafter SBH) used research methods similar in spirit to the original Card and Krueger New Jersey study to analyze the effects of an increase (in three steps) in the New York state minimum wage from \$5.15 per hour in 2004, to \$7.15 per hour in 2007 (a cumulative 39-percent increase). They compared the effect of the increase on the employment of less educated 16-to-29-year-olds in New York with similar workers in nearby Pennsylvania, Ohio, and New Hampshire, which experienced no increase in the minimum wage over the same period. SBH also compared employment outcomes for less educated 16-to-29-year-olds in New York with better educated New York state workers of the same age.²⁵

Their analysis shows that the minimum-wage increases in New York raised the wages of less skilled younger workers relative both to similar workers in the control states and to better-educated workers of the same age in New York State. But, they also found “robust evidence that raising the New York minimum . . . significantly reduced employment rates of less-skilled, less-educated New Yorkers.” Their estimates implied “a median elasticity of around -0.7 , large relative to consensus estimates . . . of -0.1 to -0.3 found in the literature” (SBH, p. 23).

The SBH study, however, is subject to the same critique applied to HKZ (and Card and Krueger before them). SBH analyzed only one experience of the minimum wage. Even if the effects of the minimum wage were, in truth, zero, we would expect to see a distribution of estimates around zero, including both positive and negative estimates. Recently, Hoffman (2014) has replicated SBH’s approach using the full CPS survey data, rather than SBH’s Outgoing Rotation Group sample of the CPS, which is based on a quarter-sample of the full CPS. Using the much larger sample, Hoffman found “no evidence whatsoever of a negative employment impact for young, less-educated workers in

²⁵ SBH also constructed a synthetic control group of individuals drawn from a larger collection of states, designed to most closely match the characteristics of the “treated” New York state group. These tests produced qualitatively similar results to the ones discussed here.

[New York] following the minimum wage increase”²⁶ (p. 17). Hoffman emphasizes that “SBH were not inherently wrong in using the [ORG sample] and their analysis and methods are appropriate. Rather, they were unlucky. The difference between employment rates at the state level from the [full] CPS and [the ORG sample] is a cautionary tale for applied labor economists, especially for analyses using a [differences-in-differences] strategy with relatively small samples and a population mean that is reasonably low” (2014: 18).

Meer and West (2013). Meer and West (2013) take a novel approach to assessing the employment impact of the minimum wage. In a noncompetitive labor market, they argue, the “effect . . . should be more apparent in employment dynamics—that is, in the actual creation of new jobs by expanding establishments and the destruction of existing jobs by contracting establishments” than in the levels of employment. With this in mind, they use state-level panel data drawn from the Business Dynamics Statistics (BDS), the QCEW, and the QWI to estimate the impact of the applicable minimum wage on the *growth* rate, rather than the *level*, of employment. They “do not find a . . . reduction in the level of employment “ but do find that “job growth declines significantly in response to increases in the minimum wage” (p. 2). The size of the estimated effect on growth rates appears to be large: “A ten percent increase to the minimum wage results in a reduction of approximately one-quarter of the [state] net job growth rate” (p. 19). Meer and West suggest that this corresponds to an elasticity of *total* employment to the minimum wage of about -0.05 . But, expressed as a share of workers earning at or near the minimum wage, as this elasticity is usually expressed, this relatively small elasticity appears to lie well outside the historical range of -0.1 to -0.3 for teenagers (MWSC) or low-wage workers more generally (Neumark and Wascher 2008). For example, if workers receiving a wage increase as a result of a given increase in the minimum wage—either because they were earning below the new minimum wage or because they were just above the new minimum wage and were covered by “spillover” increases—made up 10 percent of total employment, the -0.05 elasticity would translate to an elasticity of about -0.5 in the more commonly used presentation; if the affected group is only 5 percent, their results suggest a converted policy elasticity of about -1.0 .

Dube (2013b) and ADRZ criticize Meer and West on several grounds. First, Dube (2013b) argues, along the lines just mentioned, that the estimated

²⁶ Over the course of a full year, the rotating structure of the full CPS sample means that observations will be correlated across months. Hoffman (2014) does not appear to control for the nonindependence of observations in the full CPS, but this should not affect his conclusions because his uncorrected standard errors will make it more likely, not less likely, to find statistically significant employment changes.

employment effects are implausibly large. Second, Dube and ADRZ note that Meer and West find slower growth in *total* employment in response to the minimum wage, but ADRZ find no fall in employment growth for either teens or restaurant workers, two groups whose employment is widely assumed to be sensitive to the minimum wage.²⁷ In a response to Dube (2013b), Meer and West counter that their estimates of employment losses for young workers are, in fact, larger for 14-to-18-year-olds than they are for 19-to-21 and (separately) 22-to-24-year-olds (p. 25), as would be expected if the minimum wage were causing the deceleration in overall employment. Meer and West also estimate the employment impact separately by industry and conclude that “industries that tend to have a higher concentration of low-wage jobs show more deleterious effects on job growth from higher minimum wages,” though my own analysis of Meer and West’s results shows no correlation between industry wage levels and Meer and West’s estimated employment impacts.²⁸

Adjustment Channels

The standard competitive model makes stark predictions about the employment effects of the minimum wage: A binding minimum wage will price at least some low-wage workers out of jobs and will unambiguously lower employment. Why, then, does the bulk of the best statistical evidence on the employment effects of the minimum wage cluster at zero or only small employment effects? This section attempts to answer that question, adopting and adapting the simple “channels of adjustment” framework proposed by HKZ.

HKZ argue that minimum-wage-related cost increases change “the behavior of firms, with impacts on workers, consumers, owners, and other agents” (HKZ, p. 1). They analyze the possible channels of adjustment emphasized by three different theoretical approaches to the minimum wage: The standard competitive model, the “institutional” model, and the (dynamic) “monopsony” model.

The competitive model generally emphasizes adjustment through declining employment (or hours). But, the same competitive model also allows for other

²⁷ ADRZ fit a generalized method of moments estimator “using alternative values of the autoregressive coefficient [that] encompasses the special case where minimum wages affect employment growth (as opposed to employment levels), as considered in Meer and West (2013)” (p. 4). ADRZ’s Table 4 shows that “for the two key low-wage groups, there is no evidence that minimum wages reduce employment growth.”

²⁸ See “More on Meer and West’s Minimum Wage Study,” <http://www.cepr.net/index.php/blogs/cepr-blog/more-on-meer-and-west-s-minimum-wage-study>.

channels, including higher prices to consumers, reductions in nonwage benefits such as health insurance and retirement plans, reductions in training, and shifts in the composition of employment. The existence of these and other possible channels of adjustment means that minimum wages could have little or no effect on employment, even within a standard competitive vision of the labor market.

The institutional model, as HKZ note, was the “dominant paradigm for evaluating the minimum wage” from the time the federal minimum wage was first established in the 1930s through the decade of the 1950s. The institutional view has several key features, including: “Rejection of a well-defined downward sloping labor demand curve; labor markets that are imperfectly competitive, institutionally segmented, socially embedded, and prone to excess supply; and the importance of technological and psycho-social factors in firm-level production systems and internal labor markets . . . as determinants of cost and productivity.”²⁹ This institutional approach allows for several additional channels of adjustment. Probably the most important of these concern productivity. Employers may respond to a minimum-wage increase by exerting greater managerial effort on productivity-enhancing activities, including the reorganization of work, setting higher performance standards, or demanding greater work intensity. In the competitive model, firms are assumed already to be operating at peak efficiency, but in the institutional framework, firms are assumed to operate often below their peak efficiency because it is costly to managers and to workers to identify, implement, and maintain practices that continuously maximize efficiency (Kaufman 1999, 2010). In this context, a minimum-wage increase gives new incentives to employers to undertake additional productivity-improving practices. Alternatively, a higher minimum wage may also boost productivity through “efficiency wage” effects. A strong theoretical and empirical basis exists for the idea that wages set above the competitive market rate can induce workers to work harder (Katz 1986), either to ensure that they keep their job (Shapiro and Stiglitz 1984) or in reciprocity for the higher wages paid (Akerlof 1982).³⁰ A final potential channel of adjustment in the institutional model is the possibility that a higher minimum wage, by increasing spending power of low-wage workers, might act as a form of economic stimulus, spurring greater demand for firms’ output, at least partially offsetting the rise in wage costs (Aaronson and French 2013; Hall and Cooper 2012). As a result of these various alternative channels of adjustment, the institutional model

²⁹ HKZ, p. 5. For an excellent discussion of the institutional framework as it relates to the minimum wage, see Kaufmann (2010).

³⁰ For additional possible channels of adjustment under the institutional model, see HKZ, pp. 5–7.

suggests that the minimum wage “may have, particularly in the short-run, an approximately zero or small positive employment effect.”³¹

The dynamic monopsony model is a third theoretical approach to the labor market that opens up additional channels of adjustment. Traditional monopsony models assume that the labor market is characterized by a single employer who hires all of a large number of possible workers. The standard example is an isolated “company town” with many workers and only one large employer. A key feature of monopsony models is that workers are paid less than their marginal product, that is, less than the wage those workers would receive in a competitive labor market, so a minimum that does not raise the wage above what would be the competitive wage in a well-functioning market could raise both wages and employment. The use of the term “dynamic monopsony” is an attempt to retain this and other analytical features of the standard monopsony model, while emphasizing that the source of the monopsony power does not flow from being a single employer, but rather from the dynamics—particularly the frictions—of the low-wage labor market.

The key difference between the standard competitive model and the monopsony model concerns the circumstances employers face when it comes to recruiting and retaining staff. In the competitive model, employers can hire all the labor they desire by paying the prevailing market wage; and, in the event that a worker quits, employers can instantly replace that worker with an identically productive worker at the same wage. By contrast, in the dynamic monopsony model, employers, even those operating in low-wage labor markets, face real costs associated with hiring new workers. These costs flow from inevitable frictions in the labor market. Workers incur costs (time, effort, financial expenditures) to find job openings; and, workers must limit their job searches to openings that fit their geographic, transportation, and scheduling constraints. To overcome these frictions, employers must either pay above the going wage (to draw extra attention to the particular vacancy) or wait (with implied costs in lost output) until they are able to fill the vacancy with a worker willing to accept that particular opening at the going rate.

At first glance, these frictions seem to work against low-wage employers, who must pay higher wages to attract additional workers. In reality, however, frictions put low-wage workers at a significant disadvantage relative to their employers. Employers must pay above the going rate to fill vacancies quickly (or wait longer until the vacancy is filled at the going rate) because unemployed workers face real barriers (transportation, scheduling, information, financial, and others) to locating suitable jobs. Low-wage employers are well

³¹ HKZ, p. 6, citing Lester (1946, 1960).

positioned to take advantage of these difficulties. As in the traditional monopsony model, employers in markets characterized by dynamic monopsony are able to pay their current workers below their “marginal product.”

In the monopsony model, employers are unlikely to pay higher wages voluntarily in order to fill vacancies because they would then have to raise the pay of their existing workers to match the pay offered to their last hire. As a result, in monopsonistic settings, employers habitually operate with unfilled vacancies, rather than raising the wage for their entire workforce. In this context, raising the minimum wage can, in theory, increase employment by raising the wages of the existing workforce to the “competitive” level (no existing jobs are lost because these workers were being paid below their “marginal product”) and filling existing vacancies (which increases overall employment).³²

Size of Adjustment

The three distinct theoretical approaches to the minimum wage suggest a large number of possible channels of adjustment. Before reviewing the evidence on these various channels, however, it is useful to have an idea of the size of the adjustment that a typical minimum-wage increase requires.

Table 1 presents data on the wage costs of the last three rounds of federal minimum-wage increases: 1990–1991 (in two stages, from \$3.35 to \$4.25), 1996–1997 (in two stages, from \$4.25 to \$5.15), and 2007–2009 (in three stages, from \$5.15 to \$7.25). Each of the annual increases in the statutory level of the minimum wage was in the range of about 10 percent per year (a low of 8.4 percent to a high of 13.6 percent—see column 2). The average increase in the wage costs of affected workers, however, was in all cases smaller than the increase in the statutory rate, ranging from a low of 5.3 percent to a high of 9.4 percent (see next-to-last column). The lower average actual increase simply reflects that not all of the workers who receive a pay boost after a minimum-wage increase receive the full increase (because they are already earning above the old federal minimum, but below the new federal minimum). Even more importantly, the total direct wage cost of each of these minimum-wage increases was small relative to the total wage bill paid by employers—consistently near or below 0.1 percent of total wages paid (see last column). Relative to the wage costs of minimum-wage workers, the size of each recent minimum-wage increase was modest (between about 5 and 10

³² For a detailed discussion of dynamic monopsony, see Manning (2003).

percent of total wage costs for minimum-wage workers).³³ Relative to the total wage costs in the economy (that is, including the wages of all employees, not just those earning the minimum wage), the wages costs of recent minimum-wage increases are very small.³⁴

The size of these increases is directly relevant to the evaluation of possible channels of adjustment. For the typical minimum-wage increase, one or more of these alternative channels of adjustment must cope with what are relatively small total cost increases, when expressed as either a share of the total wages paid to minimum-wage workers or as a share of the total wages paid to all workers.

Possible Channels

1. Reduction in hours worked. The minimum wage does not raise the cost of hiring *workers*—it raises the cost of hiring an *hour of work* performed by those workers. Even within the competitive framework, employers might choose to respond to a minimum-wage increase by reducing workers' hours, rather by reducing the total number of workers on payroll (Michl 2000). If firms were to adjust entirely by cutting hours (that is, they used no other adjustment channel), a minimum-wage increase could still raise the living standard of minimum-wage workers, even in a competitive model of the labor market. Imagine, for example, that the minimum wage increased wages by 20 percent and lowered the number of hours worked by 10 percent (a labor demand elasticity of -0.5). A part-time worker working, for example, 20 hours per week, would experience a 10-percent fall in hours to 18 hours a week, but would be paid 20 percent more for each of these 18 hours worked, for a net increase in weekly pay of 8 percent. Even if the reduction in hours was so large that it exactly offset the increase in the hourly wage (a labor demand elasticity of -1.0), minimum-wage workers would still be better off after the increase because they would be earning exactly what they made before, but would now be working fewer hours per week to earn their previous weekly wage. Hours adjustments would only potentially reduce a worker's standard of living if the fall in hours were steeper than the rise in wages.

Given the high level of turnover in many low-wage jobs, the distinction between employment and hours adjustments may be blurred. If low-wage jobs

³³ Moreover, these increases were typically preceded and followed by years when the minimum wage did not change at all.

³⁴ The cost of minimum-wage increases is even smaller when expressed as a share of total compensation—wages plus nonwage benefits such as health insurance.

are typically of short duration and workers cycle in and out of these jobs during the course of the year, even a reduction in the number of low-wage jobs might, in practice, look to low-wage workers like only a reduction in (annual) hours. Low-wage workers would spend somewhat more time searching between jobs, but be paid more for each job they did land. As a result, depending on the elasticities involved, their annual hours could fall, but their annual incomes could rise.

The empirical evidence on hour effects is not conclusive. Based on indirect evidence, DLR's study of the minimum wage across contiguous counties tentatively suggests that "the fall in hours is unlikely to be large" (DLR, p. 956). Neumark and Wascher's (2008) review of the evidence concludes that "the question of how employers adjust average hours in response to a minimum wage increase is not yet resolved" (p. 78). Belman and Wolfson's (2014) review concurs: "[I]t is not evident that increases in the minimum wage in the United States have led to [reductions in hours] in recent years, but further work" (p. 142) is necessary.

2. *Reductions in nonwage benefits.* Within the competitive framework, employers might respond to a minimum-wage increase by lowering the value of nonwage benefits, such as health insurance and pension contributions. The empirical evidence, however, points to small or no effects along these lines. Based on their review of research as of the mid-1990s, Card and Krueger (1995) conclude: "The quantitative importance of nonwage offsets in response to a minimum-wage increase is an open question" (p. 169) but their own study of fast-food restaurants in New Jersey showed no tendency for employers to cut the most common nonwage benefit offered, which were free or low-priced meals (Card and Krueger 1994). Simon and Kaestner's (2004) somewhat more recent review of the "relatively few studies of the effect of minimum wages on fringe benefits and working conditions" (p. 53) also reports small or no effects of the minimum wage on nonwage benefits.³⁵ Their analysis of CPS data found that: "minimum wages have had no discernible effect on fringe benefits (specifically, on the receipt of health insurance, on whether the employer paid the whole premium cost, on whether family health insurance was provided, and on receipt of employer pensions)" (p. 67).

3. *Reductions in training.* Another channel of adjustment consistent with the competitive framework is the possibility that employers might reduce their expenditures on job training for low-wage workers. The empirical evidence,

³⁵ Citing Wessels (1980), Alpert (1986), Card and Krueger (1994), and Royalty (2000).

however, is not conclusive. In their review of the recent research on the minimum wage and training, Neumark and Wascher (2008: 207) write: "Summing up all of the evidence on training, we can only conclude that the evidence is mixed. Our own research tends to find negative effects of minimum wages on training, but most of the other recent research finds little evidence of an effect in either direction." In their review, Belman and Wolfson (2014: 288) agree: "The mixed evidence on the proposition that higher minimum wages induce firms to provide less training support a verdict of 'not proven' and perhaps 'not guilty.'" One reason that the research has not identified clear effects of the minimum wage on training may be that some employers may respond to a higher wage floor by *increasing* training for low-wage workers in order to raise their productivity to a level commensurate with their new, higher earnings. Acemoglu and Pischke (2001: 1), for example, present theoretical and empirical evidence that "in noncompetitive labor markets, minimum wages tend to increase training of affected workers because they induce firms to train their unskilled employees."³⁶

4. *Changes in employment composition.* Employers may adjust to a higher minimum wage by "upgrading" the skill level of their workforce, rather than cutting the level of their staffing. This process could conceivably work against the employment prospects of less educated and less experienced workers, especially, the argument goes, black and Latino teens. As Williams (2011) argues:

[W]hen faced with legislated wages that exceed the productivity of some workers, firms will make adjustments in their use of labor. One adjustment is not only to hire fewer youths but also to seek among them the more highly qualified candidates. It turns out for a number of socioeconomic reasons that white youths, more often than their black counterparts, have higher levels of educational attainment and training. Therefore, a law that discriminates against low-skilled workers can be expected to place a heavier burden on black youths than on white ones. (pp. 45–46)

Deere, Murphy, and Welch (1995) and SBH (2012) make arguments along these lines in their studies of workers with less than a high school degree.³⁷ As ADR note, however, a theoretical case can be made that minimum wages

³⁶ The benefits of employer-provided training, however, may be limited in low-wage contexts (Ahlstrand, Bassi, and McMurrer 2003). For a more optimistic overview of employer-provided training, including for low-wage and less educated workers, see Lerman, McKernan, and Riegg (2004).

³⁷ Deere, Murphy, and Welch (1995) also studied outcomes for minority youth.

might instead *improve* the relative employment prospects of disadvantaged workers: “An alternative view suggests that barriers to mobility are greater among minorities than among teens as a whole. Higher pay then increases the returns to worker search and overcomes existing barriers to employment that are not based on skill and experience differentials.”³⁸ A higher minimum wage could help disadvantaged workers to cover the costs of finding and keeping a job, including, for example, transportation, child care, and uniforms.

Recent research by SBH (2012) finds job losses among younger, less educated workers, but not older, less educated workers (though these results do not hold in Hoffman’s [2014] reanalysis of SBH). ADR’s (2011) research on the employment effect of the minimum wage on teens looks separately at the effects on white, black, and Hispanic teens and finds no statistically significant effect of the minimum wage on teens as a whole, or on any of the three racial and ethnic groups, separately. Using a similar methodology, DLR (2012) detected no evidence that employers changed the age or gender composition in the restaurant sector in response to the minimum wage. And in a study of detailed payroll records for a large retail firm with more than 700 stores, Giuliano (2013) found that teens from more affluent areas increased their labor supply (and employment) after the 1996–1997 increases in the minimum wage, while employment of teens in less affluent areas experienced no statistically significant change in employment.

5. *Higher prices.* Employers may respond to a higher minimum wage by passing on the added costs to consumers in the form of higher prices. In a purely competitive economy, where all firms are experiencing the same increase in labor costs in response to a minimum-wage increase, economic theory predicts that at least a portion of the cost increase will be passed through to consumers. Lemos (2008) has conducted a comprehensive review of about thirty academic papers on the price effects of the minimum wage. She concludes: “Despite the different methodologies, data periods and data sources, most studies reviewed above found that a 10 percent U.S. minimum wage increase raises food prices by no more than 4 percent and overall prices by no more than 0.4 percent”; and “[t]he main policy recommendation deriving from such findings is that policy makers can use the minimum wage to increase the wages of the poor, without destroying too many jobs or causing too much inflation” (p. 208). Lemos’s summary of her findings emphasizes the upper bound of the research results; nearly all of the studies of the national price level and sectoral prices (typically food and restaurants) found price increases

³⁸ ADR, p. 228, who cite Raphael and Stoll (2002) on this point.

only half or smaller than these upper bounds. Neumark and Wascher (2008) agree with Lemos's assessment of the likely price effects (while disagreeing with her conclusions about the overall usefulness of the minimum wage): "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" (p. 248). But, other recent research by Aaronson, French, and MacDonald (2008) on restaurant pricing, a sector with a high share of low-wage workers, "find[s] that a 10 percent increase in the minimum wage increases prices by roughly 0.7 percent" (p. 697), which they conclude suggests that "most, if not all, of the higher labor costs faced by employers are pushed onto consumers in the form of higher prices"³⁹ (p. 689).

While the existing research does not establish a precise range, most of the evidence does suggest that at least some portion, possibly a substantial portion, of the rise in labor costs may be passed on to consumers of minimum-wage-intensive services in the form of higher prices. These findings, however, are limited primarily to firms in the food-away-from-home sector, with little or no effect on prices in other sectors or in the aggregate economy. To the extent that a substantial portion of labor costs are passed on, the primary impact on employment will be determined in the product market. Higher product-market price elasticities of demand will imply bigger employment losses; smaller elasticities will mute any negative employment effects. In this context, Okrent and Alston's (2012) estimates of price elasticities for limited-service restaurants (fast food) of about -0.13 could help to explain the small employment impacts of the minimum wage, even if the share of labor costs appearing later in prices is large.

6. *Improvements in efficiency.* The "institutional" model of the labor market suggests that employers may respond to a minimum-wage increase with efforts to improve operational efficiency including "tighter human resource practices . . . , increased performance standards and work effort, and enhanced customer services" (HKZ, p. 7). Employers might prefer these kinds of adjustments to cutting employment (or hours) because employer actions that reduce employment can "hurt morale and engender retaliation" (HKZ, pp. 6–7). In institutional models—different from competitive models where firms are

³⁹ Their results were larger for limited-service restaurants (a statistically significant 1.55 percent) than for full-service restaurants (about 0.3 percent, but statistically insignificant). In their study of the San Francisco citywide minimum wage, Dube, Naidu, and Reich (2007) found that prices "increased significantly" at fast-food restaurants, but not at table-service restaurants.

always assumed to be operating at peak efficiency—firms generally have some scope for increasing output, albeit usually at a cost of greater managerial effort. Little direct evidence exists on operational and human resource efficiencies as a channel of adjustment. HKZ's study of the impact of the federal minimum-wage increase on eighty-one fast-food restaurants in Georgia and Alabama, however, asked fast-food managers specifically about the scope for efficiency improvements in response to the minimum-wage rise. About 90 percent of managers indicated that they planned to respond to the minimum-wage increase with higher performance standards such as "requiring a better attendance and on-time record, faster and more proficient performance of job duties, taking on additional tasks, and faster termination of poor performers" (HKZ, p. 27). Roughly the same share of managers said that they sought to "boost morale" by presenting the minimum-wage increase as a "challenge to the store" and using this as a way "to energize employees to improve productivity" (HKZ, pp. 28–29). Based on their interviews with store managers, HKZ suggest that a minimum-wage increase may function as a "catalyst or shock that forces managers to step out of the daily routine and think about where cost savings can occur."⁴⁰

7. *"Efficiency wage" responses from workers.* A higher minimum wage may also motivate workers to work harder, independently of any actions by employers to increase productivity. According to "efficiency wage" theory, wages above the competitive-market rate may elicit greater work effort for several reasons. As Shapiro and Stiglitz (1984) have argued, higher pay increases the cost to workers of losing their job, potentially inducing greater effort from workers in order to reduce their chances of being fired. Akerlof (1982) has suggested that workers may see higher wages as a gift from employers, leading workers to reciprocate by working harder.⁴¹ While a large body of research has attempted to test for the existence of "efficiency wages," few studies directly address the theoretical or empirical link between efficiency wages and the minimum wage. Rebitzer and Taylor (1995), for example, have

⁴⁰ HKZ, p. 29. Card and Krueger (1995: 323) report that the "Dollar General Corporation noted in its 1992 annual report that the impact of the 1992 minimum wage hike was minimized due to "greater employee productivity." It is not clear whether Dollar General viewed these changes as related to management's cost-saving efforts or "efficiency wage" considerations (the next channel of adjustment considered here) or some other channel.

⁴¹ Efficiency wages may work through other channels, some covered elsewhere here, others less relevant to the minimum wage; see, for example, Katz (1986: 270–71): "Efficiency wage theories suggest that firms may find it profitable to pay workers' wages above the market clearing level since such wage premiums can help reduce turnover, prevent worker malfeasance and collective action, attract higher-quality employees, and facilitate the elicitation of effort by creating feelings of equitable treatment among employees."

developed a formal model that demonstrates that, in the context of efficiency wages, a minimum wage “may increase the level of employment in low wage jobs.” But, to my knowledge, there are no studies testing for efficiency wage effects in connection with the U.S. minimum wage.

8. *Wage compression.* Employers faced with higher wage costs for their low-wage workers may also seek to make up for these costs by slowing the growth of earnings of higher wage workers. In the specific context of a minimum-wage increase, HKZ found, for example, that almost half of the employers interviewed said that, in the wake of an increase, they “would delay or limit pay raises/bonuses for more experienced employees”⁴² (p. 28). Broader studies of the U.S. economy also conclude that the minimum wage compresses the overall wage distribution.⁴³ These empirical findings give some support to the possibility that employers may compensate for higher wage costs at the bottom by reducing wage growth for workers nearer to the top.

9. *Reduction in profits.* Employers may also absorb the extra costs associated with a minimum-wage increase by accepting lower profits.⁴⁴ Unfortunately, as Draca, Machin, and Van Reenen (2011), note “there is almost a complete absence of any study directly examining the impact of minimum wages on firm profitability” (p. 130). Card and Krueger (1995) report the results of several attempts to analyze the impact of minimum-wage increases on firm profits in the United States, but found only a “mixed” and “tentative” effect. More recently, Draca, Machin, and Van Reenen’s analysis of British firm-level data concluded that “wages were significantly raised, and firm profitability was significantly reduced by the minimum wage introduction.”⁴⁵

Aaronson, French, and Sorkin (2013) provide theoretical and some empirical support for the possibility that changes in the minimum wage may lead some firms that are less profitable after a minimum-wage increase to close, only to be replaced by new firms that are more profitable at the new, higher wage floor. Using firm-level data from the unemployment insurance system

⁴² Note that HKZ’s evidence is about managers’ intentions and does not speak to any actions taken.

⁴³ See, for example, DiNardo, Fortin, and Lemieux (1996), and Autor, Manning, and Smith (2010).

⁴⁴ In the competitive labor-market case, Neumark and Wascher (2008, p. 243) note: “Prices rise to match the increase in marginal costs associated with a higher minimum wage, but, as a result, output and profits decline.” In the case of dynamic monopsony, however, as Card and Krueger (1995, p. 323) explain: “...if a minimum wage forces the firm to pay slightly more than its optimally-selected wage, then the firm will offset virtually all of this extra cost by savings from being able to fill vacancies more rapidly, having lower turnover, improved morale, etc. Any decline in profitability is of second-order magnitude...”

⁴⁵ Draca, Machin, and Van Reenen (2011: 149). They also found “no significant effects on employment or productivity” (p. 130).

(ES-202) and Census' Statistics of U.S. Businesses, they found that *both* firm exit and firm *entry* increased in the wake of state-level increases in the minimum wage, with "employment gains from entry ... roughly matched by the losses induced by exit, consistent with a small change in net employment in response to a minimum wage increase" (pp. 2–3).

10. Increases in demand (minimum wage as stimulus). Since the minimum wage transfers income from employers (who generally have a high savings rate) to low-wage workers (who generally have a low savings rate), a minimum-wage rise could spur aggregate consumer spending, potentially compensating firms at least partially for the direct increase in wage costs. Hall and Cooper (2012), for example, estimate that an increase in the federal minimum wage from \$7.25 per hour to \$9.80 per hour over roughly 2.5 years would increase the earnings low-wage workers by about \$40 billion over the period. The result, they argue, would be a significant increase in GDP and employment:

Using ... standard fiscal multipliers to analyze the jobs impact of an increase in compensation of low-wage workers and decrease in corporate profits that result from a minimum-wage increase, we find that increasing the national minimum wage from \$7.25 to \$9.80 ... would result in a net increase in economic activity of approximately \$25 billion over the phase-in period and ... generate approximately 100,000 new jobs. (p. 9)

Aaronson and French (2013) found slightly larger short-term effects on GDP—a rise of 0.3 percent—when they estimated the macroeconomic impact of an increase in the minimum wage from \$7.25 to \$9.00, though they did not attempt to convert those GDP estimates into employment figures. They frame a minimum-wage increase as a "tax and transfer" program. A higher minimum wage raises prices for both minimum-wage and non-minimum-wage workers, but "an increase in aggregate household spending can arise if minimum wage workers have a higher propensity to spend ... than non-minimum-wage workers" (p. 1).

A macroeconomic impact of the minimum wage is plausible, but at least two caveats are in order. First, the small size in macroeconomic terms of the typical minimum-wage increase (see Table 1) suggests that any macroeconomic impact on spending cannot be large, especially because any gains in spending by low-wage workers are partly offset by income declines for their employers or by any price increases induced by the minimum wage itself. Second, in general, these demand-driven stimulus effects will only hold when the economy is below full employment.

11. *Reduced turnover.* The “dynamic monopsony” model of the labor market is sometimes referred to as a “frictions model” because these models take seriously the idea that workers and employers must contend with important deviations from the smooth functioning of the standard, perfectly competitive model. Perhaps the most important frictions in the low-wage labor market involve the costs associated with the high rates of turnover, which are assumed to be zero in the standard competitive model. Because many low-wage workers are constrained by scheduling responsibilities (child care, for example), transportation limitations (lack of a reliable car or inadequate public transportation), and only partial information about available vacancies in their local labor market, employers paying the “going wage” often face significant recruitment costs in the form of unfilled vacancies, rapid turnover, and related screening and training expenses.

In frictions models, a higher minimum wage makes it easier for employers to recruit and retain employees, lowering the cost of turnover. These cost savings may compensate for some or all of the increased wage costs, allowing employers to maintain employment levels.⁴⁶ Moreover, if the minimum wage reduces the number and the average duration of vacancies, the employment response to a minimum-wage increase could even be positive.⁴⁷ In a follow-up to their 2010 study, DLR (2013) adapted their “contiguous counties” methodology, to look at the effect of the minimum wage on labor turnover among teens and restaurant workers. They found “striking evidence that separations, new hires, and turnover rates for teens and restaurant workers fall substantially following a minimum wage increase” (p. 2). Their findings, using nationally representative data, are consistent with local case studies of the minimum wage and related “living wage” laws, including Dube, Naidu, and Reich’s (2007) analysis of the San Francisco city-wide minimum wage; Fairris (2005) studying local government contractors in Los Angeles; Howes (2005) on homecare workers in California; and Reich, Hall, and Jacobs (2005) on workers at the San Francisco airport.⁴⁸

⁴⁶ This raises the question of why employers don’t already pay the higher wages. The short answer is that some firms already do. Both strategies—lower wages and high turnover versus higher wages and low turnover—may be profitable. In the absence of a minimum wage, employers choose the strategy that they prefer. In the presence of a minimum wage, employers are constrained to choose strategies that are consistent with wages at least as high as the minimum wage.

⁴⁷ The costs of turnover can be high, even for low-wage workers. See, for example, Boushey and Glynn (2012).

⁴⁸ All cited in Dube, Lester, and Reich (2012). Belman and Wolfson (2014) devote a chapter to “Gross Flows in the Labor Market” without drawing strong conclusions.

Conclusion

Across all of the empirical research that has investigated the issue, minimum-wage increases are consistently associated with statistically significant and economically meaningful increases in the *wages* of affected workers. At the same time, what is striking about the preceding review of possible channels of adjustment—including employment—is how often the weight of the empirical evidence is either inconclusive (statistically insignificant or positive in some cases and negative in others) or suggestive of only small economic effects.

One plausible explanation for these findings is that employers (and workers) respond on multiple fronts to any increase in the minimum wage. Individual establishments will follow different paths that depend on a complex set of circumstances that economists—operating with what is, even in the best of circumstances, a limited set of data—cannot fully capture or explain. Some employers may cut hours; others, fringe benefits; still others, the growth rate of wages for highly paid workers. Some employers may raise prices (particularly if their competitors are experiencing similar cost increases in response to the minimum wage). Some employers may see their profits fall (along with those of their competitors), while others may reorganize the work process in order to lower costs. Some of the strongest evidence suggests that many employers may experience declines in costly turnover. And workers may respond to the higher wage by working harder. Any of these channels might be sufficient to eliminate the need for employment cuts or reduce the size of employment cuts to a level below where they can be reliably measured. Employers and workers at the same establishment may follow more than one of these adjustment paths at the same time. Given the modest costs associated with historical increases in the minimum wage, it seems entirely plausible that small adjustments across a few of these margins could more than compensate for the higher wage floor.

One long-standing feature of much of the research on the minimum wage is the strong (though not exclusive) focus on the employment effects for teenagers, who represent a decreasing share of workers at or near the minimum wage. In the CPS data for 1979, for example, about 26 percent of workers earning less than \$10 per hour (in constant 2011 dollars) were between the ages of 16 and 19; by 2011, the share had fallen to 12 percent (Schmitt and Jones 2012). In their analysis of a proposal to raise the minimum wage in Los Angeles to \$13.25 by 2017, Reich and colleagues (2014) estimate that only about 3 percent of the workers who would receive a wage increase would be teenagers. Both the older research reviewed by the MWSC and more recent research (see, for example, Aaronson, Agarwal, and French 2007), typically

finds no employment losses for adult workers, even when the data do show effects of the minimum wage on adult wages.⁴⁹

A recent wave of city-specific minimum wages that are, by some measures, well above the historical range of the minimum wages in the United States and that appear to have fueled calls for higher state and federal minimums as well⁵⁰ raise important questions about how effective these adjustment channels will be in averting job loss at higher wages. Dube (2014) suggests that minimum wages in the range of 50 to 60 percent of the median in the relevant local labor market are not likely to lead to significant job loss. In their analysis of a proposed increase in the minimum wage in Los Angeles to \$13.25 per hour by 2017, Reich et al (2014) agree that minimum wages that in inflation-adjusted terms lie outside historical experience may still have relatively little impact on employment if they are in the upper end of historical levels relative to the median. They also note that at the city level, at least, nominal increases in the minimum wage have typically exceeded the size of increases at the federal level. What is clear is that these experiences with higher levels will provide researchers with opportunities to measure the impact of minimum wages at or beyond those studied in most of the research reviewed here.

Some of these adjustment paths discussed here reduce the benefit of the minimum wage to affected workers (cuts in nonwage benefits or training), but most have an ambiguous effect (reductions in hours or increased work effort) or no effect (lower profits or wage compression within a firm) on the well-being of low-wage workers. Some adjustment channels arguably improve workers' well-being (lower turnover or increased consumer demand). The strongest evidence suggests that the most important channels of adjustment are: reductions in labor turnover, improvements in organizational efficiency, reductions in the growth rate of wages of higher earners ("wage compression"), and small price increases.

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⁴⁹ See Aaronson, Agarwal, and French (2007), Table A-3.

⁵⁰ Minimum-wage advocates the National Employment Law Project (NELP) maintain a comprehensive and up-to-date list of city, state, and federal campaigns to raise the minimum wage at: <http://www.raisetheminimumwage.com/pages/campaigns/>.

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