# Beyond the Debate: A Meta-Analysis of Minimum Wage Studies

Thomas Esterbrook

Advisor: Professor Joseph Quinn



Boston College Department of Economics

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This thesis explores the debate surrounding the impact of minimum wage increases on employment, dissecting the conflicting results and methodological divergences in the existing economic literature. It engages in a detailed meta-analysis of seminal studies, with a particular focus on how differing research methodologies and definitions of employment have contributed to the lack of consensus among economists. The analysis reveals that while some studies, like those by Card and Krueger (1994), find no negative effects on employment, others, such as Neumark and Shirley (2022), report significant adverse impacts, particularly on low-skilled and younger workers. This thesis examines the prevalent methodological approaches and highlights the role of controlling for spatial heterogeneity and the careful selection of control groups in assessing the true effects of minimum wage policies.

### Introduction

Since its inception in 1938, the federal minimum wage has been a topic of debate in both politics and economics. Because economists often provide politicians with the research needed to make decisions, consensus among economists is key for legislation to be effective. In the case of the minimum wage, the only consistency in terms of both evidence and opinions is the lack of consistency. For decades, the consensus was that the labor market was subject to the same fundamental rule as all markets: supply and demand. Implementing a price floor in the form of a minimum wage was thought to lead to inefficiency in the form of unemployment according to classical macroeconomic theory. A landmark study by Card and Krueger (1994) found that a minimum wage hike in New Jersey did not negatively impact employment, turning what had

once been a widely accepted theory on its head. Since then, dozens of economists have contributed to the minimum wage literature. So many studies have been conducted that economists have started analyzing and reporting on the studies themselves to answer the question of whether raising the minimum wage increases unemployment, and if so, to what extent. The contemporary discourse, as evidenced by two significant recent papers - one by David Neumark and Peter Shirley (2022) and the other by Sebastian Gechert (2022) - highlights a critical divergence between the empirical evidence presented in academic research and the expert opinion of academics.

Neumark and Shirley provide a comprehensive analysis of the U.S. minimum wage literature, focusing in particular on estimates of the employment effects since the early 1990s. They begin by focusing on the fact that conclusions regarding the evidence of minimum wage's impact on unemployment are varied. Neumark and Shirley then review the findings of 70 studies regarding the elasticity of employment, which is used to gauge the effect of an increased minimum wage. Their findings suggest a predominant presence of negative employment effects in the literature, with 80% of the estimated employment elasticities being negative. This evidence is more pronounced for teens, young adults, and the less educated, challenging the notion that higher minimum wages do not reduce employment. The authors emphasize the disparity in how economists summarize the body of evidence, ranging from assertions of no employment effects to acknowledging mixed results or predominantly adverse effects.

Similarly, Gechert (2022) delved into recent methodological advancements and empirical findings in minimum wage research, highlighting the complexity and nuances in interpreting the results which often lead to varied conclusions. This paper, unlike the study by Neumark and Shirley, uses meta-analysis, an emerging methodology in economics that can theoretically

identify and correct for publication bias. The law of large numbers suggests that, given enough studies, the findings of the studies should be normally distributed around the mean, and that mean could be taken as the best estimate of the effect of minimum wage on unemployment. The pressure to report and publish statistically significant findings that align with the consensus of the academic community is purportedly responsible for the fact that minimum wage research has failed to produce a normally distributed range of findings despite the large number of studies that have been published on the topic. Multiple papers that employ meta-analytical techniques to correct for this bias have concluded that the neoclassical theory of labor markets should be discarded due to a lack of evidence (Gechert, 2022). In other words, according to Gechert, there is not enough evidence to determine that minimum wage and unemployment are positively correlated.

These papers and their findings are at direct odds with each other despite being published within very similar timeframes, making them a good example of the issues that plague the minimum wage debate. Forming an educated opinion based on the evidence is difficult when the evidence is contradictory. To make matters worse, even analyses of the evidence in the literature fail to come to a consensus. One issue that can be noticed with all the studies that will be examined is that they fail to clearly lay out what the focus of minimum wage research should be. For example, employment is a broad term. Researchers have examined the effects of increased wages on the employment levels of countless groups, but which groups should the minimum wage be helping? Are we more worried about teenagers or low-skill workers providing household income? Is it more important to maximize the availability of full-time employment or just the number of hours worked? This is beyond the realm of statistical analysis and the answers to questions like these will not be the focus of this work, but these are questions that need to be

asked. For that reason, the analysis of the studies employed in this thesis will be focused on several questions aimed at clarifying the role a given piece of evidence should play in the larger discussion of the minimum wage.

No study can perfectly isolate the impact of the minimum wage on employment. While analyzing the works listed below, the findings will not be the only focus as is common in most meta-analyses. The methods employed by different studies will be examined, specifically in the way different methods and focuses lead to different results. After analyzing how different methodologies are utilized by researchers, the focus of these methodologies will also be analyzed by exploring how employment was defined, what different groups are distinguished, what the temporal range of the study was, which industries were focused on, and whether a control group was established to highlight differences or if the study simply modeled employment before and after a minimum wage increase. These considerations will highlight the wide variety of research regarding this admittedly vast topic.

### **Meta-Analysis**

Sebastian Gechert's (2022) article "Reconsidering macroeconomic policy prescriptions with meta-analysis", mentioned above, will now be summarized to explain how contemporary researchers utilize meta-analytic methods. While it is an interesting method, it oversimplifies the results of studies, as will be shown. Criticism from Neumark and Shirley (2022), also previously mentioned, will be discussed to both validate and further explain the methods mentioned above.

The first step of meta-analysis, according to Gechert, is to define a parameter that can be found in as many of the studies regarding the topic at hand as possible. For example, in a metaanalysis of studies measuring the impact of a drug on an individual's probability of a stroke, that probability would be present in all the studies and therefore designated as the parameter that

could be used to see the distribution of study results. In this case, minimum wage meta-analyses typically use the employment elasticity as the main variable to be estimated, an approach Neumark and Shirley use as well. In cases where employment elasticity is not directly reported, calculations are done to convert the findings into the desired format. Next, data gathering in the form of analyzing studies and gathering information on methods, findings, and estimations are required. This is "the most laborious part of meta-analysis" according to Gechert (2022) and may take some time, but there is enough literature on this topic that more than enough data are typically accessible. Typically, seminal works are identified to start, and from there works that cite these seminal works are found and included in the meta-analysis if they are relevant. From there, researchers employing standard meta-analytical techniques typically look for publication bias by examining the distribution of estimates and checking to see if the distribution is normal. In theory, a normal distribution of estimates is to be expected. Studies are all aimed at uncovering the same population mean, but error and randomness naturally lead to deviations from the mean. If these studies are unbiased, however, one would expect these deviations to be positive as frequently as they are negative, and for outliers to be few and far between.

According to Gechert, multiple meta-analyses of hundreds of studies have found that employment elasticity estimates are not normally distributed (ibid.). This has led some economists to conclude that publication bias is present in research regarding minimum wage, although what this entails is unclear. Statistically insignificant results are rarely, if ever, published, but that is not unique to minimum wage research. Furthermore, while this could be taken as evidence for the lack of a consensus surrounding the minimum wage, the explanation is proximate at best. No reason for why this might be happening is provided, just that it is.

Neumark and Shirley's (2022) paper "Myth or Measurement: What Does the New Minimum Wage Research Say About Minimum Wages and Job Loss in the United States?", while authored before this specific article by Gechert, noticed the trend of meta-analyses on the minimum wage and set out to list some concerns regarding this method. First, they claim that "many papers present estimates that the authors do not view as credible (e.g., showing the estimates for a panel data specification without the fixed effects, prior to showing the preferred estimates with fixed effects)," (ibid., 390). They explain that this is why they emailed the authors of the works they had gathered asking for their interpretation of their own work and for one estimator of elasticity that could be used as a parameter. As they admitted in the same study, however, the estimates that were sent closely matched the estimates that Neumark and Shirley gathered when analyzing the works themselves. It is important to be thorough in the collection of estimators and that documentation of this collection process is important, but since they show that it is possible to do this effectively, the strength of this criticism was significantly diminished.

Next, they state that arriving at a single estimate by averaging all the studies used is problematic because the characteristics of these studies, such as temporal range and method, vary considerably, and the elasticity may vary over time. For this reason, they avoided arriving at one overarching estimate of employment elasticity and instead published figures regarding the distribution of the estimates gathered. While this is a valid criticism, the meta-analysis being conducted in this thesis is less concerned with determining a value that can be used to gauge the responsiveness of employers to changes in the price of labor and more focused on why there are so many different estimates and opinions. Therefore, it will only be considered to the extent that

it discounts other meta-analyses that align more closely to contemporary methods and creates even more of a reason for a new approach.

Finally, Neumark and Shirley argue that skewed sets of estimates do not necessarily indicate publication bias and could instead be attributable to other sources (ibid., 399-400) This issue will be addressed directly by accounting for the methods used by researchers, including Neumark and Shirley themselves, in their respective studies. Meta-analyses typically only focus on the results of studies and fail to account for any other aspect of a given study, which is why, instead of examining dozens of studies briefly and only reporting on their conclusion, only the most influential studies will be explored to provide a more comprehensive investigation and analysis that will hopefully identify the factors that contribute to such varied conclusions on minimum wage's impacts.

Of particular interest in this paper by Neumark and Shirley was their collection of elasticity estimates gathered from a range of different authors, shown below. They did not explain why or how they chose these studies, although they had to get into contact with all the authors over email to establish the employment elasticities for each paper, so it is possible these were just the studies available. They found that the average employment elasticity was -0.148, indicating the prevalence of negative estimates of the minimum wage's impact on employment in the literature (ibid., 398). Of particular interest, though, is the high quantity of insignificant estimates near 0. If economists tend to publish significant findings more than insignificant ones, which would not be surprising, then the studies that find no impact on employment may be underrepresented. Another interesting feature of this paper was the fact that the authors isolated state-level analyses and federal-level analyses to investigate the possibility that the scope of this focus might impact results, but the federal-level analyses were, on average, marginally smaller

than state-level analyses (ibid., 401). They did not distinguish between county-level comparisons, though, leaving room for future research.



Figure 1, Employment Elasticities by Neumark and Shirley (Neumark and Shirley, 398)

Ultimately, this thesis will provide a summary of some of the most famous and convincing studies that provide evidence suggesting minimum wage is harmful to employment as well as those that show it is not harmful or hardly so. Each of the seven studies gathered will be summarized, analyzed, and criticized. No study can be perfectly comprehensive, but the lack of an account of any of the most important effects of the minimum wage is something that should be noted.

# Studies that find little to no harmful effects from the minimum wage

# Card and Krueger (1994)

### Summary

David Card and Alan Krueger (1994) challenged long-held beliefs about the impact of minimum wage increases on employment when they published "Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania". New Jersey raised its minimum wage in 1992 by \$0.80, while Pennsylvania's remained fixed. This provided Card and Krueger with the opportunity to survey fast-food restaurants, a quintessential employer of minimum wage workers who would be impacted most directly by minimum wage increases, for employment data. Using New Jersey fast-food restaurants as the treatment group and fast-food restaurants nearby in Pennsylvania as the control group, Card and Krueger found that the increased minimum wage in New Jersey did not lead to a reduction in employment compared to Pennsylvania. The evidence that no negative impact on employment in New Jersey was observed after the implementation of the new minimum wage laws became even more powerful because of the thoroughness of their analysis surrounding the use of this difference-indifferences method and helps to explain why this work forever changed the landscape of the minimum wage debate.

# Methods

A federal law went into effect on April 1, 1991, raising federal minimum wages across the country from \$3.80/hour to \$4.25/hour. Exactly one year later New Jersey's minimum wage increased to \$5.05/hour, making it the highest state minimum wage in the country. This change allowed Card and Krueger to utilize a difference-in-differences estimation and analyze restaurant employment in New Jersey and eastern Pennsylvania. Two key components of this study were the choices made regarding the analyzed industry and control group. Fast food restaurants were chosen due to their adherence to minimum wage regulations, high levels of employment of lowwage workers, and similarity of both requirements and product. Restaurants that closed over the

course of the study were accounted for due to the high response rate of restaurants in telephone surveys at the time, preventing survivorship bias (ibid., 774-775). As for the application of their difference-in-differences estimator, Card and Krueger argued that the geographic proximity, economic conditions, and industry characteristics of the control and treatment groups, which are comprised of nearby restaurants in New Jersey and Pennsylvania, were all similar enough to justify their comparability (ibid., 778-779). What made this study truly innovative was the fact that the authors used an additional control group in the form of restaurants from New Jersey that paid higher wages than required by state law. This was done to verify the usage of Pennsylvania restaurants as a control group, since a significant difference between the purportedly unaffected New Jersey restaurants and Pennsylvania restaurants would have indicated the presence of another influential variable.

# Findings

Ultimately, Card and Krueger concluded that the minimum wage increase had no discernable effects on employment and was even associated with a slight increase. It was found that there was a small, positive impact on fast-food employment for full-time equivalent workers in New Jersey while employment in Pennsylvania decreased. During the course of the study, which spanned from February to December of 1992, restaurants not impacted by the minimum wage increase (i.e., both Pennsylvania restaurants and New Jersey restaurants that paid their workers above the minimum wage) experienced negative changes in employment. On the other hand, New Jersey restaurants that were impacted by the minimum wage increase saw small but positive changes in employment (ibid., 780).

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

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

<sup>a</sup>Stores in New Jersey were classified by whether starting wage in wave 1 equals \$4.25 per hour (N = 101), is between \$4.26 and \$4.99 per hour (N = 140), or is \$5.00 per hour or higher (N = 73). <sup>b</sup>Difference in employment between low-wage (\$4.25 per hour) and high-wage ( $\geq$  \$5.00 per hour) stores; and difference

<sup>b</sup>Difference in employment between low-wage (\$4.25 per hour) and high-wage ( $\ge$  \$5.00 per hour) stores; and difference in employment between midrange (\$4.26-\$4.99 per hour) and high-wage stores.

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

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

Figure 2, Average Employment Per Store Before and After the Rise in New Jersey Minimum Wage (Card and Krueger, 780)

Some potential concerns about these results were addressed by the authors after explaining the basic results. Their conclusion withstood various tests to ensure the accuracy of their assumptions. It was found that "...whether the affected stores are compared to stores in Pennsylvania or high-wage stores in New Jersey, the estimated employment effect of the minimum wage is similar" (ibid., 779), meaning any difference in employment between lowwage restaurants across state borders was attributable to the increase in minimum wage. Their findings were determined to be uninfluenced by unobserved demand shocks, they observed an increase in the ratio of full-time workers to part-time workers, and the hours of operation for restaurants in New Jersey did not decrease in a statistically significant way relative to restaurants

in Pennsylvania (ibid., 784-786). Additionally, fringe benefits did not decrease and the time

between raises did not increase in New Jersey stores in a statistically significant way (ibid., 786).

Card and Krueger's use of an additional control group to test the efficacy of their original control group helped to legitimize their results, but one interesting note is their finding that wage increases for restaurants that initially paid at or above the new minimum wage were largely absent after the increase was implemented (ibid., 791). This contradicts the findings of some later studies that analyzed the impact of minimum wage increases on workers who were not directly affected by the increase.

# Dube, Lester & Reich (2010)

#### Summary

Arindrajit Dube, T. William Lester, and Michael Reich (2010) compared employment data from adjacent counties across state borders with different minimum wage levels in their study "Minimum Wage Effects Across State Borders: Estimates Using Contiguous Counties." This methodology, similar to that employed by Card and Krueger, allowed them to control for local economic factors that could influence employment, providing a more accurate assessment of the impact of minimum wage changes. They found that increases in the minimum wage did not lead to significant reductions in employment. This finding added to the challenge to the traditional view, first posed by Card and Krueger, that increasing the minimum wage does not lead to job loss.

What stood out about this study was that the authors found that failing to control for local economic conditions led to a negative bias due to spatial heterogeneity, the variation in economic and labor market conditions across different geographic areas (Dube et al., 953). When assessing the impact of minimum wage policies, it is crucial to consider that relevant economic factors such as unemployment rates, industry composition, cost of living, and labor market dynamics can vary significantly from one region to another. The concept of spatial heterogeneity implies

that the effects of minimum wage increases will not be uniform across all areas. By analyzing contiguous counties across state borders with different minimum wage levels, the study aimed to account for these variations and isolate the impact of minimum wage changes from other regional economic factors.

#### Methods

While Card and Krueger limited their focus to two states in the northeast, Dube, Lester, and Reich examined counties on the borders of states across America. The rationale was that if a binding federal minimum wage increase was imposed on a county that shared a border with a county in a different state, one where the minimum wage increase was not binding, their economies would not fall prey to the issue of spatial heterogeneity and therefore would function as useful control and treatment groups for a difference-in-differences estimation (ibid., 949-950). Employment rates of contiguous border county-pairs were tracked from 1990 to 2006 and minimum wage changes in 1991-1992 and 1996-1997 ensured the relevancy of the data collected. The Quarterly Census of Employment and Wages was chosen as the source of data due to the access it provides to both employment and earnings information at the county level, and 98% of workers' information is contained in this census (ibid., 948-949). This availability gave Dube, Lester, and Reich access to the total employment of workers over the time frame along with their average earnings, both of which were used to gauge the impact of the minimum wage on the labor force.

An interesting feature employed by the authors was the use of two different types of samples. The Contiguous Border County-Pair (CBSP) sample was compared to the All-County (AC) sample, and the former was shown to account more fully for issues of spatial heterogeneity while the latter was introduced to provide a broader context and demonstrate the limitations of

traditional analyses (ibid., 956-957). To round out the thoroughness of their study, the authors focused on the restaurant industry due to its high concentration of minimum wage workers, the comparability it enabled considering previous research, and the data it enabled the authors to use. Other low-wage industries were examined, but not as thoroughly as the restaurant industry (ibid., 948).

The table below provides descriptive statistics comparing the all-county sample to the contiguous border county-pair sample. It highlights the similarities in characteristics such as population, density, employment levels, and average earnings between these samples, underlining the researchers' methodological approach to control for local economic conditions by focusing on contiguous counties that straddle state borders with different minimum wage laws. This comparison supports the validity of using border county-pairs as controls to identify the effects of minimum wage changes more accurately on employment and earnings in the restaurant industry.

	(	1)	(2)	
	All-County Sample		Contiguous Border County-Pair Sample	
	Mean	s.d.	Mean	s.d.
Population, 2000	180,982	423,425	167,956	297,750
Population density, 2000	465	2,553	556	3,335
Land area (square miles)	1,107	1,761	1,380	2,470
Overall private employment	32,179	119,363	32,185	101,318
Restaurant employment	4,508	10,521	4,185	7,809
Restaurant average weekly earnings (\$)	171	44	172	46
Accommodation and food services employment	13,226	32,334	12,865	26,862
Accommodation and food services average weekly earnings (\$)	273	64	273	67
Retail employment	4,703	14,642	4,543	11,545
Retail average weekly earnings (\$)	306	77	304	77
Manufacturing employment	6,608	20,323	6,312	14,100
Manufacturing average weekly earnings (\$)	573	202	576	204
Minimum wage	4.84	0.66	4.84	0.67
Number of counties	1,380		504	
Number of county-pairs	NA		318	
Number of states	48		48	

Sample means are reported for all counties in the United States and for all contiguous border county-pairs with a full balanced panel of observations. Standard deviations are reported next to each mean. Weekly

sample means are reported to an connect an me of med states and for an configuous broder county-parts with a run balance part of osservations, earnings and minimum wages are in nominal dollars. Sources: QCEW; U.S. Department of Labor, Employment Standards Administration, Wage and Hour Division, U.S. Bureau of the Census, 2000 Census.

Figure 3, Descriptive Statistics (Dube et al., 950)

#### Findings

This study contributed a substantial number of conclusions to minimum wage literature. The simplest and arguably most relevant finding was that the positive increases in wages were not accompanied with any statistically significant losses of jobs in the restaurant industry (ibid., 952-953). While this is important, the authors did not stop there. The reason for using both the CBSP and AC samples was to demonstrate that the estimations of traditional models could be replicated, but the use of only border counties showed how spatial heterogeneity was present and unaccounted for in these models, leading to a negative estimate that appears statistically significant but has estimates that are biased downwards and standard errors that are overstated (ibid., 951-952). Finally, various robustness checks were utilized to confirm the reliability of the findings. Most importantly, the presence of cross-border spillovers might have nullified the results of this study. Ultimately, however, the authors concluded through a comparison of the impact of the spillover effect in counties where it was possible to occur, or border counties, and counties where it was not likely, or interior counties, revealed that spillovers were not a concern (ibid., 958-959).

#### Addison, Blackburn, and Cotti (2012)

#### Summary

This work, titled "The Effect of Minimum Wages on Labor Market Outcomes: County-Level Estimates from the Restaurant-and-Bar Sector," by John T. Addison, McKinley L. Blackburn, and Chad D. Cotti, scrutinizes the influence of minimum wage changes on employment and earnings specifically within the restaurant industry. To bridge previous research gaps by employing a comprehensive county-level analysis across the United States, the authors

focused "on a sector that has primarily been analyzed using datasets with insufficient geographic variation to reliably identify minimum-wage effects," (Addison et al., 433). Unlike earlier studies that primarily analyzed demographic groups, this research provided a detailed look at the sector-specific effects of minimum wage adjustments (ibid., 412-413). The results of this study validated the work of both Card and Krueger as well as that of Dube, Lester, and Reich, both of which focused on the restaurant industry.

This work also responded to criticisms from past studies that pointed out potential issues with difference-in-difference estimates, especially regarding assumptions made by Card and Krueger. While it is a useful method for controlling for and investigating fixed effects in panel data, it may lead to bias if error terms are correlated. The authors respond by focusing on countylevel data utilizing methods that employ both spatial heterogeneity and temporal dynamics, something Card and Krueger were criticized for not doing (ibid., 413-415).

#### Methods

The authors used county-level data to examine the impact of minimum wage changes on the restaurant-and-bar industry. The Quarterly Census of Employment and Wages (QCEW), like many studies prior, was used as a data source (ibid., 417). By employing a competitive model of labor market dynamics, both supply and demand factors were considered (ibid., 418). Their analysis also incorporated various econometric techniques. Local economic trends were controlled for (ibid., 414-415) and the difference between state and federal level minimum wage increases were tracked (ibid., 418-419). Finally, data were examined through both balanced and unbalanced panel analyses. This was the authors' way of accounting for the fact that, of the 2459 counties that were observed, 634 of them had partial data and were therefore omitted from the analysis. The remaining 1825 counties constituted the balanced panel, although the authors

examined the unbalanced panel as well to show this did not skew the results in any way (ibid., 418).

### Findings

The key findings of the study once again challenge the predictions of the traditional model that minimum wage increases lead to job losses in the restaurant industry. After accounting for county-level employment trends and controlling for spatial trends, the study found no significant negative employment effects from minimum wage increases (ibid., 423-424). This suggests that the restaurant-and-bar sector exhibits a very low labor demand elasticity, corroborating the findings of the studies mentioned above. The study also highlights differences within the sector. While the fast-food sub-sector experienced statistically significant negative employment effects, the full-service sub-sector experienced positive effects (ibid., 422). These nuanced results suggest that minimum wage impacts may vary across different types of restaurants, reflecting potential differences in labor costs, product demand elasticities, and the burden of higher labor costs being passed on to consumers through higher prices.

The table below analyzes the impact of changes in the minimum wage alongside other influential variables such as population size, total employment, average weekly earnings, unemployment rate, and enrollment rates on sector-specific employment and earnings. The results indicate the minimum wage does not significantly impact employment, while earnings increase significantly when there is an increase in the minimum wage (ibid., 424). Adjustments for county-specific trends were included, suggesting that previous models without these adjustments may overstate negative impacts.

Independent variable	Employment	Earnings		
Minimum wage	-0.006	0.171**		
-	(0.033)	(0.035)		
Population	0.277**	0.029		
*	(0.066)	(0.059)		
Total employment	0.763**	0.207**		
	(0.061)	(0.024)		
Total average weekly earnings	-0.129**	0.133**		
	(0.035)	(0.030)		
Unemployment rate	0.001	-0.002**		
1 2	(0.002)	(0.001)		
Enrolment rate	-0.083**	-0.049**		
	(0.025)	(0.016)		
$R^2$	0.99	0.97		
p-value: Hausman test	0.0000**	0.0000**		

*Notes*: See notes to Table 2. All regressions are weighted by the county's average population. The *p*-value reported is for a Hausman test of the null hypothesis that the probability limits of the coefficient estimates for the six continuous independent variables in each specification are the same in specifications with and without county-specific trends. Sample size in all regressions is 116,800.

\*\*,\* denote statistical significance at the 0.05 and 0.10 levels, respectively.

Figure 4, Regression Estimates for Equations with County-Level Trends (Addison et al., 424)

#### Discussion

Card and Krueger explain quite thoroughly why and how they chose to study fast-food restaurants, but they do not examine the characteristics of the workers whose employment levels were being measured. The only information discussed in that regard is the fact that teenage employment as a whole rose in all of New Jersey relative to teenage employment in all of Pennsylvania, unlike the rest of the labor market which saw a slightly steeper decrease in New Jersey's employment levels (Card and Krueger, 789-790). As for the timeframe of the study, two waves of interviews were conducted over telephone 7-8 months apart, where the first was conducted before the change in minimum wage and the second was conducted after (ibid., 773). If any effects took longer than 8 months to appear, this study might have missed them. That said, the most significant impact found by Card and Krueger was the increase in prices in New Jersey fast-food restaurants relative to Pennsylvania, so it is likely that these were the true effects of this minimum wage increase (ibid., 788). As discussed above, the Pennsylvania restaurant control group was compared to higher-wage restaurants in New Jersey to see how they compared, and the "test" of the usefulness of the control group was passed. Finally, unemployment was not the only measure of minimum wage's impact on employment. Hours of operation and the difference in the ratio of full-time and part-time workers were both accounted for, and there were no significantly negative effects. Overall, this study accounted for just about all the substantial potential impacts of a higher minimum wage.

Dube et al. and Addison et al. used the QCEW even though it did not contain information on hours worked, the ratio of part-time to full-time workers, or hours worked. This was partially accounted for in the Dube et al. study through estimates, but they were calculated using an assumption of a uniform distribution of wages (Dube et al., 955). Despite these blemishes, it provided comprehensive data, 99.7% of wage and salary employment, at a county level because it accounted for all workers with unemployment insurance (Addison et al., 417). Both studies were also similar in that they employed county-level studies to analyze the restaurant industry, and they both studied the effects from 1990 to 2006. The key differences between these studies were that the Dube et al. study focused on the role of spatial heterogeneity in research while the Addison et al. study scrutinized the impact specifically on the restaurant industry, particularly its sub-sectors. The focus of Dube et al. on the harm of spatial heterogeneity on results also served to validate the control groups of all three studies, since all three utilized the same type of control group in the form of nearby economies unaffected by minimum wage increases.

#### Studies that find adverse effects from the minimum wage

#### Neumark, Schweitzer, and Wascher (2004)

#### Summary

David Neumark, Mark Schweitzer, and William Wascher (2004) criticized previous research for focusing mainly on employment effects and for not considering the effects of minimum wage on different parts of the wage distribution. In their study "Minimum Wage Effects throughout the Wage Distribution" they found that minimum wage increases led to wage gains near the bottom of the wage distribution, but lost hours and employment more than offset this gain. Additionally, these increases tend to have a ripple or ladder effect, affecting wages slightly higher up in the wage distribution.

The authors also delved into the potential disemployment effects of these wage increases, particularly among lower-skilled workers. The impact of a higher minimum wage on wages, hours, employment, and income were reviewed. The effect on hours was conditional on the worker remaining employed to avoid over-emphasizing the adverse effects of a minimum wage increase. While immediate impacts seemed to be beneficial (in regard to higher wages) or not too severe (in regard to lower employment and hours), the authors found that, in the year after the wage increase was implemented, wages tended to fall and the negative impact on employment and hours became more severe (ibid., 442-443). Ultimately, the authors conclude that the wage gains were outweighed by the decline in both employment and hours, the latter being an underrepresented consideration in past studies.

# Methods

In a comprehensive review of all facets of employment measurements, Neumark et al. used the Current Population Survey (CPS) to analyze the wages, hours, employment, and income

of individuals in an 18-year timeframe (ibid., 429). By analyzing the lagged effects of minimum wage increases, the authors sought to show that the impacts of minimum wage increases tend to take time to appear (ibid., 432). Additionally, the effects are not limited to workers whose wages are increased by law. If workers who had earned raises were suddenly making minimum wage, they might demand a comparable increase in pay. This was the rationale behind the examination of the wages of workers above the minimum wage, as the impact was not necessarily limited to low-wage workers. An unrestricted model with only dummy variables to differentiate groups of wages is also used, and a comparison of these models serves to highlight interesting discrepancies. To estimate the impact on the wage distribution, the authors also considered using higher-order polynomials relative to the minimum wage (ibid., 432). They did this because they had split the distribution of wages in seven ways, with more narrow ranges closer to the minimum wage (ibid., 441). Using a 7th-order polynomial helped to "impose some smoothness on the estimates", although the results were not very sensitive to the changing of orders (ibid., 432). Higher-order polynomials in general are used to model non-linear relationships within data, providing flexibility to the regressions that allows them to fit a variety of curves. The experimentation with different order of polynomials was not documented, but ultimately the utilization of the higher-order polynomials was for robustness and were not included in the primary regression.

### Findings

The authors found that the positive impact of the minimum wage on wages was most prominent for wages up to 150% of the minimum wage; after that, the effects rapidly diminished (Neumark et al., 438). Hours and employment declined more significantly than wages increased, especially in the years following the minimum wage increase (ibid., 442-443). Overall, results

point towards low-wage workers being harmed more than helped by minimum wage increases, implying that these policy changes are counter-effective and in line with the traditional model. Interestingly, the unrestricted model showed a more significant disemployment effect than the model that used polynomials (ibid., 445). This result underscores the complexity of the impacts of the minimum wage on the economy in general.

# Clemens and Wither (2019)

### Summary

Jeffrey Clemens and Michael Wither (2019) analyzed employment rates, income levels, and economic mobility in their work "The Minimum Wage and the Great Recession: Evidence of Effects of the Employment and Income Trajectories of Low-Skilled Workers". The authors cited the study authored by Dube et al. to emphasize the lack of consensus among economists regarding the impact of the national minimum wage increase on the high levels of unemployment during the Great Recession (ibid., 53). They found that binding minimum wage increases had significant negative effects on both the employment and income growth of the targeted lowskilled workers. Their methodology involved comparing workers in states affected by federal minimum wage increases with those in other states that were not, where the state minimum wage was higher than the federal one. While they found that the wage distribution shifted as intended, there were reductions in employment, lost wage growth due to reduced experience accumulation, and higher likelihoods of what the authors deemed the "internship effect", low-skilled workers taking on unpaid work.

# Methods

This study employed a difference-in-differences approach, comparing outcomes for lowskilled workers in states affected by federal minimum wage increases (bound states) to those in states where the minimum wage was already above the federal level (unbound states). The analysis was further enhanced through its utilization of a triple-difference model that accounts for variations across different demographic groups and industries, enhancing the robustness of the findings (ibid., 56-57). The researchers carefully controlled for a range of state-level economic variables, demographic characteristics, and industry-specific trends to isolate the impact of minimum wage increases from other concurrent economic factors.

The authors used baseline data to categorize workers into a "target" group directly affected by wage increases and a "within-state control" group (ibid., 56). The study used longitudinal data from the 2008 panel of the Survey of Income and Program Participation (SIPP), which allowed the researchers to track individual employment and income trajectories over time, enhancing their ability to infer causal relationships (ibid., 54-55). The analysis was robust, including tests with various sample constructions and controls for the varying severity of the recession across states. They controlled for both state and time fixed effects to isolate the minimum wage impacts and computed clustered standard errors to address potential data issues like autocorrelation and heteroskedasticity (ibid., 56). This methodological rigor enabled them to provide a detailed analysis of the effects of minimum wage policies on employment and income during a critical economic period.

#### Findings

Clemens and Wither found that binding increases in the federal minimum wage significantly reduced the earnings of low-skilled workers in bound states relative to their

counterparts in unbound states (ibid., 58). This negative impact was more pronounced in the "medium run", or two subsequent years, suggesting that the adverse effect of minimum wage increases on employment and income persisted beyond the immediate change in policy (ibid., 59). The analysis showed that minimum wage increases negatively affected the economic mobility of low-skilled workers, making them less likely to earn higher levels of income. This effect, was most prominent among workers with less education, highlighting the policy's unintended consequences on the individuals it aimed to support (ibid., 61-62). Younger workers, individuals in the food service industry, and those with some college education were more likely to experience employment losses and shifts towards unpaid work (ibid., 60). The analysis suggests that minimum wage policies had varied impacts on low-skilled workers, influenced by factors such as age, education, and industry of employment.

The table below shows that for those earning less than \$7.50 on average, minimum wage hikes decreased the probability of reaching earnings above \$1500 by 4.7 percentage points. Adjusting this analysis for individuals with baseline wages between \$8.50 and \$10.00 resulted in a slightly higher reduction of 5.4 percentage points. These effects were especially pronounced among workers without college education, where the probability of earning more than \$1500 was reduced significantly compared to a smaller effect observed among those with some college education. Further examination of the potential to reach a middle-income threshold of \$3000 per month showed a decrease by 1.7 percentage points following minimum wage increases. Although this result was statistically significant at the 10% level in the difference-in-differences analysis, it was not distinguishable from zero in the triple-difference specification. Sub-sample analysis indicates that the medium-run effects on reaching this income threshold were primarily among those with some college education. Additionally, the evidence suggests that increases in

the binding minimum wage could hinder medium-run class mobility for low-skilled workers, with significant impacts manifesting within the first year of the wage increase (ibid., 61).

Dependent Variable	(1) Employed	(2) Unpaid work	(3) No earnings	(4) Ind. income	(5) Fam. income	(6) Below FPL	
Panel A:			Difference-in-differ	ences specifications			
Bound × Post 1	-0.044*	0.015+	0.059**	-92.087*	-117.957	0.013	
	(0.019)	(0.009)	(0.019)	(36.474)	(85.300)	(0.012)	
Bound × Post 2	-0.066**	0.017+	0.082***	-144.042**	-273.063*	0.017	
	(0.020)	(0.010)	(0.021)	(44.748)	(119.576)	(0.012)	
Ν	147,459	147,459	147,459	147,459	147,459	147,459	
Mean of Dep. Var.	0.702	0.125	0.422	748.459	4,190.870	0.277	
Panel B:	Triple difference specifications						
Bound $\times$ Post 1 $\times$ Target	-0.039	0.008	0.047*	-105.029+	-94.301	0.008	
_	(0.026)	(0.011)	(0.023)	(55.231)	(112.504)	(0.017)	
Bound $\times$ Post 2 $\times$ Target	-0.068**	0.014	0.082***	-174.255*	-276.503*	0.015	
	(0.022)	(0.012)	(0.022)	(73.107)	(133.386)	(0.018)	
Ν	270,245	270,245	270,245	270,245	270,245	270,245	
Mean of dep. var.	0.763	0.089	0.326	995.515	4,249.402	0.230	

Note: +, \*, \*\*, and \*\*\* indicate statistical significance at the 0.10, 0.05, 0.01, and 0.001 levels respectively. Panel A reports estimates of the minimum wage's short and medium run effects on the relevant dependent variables, which are named in the heading of each column. More specifically, the estimates in row 1 are of the coefficient  $\beta_{p(t)}$  from Eq. (1), where the relevant p(t) corresponds with the period beginning in August 2009 and extending through July 2010. The estimates in row 2 are of the coefficient  $\beta_{p(t)}$  from Eq. (1), where the relevant p(t) corresponds with the period beginning one year after the July 2009 increase in the federal minimum wage. Panel B reports analogous estimates of  $\beta_{p(t)}$  from Eq. (2), namely our triple-difference specification. In Panel A the sample consists exclusively of individuals with average baseline wages are between \$8.50 and \$10.00 as a within-state control group. Standard errors are clustered at the state level.

Figure 5, Effects on employment status, income, and poverty status (Clemens and Wither, 60)

The study contributes to the ongoing debate on the efficacy of minimum wage policies as a tool for improving the living standards of low-skilled workers. While intended to boost incomes, the evidence suggests that increases in the minimum wage during the Great Recession ended up reducing employment and hindered income growth for the target population, raising important questions about the policy's design and implementation in times of economic distress.

### Jardim et al. (2022)

#### Summary

Jardin et al.'s work titled "Minimum Wage Increases, Wages, and Low-Wage

Employment: Evidence from Seattle" provided an in-depth analysis of the effects of Seattle's

Minimum Wage Ordinance, which raised the city's minimum wage to \$11/hour in 2015 and to

\$13/hour in 2016. Using administrative data from Washington State, the research conducts both

aggregate and individual-level analyses to determine how these wage increases impacted lowwage employment in Seattle compared to outlying regions. This study is critical to understanding the broader implications of minimum wage policies on the labor market, particularly due to its focus on the impact of staggered minimum wage increases. By examining the impact of both increases, the research offered a novel perspective on the economic and employment dynamics triggered by wage adjustments.

### Methods

The study by Jardim et al. on the impact of minimum wage increases in Seattle employed a comprehensive approach to evaluate both the aggregate and individual-level effects on the lowwage labor market using data from Washington State. The research utilized a synthetic control method, creating a comparison between Seattle and outlying regions to isolate the effects of the minimum wage increase from other regional economic activities (ibid., 263-264). This method focused on several outcomes including the number of low-wage jobs, total hours worked, average wages, and total payroll for these jobs, defining low-wage jobs as those below a specific hourly threshold adjusted for inflation (ibid., 265-266).

At the micro-level, the study tracked individual workers over time to assess changes in their employment status, hours worked, and wages due to the wage policy changes. It defined a control group consisting of workers in similar labor market conditions outside Seattle for a comparative analysis (ibid., 272-274). The methodology also employed nearest-neighbor matching to pair Seattle workers with similar counterparts in other regions, which enhanced the analysis by considering factors like previous wage levels and employment history (ibid., 278).

# Findings

Jardim et al. identified several key impacts on the low-wage labor market. The increases in the minimum wage resulted in higher hourly wages among the lowest-paid workers, with a net gain in workers' earnings averaging between \$10 to \$12 per week by the end of the study period, despite reductions in hours worked. This finding underscored a positive impact on income despite shifts in employment dynamics (ibid., 266). The synthetic control, shown below, indicated that in addition to these effects, the rate of workers paid under \$15 an hour entering the labor market decreased despite Seattle's otherwise booming economy (ibid., 306).



Figure 6, Relative Decline in New Low-Wage Labor Market Entrants in Seattle (Jardim et al., 307)

The study also highlighted significant employment effects, particularly on the intensive margin, where reductions in hours worked were observed. These effects were especially pronounced among less experienced workers, suggesting that while wage hikes improve earnings, they may also lead to decreased employment opportunities or reduced hours for this group (ibid., 263-266).

### Neumark, Salas, and Wascher (2014)

# Summary

The 2014 study titled "Revisiting the Minimum Wage-Employment Debate: Throwing Out the Baby with the Bathwater?" provided a comprehensive analysis of the debate surrounding the impact of minimum wage policies on employment Neumark et al. critically examined the methodologies and conclusions of various studies on the employment effects of minimum wage increases. The authors explored the historical context of the debate, the evolution of empirical research, and the shift in consensus over the years, resulting in a detailed critique of recent methodological approaches that argue against the disemployment effects of minimum wage increases.

This work directly examined the results of the Dube et al. (2010) study mentioned above, as well as one by Allegretto, Dube, and Reich from 2011 that controls for spatial heterogeneity at the county level (Neumark et al., 610-611). After criticizing these papers for making invalid assumptions, the authors presented new evidence that points to very negative impacts of the city minimum wage on teenagers.

#### Methods

The paper meticulously evaluated the methodological approaches employed by recent studies that challenge the notion that minimum wage increases lead to job losses, particularly among low-skilled workers. The authors focused on the use of spatial heterogeneity and the creation of synthetic control groups to account for potential confounders in assessing the impact of minimum wage laws. They argued that certain studies may discard useful identifying information by overly narrowing the scope of control groups or by making untested assumptions

about the economic environments of treatment and control groups. In effect, these actions ended up removing the information that the authors had set out to examine (ibid., 31-36). The study advocates for a broader, data-driven approach in selecting control states or regions, employing synthetic control methods to improve the reliability of estimating the effects of minimum wage increases.

# Findings

The analysis presented by Neumark et al., suggests that when more inclusive and datainformed methodologies are applied, there is stronger evidence of negative employment effects of minimum wage increases, particularly among teenagers, with estimated employment elasticities around -0.3 (ibid., 42). For restaurant employment, the results are more mixed but still suggest negative effects when weighted estimates are considered. The authors conclude that the debate over the employment effects of minimum wages is far from settled, emphasizing that policymakers need to carefully weigh the potential for higher wages against the risk of job losses (ibid., 45-47). The critique extends to the methodological rigor of recent studies, suggesting that some may have inadvertently discarded valuable information, leading to potentially misleading conclusions about the lack of disemployment effects from minimum wage increases.

#### Discussion

Starting with the 2004 Neumark et al. study on wage distribution, the groups of workers studied, as well as the components of their employment, were thoroughly analyzed. Adults in general were studied, revealing that the impact on low-wage workers was more general than it was simply on teenagers. Additionally, women appear to experience a slightly stronger negative impact from minimum wage increases (Neumark et al., 445). Interestingly, the study finding that

overall income tended to be unaffected or slightly positively impacted after two years for workers at or near the minimum wage was ignored. This would imply that the wage increase was substantial enough to overcome or at least cancel out the aggregate effects of lost hours and jobs, but this is not discussed. The timespan of the study was extensive, and additional considerations regarding the potential impact of the minimum wage years after it was raised furthered the temporal analysis. This study did not use a control group beyond a comparison of past employment information, which is concerning.

The study by Clemens and Withers differed regarding its use of a control group. Not only were workers unaffected by the minimum wage increases considered, but there was also the establishment of a "target" group that focused specifically on low-wage workers that were supposed to be helped by the minimum wage increase. To make this comparison, low-wage workers in both bound and unbound states were compared, leading to the aforementioned results. The focus of this study was the staggered minimum wage increase from 2007 to 2009 and how it impacted low-skilled workers, restaurant workers, and teenagers. Finally, employment was measured through employment levels, the emergence of unpaid jobs, and overall income trajectory.

The Jardim et al. study looked at back-to-back minimum wage increases, which is a common way for increases to the minimum wage to be implemented, and how the restaurant industry was impacted. A real hourly wage rate was determined and used to measure the true effect of the higher minimum wage, and a control group in the form of regions nearby that were nonetheless separate from the impacts of the Seattle increase.

# **Conclusions**

The minimum wage's impact on employment and the overall welfare of workers is extremely broad, a major issue that has contributed to the difficulty economists have faced when trying to determine exactly what it is that minimum wage increases affect. The conclusions drawn here should be taken in light of the fact that there are plenty of workers, industries, and aspects of employment that can be focused on when considering this topic. That said, the studies closely analyzed here are just a few of the dozens of published studies regarding this topic, but they provided a good foundation for analyzing the general tendencies of the field.

# Controlling for spatial heterogeneity

The concept of spatial heterogeneity is integral for evaluating the impacts of minimum wage policies, as it refers to the variations in economic conditions that exist across different geographic areas. When studies fail to adequately control for these variations, the resultant findings may be misleading, suggesting that what holds true in one area under specific economic conditions might incorrectly be generalized to others. This oversight can significantly skew policy discussions and lead to misguided legislative actions.

In addressing spatial heterogeneity, researchers face the challenge of ensuring that the control groups used in their studies are truly comparable to the treatment groups. The assumption that geographical proximity equates to economic similarity is particularly problematic. Economic landscapes can vary dramatically even between neighboring regions due to differences in industrial composition, labor market dynamics, and demographic characteristics. For instance, an urban area may have a very different economic environment compared to a rural area only a few miles away. Therefore, selecting control groups based solely on geographic closeness without

considering underlying economic factors can result in inaccurate estimations of minimum wage effects (Dube, Lester, & Reich, 2010). That said, it was also demonstrated that failing to control for spatial heterogeneity can lead to misleading conclusions about the impact of minimum wage increases on employment. For instance, when spatial heterogeneity is not adequately addressed, studies might erroneously attribute broader regional economic trends or characteristics to the effects of minimum wage changes (ibid.). Thus, the researchers emphasize the importance of using methods that effectively control for these local differences to obtain more accurate and reliable estimates of minimum wage impacts.

Moreover, some recent methodologies in minimum wage research have been criticized for possibly discarding valuable data by narrowing the scope of control groups too much. This methodological constraint might lead to the exclusion of relevant information that could provide more comprehensive insights into the true effects of minimum wage changes. For example, by focusing too narrowly on specific sectors or demographics, researchers might miss broader impacts on the overall labor market. This issue highlights the delicate balance researchers must maintain between controlling for spatial heterogeneity and retaining enough variability in the data to allow for valid generalizations (Neumark, Salas, & Wascher, 2014).

Furthermore, the reliance on county-level comparisons in some studies has sparked debate over whether this approach actually leads to the omission of crucial data. Critics argue that while county-level data might help control for localized economic variations, they could also eliminate valuable information about wider regional dynamics that are essential for understanding the full impact of minimum wage policies. This criticism suggests that a more nuanced approach is needed, one that incorporates both local and regional economic factors without compromising the integrity of the data (Neumark, Salas, & Wascher, 2014).

The discussion of spatial heterogeneity in minimum wage research shows the need for rigorous methodological frameworks that can handle the complexity of economic environments. It calls for careful consideration in the future of how control groups are selected and how economic similarities and differences are accounted for in comparative analyses. By refining these aspects of research methodology, studies can provide more accurate and relevant insights, thereby informing policy decisions more effectively and ensuring that the implications of minimum wage increases are fully understood and appropriately addressed.

### The Wage Ladder

The analysis of the wage ladder effect, which explores how minimum wage increases influence wages at varying levels within the wage distribution, is crucial in understanding the full spectrum of minimum wage impacts. Studies have shown that increases in the minimum wage not only raise wages at the bottom of the wage distribution but also have ripple effects that extend to higher wage levels. This dynamic can complicate the assessment of minimum wage policies, as the effects are not confined to the lowest-paid workers (Neumark, Schweitzer, & Wascher, 2004).

Neumark et al. (2004) found that wage gains resulting from minimum wage increases were most pronounced near the bottom of the wage distribution, but they tended to diminish at higher wage levels. This observation highlights the "ladder" effect, where increases in minimum wage potentially elevate wages slightly higher up in the distribution, affecting a broader range of workers than typically anticipated. These findings suggest that the impacts extend beyond the initially targeted low-wage group, potentially altering the entire wage structure of affected sectors (Neumark, Schweitzer, & Wascher, 2004).

Moreover, the wage ladder phenomenon may lead to unintended consequences, such as wage compression, where the differential between lower and higher wages decreases. This compression can affect workplace morale and productivity, as the relative earnings of more experienced or skilled workers are diminished in comparison to their counterparts with less experience. This aspect of the wage ladder effect challenges the view that minimum wage increases uniformly benefit low-wage workers without broader economic repercussions.

The study by Card and Krueger (1994) also interacts with the wage ladder concept by examining the effects within the fast-food industry in New Jersey and Pennsylvania. They found that the minimum wage increase did not negatively impact employment, and their control group analysis helped validate the comparability of the two states. This study provides a foundational example of how wage ladder effects can be analyzed effectively using robust methodological approaches, although it did not explicitly focus on the ripple effects across the wage distribution. That said, their control group was within the scope of potential wage ladder effects, which makes their finding that restaurants higher up the wage ladder in New Jersey experienced negative changes in employment all the more curious. This would not impact their main findings, since this was an additional test for robustness, but it might imply that these negative changes in unemployment were the result of more skilled employees taking easier jobs that pay just as much, displacing employees who had been receiving minimum wage at these restaurants before the increase. Research would need to be conducted to corroborate this theory, but it shows how tricky it can be for researchers to nail down the effects of higher minimum wages.

Ultimately, the wage ladder concept underscores the complexity of minimum wage impacts on the wage distribution. A thorough understanding of these dynamics is essential for

crafting effective labor policies that achieve the desired economic outcomes without causing undue disruption in the labor market.

#### The Fast-Food Industry

The fast-food industry often serves as a focal point in studies analyzing the impacts of minimum wage increases due to its high employment of low-wage workers and its responsiveness to changes in labor costs. Additionally, they are an industry that cannot easily leave a city if minimum wage rises, unlike companies that contract factories or warehouses. Location is an integral aspect of their business model, forcing them to remain where they are. This sector's characteristics make it an ideal case study for observing the direct effects of wage policy changes on employment and economic practices within a specific industry context.

The seminal work by Card and Krueger (1994) on the fast-food industry in New Jersey and Pennsylvania provides a clear example of how targeted studies can yield insights into the sector-specific impacts of minimum wage laws. Their research found that the increase in New Jersey's minimum wage did not lead to a reduction in employment compared to Pennsylvania, where the minimum wage remained constant. This finding challenged the traditional economic theory that suggests minimum wage increases lead to job losses, particularly in labor-intensive, low-margin industries like fast food (Card & Krueger, 1994).

Furthermore, the study utilized a rigorous methodological framework that included a difference-in-differences estimation approach, which helped isolate the effects of the minimum wage increase from other potential economic variables. The choice of the fast-food industry was strategic due to its uniformity in employment practices and the high proportion of minimum wage jobs, which ensured that the findings were directly related to the policy change (Card & Krueger, 1994).

Subsequent studies, such as those by Dube, Lester, and Reich (2010), have built upon the foundation set by Card and Krueger, further examining the fast-food industry across different states with varying minimum wage levels. These studies have confirmed and expanded upon the initial findings, showing that not all sectors react uniformly to minimum wage increases and that the fast-food industry may be more resilient to such changes than previously thought (Dube, Lester, & Reich, 2010). Moreover, the study by Addison et al. found that while minimum wage increases do not harm employment, they do lead to increases in average earnings within the restaurant-and-bar sector. On the other hand, the studies by Clemens and Wither and Jardim et al. did not isolate the industries they examined, and they found negative impacts not just on employment, but also on wages. Does this imply that limiting the scope to just one industry minimizes the impact, or do sectors need to be studied individually to minimize unrelated factors? Again, more research is needed, but the fact remains that this issue needs to be examined before any meaningful conclusions can be drawn. Without resolution, researchers may continue to go back and forth on these issues without making any real progress.

The focus on the fast-food industry in minimum wage research highlights the importance of considering sector-specific dynamics when analyzing labor policies. It also shows the need to account for industry characteristics, such as profit margins, labor intensity, and pricing flexibility, which can all influence how businesses absorb increased labor costs. By understanding these factors, researchers and policymakers can better predict and manage the economic impacts of minimum wage increases, ensuring that policies are effectively tailored to the realities of specific industries.

# General conclusion

The implementation of the federal minimum wage in 1938 marked the beginning of a long-standing debate within economic circles, primarily focused on the policy's impact on employment levels. The study by Card and Krueger in 1994 was pivotal, as it questioned the prevailing consensus that minimum wage increases invariably lead to job losses, particularly within low-wage sectors. This inquiry sparked a series of subsequent studies that explored this relationship from various angles, employing a range of methodologies and resulting in a spectrum of findings.

The discourse surrounding these studies, particularly those by Neumark and Shirley (2022) and Gechert (2022), highlights a critical split in the academic community, reflecting both a reaffirmation of negative employment impacts and a reevaluation of the methodologies used in prior research. This divergence emphasizes the complexity of economic analyses and the crucial role of methodological rigor and transparency.

In addressing spatial heterogeneity, this analysis underlined the importance of choosing appropriate control groups and considering geographic economic differences, which can significantly affect study outcomes. The tendency of some studies to narrow their control groups excessively might exclude relevant data, potentially leading to misleading conclusions about the effects of minimum wage policies. The wage ladder concept was discussed to illustrate the broader economic implications of minimum wage increases, showing that the effects extend beyond the lowest-paid workers and can induce wage compression throughout the wage distribution. This phenomenon complicates the simplistic narrative that minimum wage hikes uniformly benefit low-wage workers and can lead to unintended consequences. The fast-food industry, used in several studies as a focal point for examining the sector-specific impacts of

minimum wage laws, provided empirical evidence that contradicted traditional economic theories by demonstrating the industry's resilience to minimum wage increases.

It is crucial to acknowledge how the focus of methodologies on defining employment, distinguishing between different worker groups, considering the temporal range of studies, and selecting which industries to examine profoundly influences research outcomes. This analysis has shown that whether researchers establish control groups to highlight differences or simply model employment changes before and after minimum wage increases can significantly impact their findings. These methodological choices, along with the diverse approaches taken by different researchers, highlight the complexity of this area of study.

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