

MINIMUM WAGES AND EMPLOYMENT: AN OVERVIEW OF EMPIRICAL EVIDENCE

NODIR ADILOV

Indiana University – Purdue University Fort Wayne

ABSTRACT

Models of perfectly competitive labor markets imply that an increase in the minimum wage decreases employment, while the monopsony power labor market models suggest that higher minimum wages might increase employment. Since theoretical models of labor markets can support contradictory predictions, this article provides an overview of several key empirical studies on the effects of the minimum wage on employment and discusses the controversy related to the empirical methods and the findings.

Currently, the Congress is discussing a proposal to increase the federal minimum wage from \$5.15 to over \$7 per hour. The proposal is based on the argument that raising the minimum wage will improve economic well-being of low-wage workers. The proposal has both its opponents and proponents.

The opponents of the proposal argue that an increase in the minimum wage would reduce employment and, thus, would negate the benefits of higher wage levels. To support this argument, they often cite the predictions of competitive labor market models that increasing the minimum wage negatively affects employment. Competitive models of labor markets are based on several assumptions. First, these models assume that no single market participant has the ability to affect wage levels. Second, the competitive models assume that job seekers have perfect information about potential jobs and can easily switch jobs. Third, employers are assumed to have perfect information about the skills of job seekers

and to have the ability to hire an unlimited number of workers at the competitive market-clearing wage. Although the competitive models of labor markets have several unrealistic simplifying assumptions, these models are commonly used by the opponents of the minimum-wage proposal because these models make strong predictions that an increase in the minimum wage above the market equilibrium wage decreases employment.

The proponents of the proposal to increase minimum-wage levels often argue that such an increase will benefit workers due to the existence of a monopsony power in labor markets. Specifically, the proponents rely on the prediction of the monopsony power models that an increase in the minimum wage might increase employment. Monopsony power models of labor markets assume that employers have some market power in labor markets or that employers have imperfect information about the potential employees. According to the monopsony power models, the labor supply curve faced by an individual employer is upward-sloping. Therefore, the employers must increase wages to attract more workers. The monopsony power models predict that employers hire fewer workers and pay lower wages than the competitive market does. Consequently, it is possible that an increase in the minimum wage might increase employment. This theoretical prediction contrasts with the predictions of the competitive models of labor markets.

Since the competitive and monopsony power models make contradictory theoretical predictions, it is important to evaluate the strengths of the opposing arguments using empirical evidence. Thus, this article compares the findings and the implications of the recent empirical studies of minimum wages.

TIME-SERIES AND PANEL DATA STUDIES OF LABOR MARKETS

Early empirical studies use time-series analyses to test the predictions of the competitive labor markets. Those studies typically investigated how teenage employment was affected by the changes in the minimum wage. The time-series empirical studies focused on teenage employment because minimum wages are usually binding for teenagers as a result of teenagers' low levels of experience and skills. As summarized in Brown [1], most estimates of the time-series models indicate that teenage employment decreases by 1 to 3 percent when the minimum wage is increased by 10 percent. In other words, the elasticity of labor demand is estimated to be around -0.2 . Some time-series studies suggested smaller negative effects of the minimum-wage laws¹.

Neumark and Wascher [3] utilize panel data analysis to estimate the effects of the minimum wage using the observations from 50 states from 1977 through

¹ See Wellington [2]

1989. The authors find that a 10 percent increase in the minimum wage decreases employment by 1 to 2 percent. These estimates are consistent with the estimates of time-series models. The time-series and panel data analyses of labor markets strengthened economists' belief that competitive models were appropriate tools to study labor markets.

Time-series studies have several limitations. The two main limitations are that the time-series observations are not independent and that it is difficult to differentiate the effects of a change in the minimum wage from the effects of other structural changes, such as the changes in economic conditions, notwithstanding that the studies try to control for structural changes. Further, according to Card and Krueger [4], the negative effects of minimum-wage increases tend to be magnified due to a publication bias in the time-series studies. In particular, Card and Krueger observe that, although the number of time-series observations had increased over time, the standard errors of the estimates did not decrease. This might indicate that earlier time-series studies might have a publication bias. Thus, Card and Krueger argue that research papers with statistically significant results that confirm the negative relationship between the minimum wage and unemployment are more likely to be published. In addition, Card et al. [5] argue that the panel data estimates of Neumark and Wascher misspecify enrollment variable, thereby biasing the results. These and similar critiques of earlier studies of labor markets created a need to replicate the time-series results in order to confirm or to reject the predictions of the competitive labor market models.

NATURAL EXPERIMENTS

Due to the critiques of earlier methodology in empirical studies of minimum wages, the researchers searched for alternative methodologies to study labor markets. Optimally, one would need to conduct true laboratory-type socio-economic experiments in order to test the effects of the minimum wage. However, cost limitations of such experiments led economists to seek for "natural experiments" that replicate conditions of true experiments. Natural experiments compare the effects of an exogenous policy variable in two subsets of populations: treatment and control groups. For minimum-wage studies, the treatment group is a state with an increase in the minimum wage, while the control group is a state where the minimum wage remains the same. If the minimum wage has a negative effect on employment, then one would expect that states with higher increases in the minimum wage would experience greater losses in employment.² This natural experiments methodology is also referred to as a "differences-in-differences"

² One would expect greater increase in employment in a state with a lower minimum-wage increase if employment is increasing in both states.

approach because it compares the changes in employment levels, rather than the absolute levels of employment in two groups.

Card [6] used natural experiments methodology to investigate the effects of the 1988 California minimum-wage increase. Card compared changes in employment levels in California to the changes in employment in similar states that did not experience the minimum-wage increase. Contrary to the estimates of the time-series studies, Card found that the minimum-wage increase in California did not have negative impact on teenage employment or on employment in the retail trade. These results contradict the predictions of the competitive labor market models and do not contradict the predictions of the monopsony power models.

In 1994, Card and Krueger [7] published a study of the New Jersey minimum-wage increase. The study generated a controversy among labor economists because of its findings that an increase in the minimum wage might increase employment. In 1992, the minimum wage in New Jersey increased from \$4.25 to \$5.05 per hour, while the minimum wage in Pennsylvania stayed the same. Card and Krueger compared the fast-food industry employment levels in these two states before and after the New Jersey minimum-wage increase. The authors collected data by surveying 410 fast-food restaurants in New Jersey and Pennsylvania over the phone. The analysis of the data did not indicate that the minimum wage decreased employment in New Jersey relative to Pennsylvania. On the contrary, the results suggested that the minimum wage had small positive (statistically significant) effect on employment in New Jersey.

Since the Card and Krueger's findings challenged a conventional notion that the minimum wage decreases employment, other economists attempted to replicate the study to see whether the results were robust. Using the same methodology as Card and Krueger, Neumark, and Wascher [8] analyzed the New Jersey minimum-wage increase by using payroll data from fast-food restaurants instead of relying on telephone surveys. Neumark and Wascher argued that the payroll data was more accurate. Specifically, the researchers and the Employment Policies Institute directly contacted fast-food restaurants in New Jersey and Pennsylvania to obtain payroll information. The restaurants in the Neumark and Wascher sample did not exactly match the restaurants in the Card and Krueger sample, despite Neumark and Wascher's attempts to match the data by using the five-digit zip code identifiers of the restaurants.

Neumark and Wascher found that, contrary to the Card and Krueger's findings, the 1992 New Jersey minimum-wage increase decreased employment in New Jersey by 3.9 to 4.0 percent relative to Pennsylvania. This finding implies that the elasticity of labor demand is from -0.21 to -0.22 and is consistent with the time-series estimates. The explanation offered by Neumark and Wascher for differences between the results implied by the telephone survey and payroll data is that the telephone survey data are subject to the measurement error, while the payroll data are more accurate and more representative. Another factor explaining the difference between the results is that the payroll data were based on the number

of hours worked, while the telephone survey data were based on the number of full-time employees.

Contradictory results of the Card-Krueger's and Neumark-Wascher's studies raised several questions as to which data set was more appropriate to use. Thus, Card and Krueger [9] tried to replicate their earlier New Jersey minimum-wage study results by using the Bureau of Labor Statistics's (BLS's) employer-reported data. This data set was supposed to address data representativeness and measurement error concerns related to the telephone survey methodology. The analysis of the BLS data indicated that the minimum-wage increase in New Jersey did not have significant effect on employment in the fast-food industry. Further, Card and Krueger found that the Neumark-Wascher results could have been biased due to a single outlier, a restaurant in Pennsylvania that had reported a large increase in employment.

ILR REVIEW SYMPOSIUM ON "THE NEW ECONOMICS OF THE MINIMUM WAGE"

In 1995, Card and Krueger (CK) published a book entitled *Myth and Measurement: The New Economics of the Minimum Wage* [10], in which the authors summarized the earlier literature and recent empirical studies on minimum wages. The book argues, using the findings from the empirical tests based on natural experiments, that an increase in the minimum wage does not negatively affect employment of low-wage workers. Since the book was very influential and changed the way minimum-wage discussions are conducted, *Industrial and Labor Relations Review* published a symposium on this subject in 1995. In this section, I summarize the comments and critiques of various labor economists regarding CK's book.

Brown [11] comments on several aspects of CK's work. Brown argues that CK's findings concerning the implications of minimum-wage laws are short-term results. In other words, Brown suggests that short-run effects of an increase in the minimum wage are much smaller than the time-series studies suggest, and that the long-run effects of the minimum wage may differ from the CK's short-run estimates. From a theoretical perspective, one would expect a greater impact on employment in the long-run since firms need time to adjust their production capacities. However, it is hard to isolate long-run effects of the minimum wage from other structural changes.

According to Brown, the CK's estimates might be biased toward zero due to the firms' ability to adjust their practices before the minimum-wage law takes effect. Brown also argues that some firms might exit the industry while other firms choose not to enter in response to a change in the minimum wage. The data for those firms are difficult to obtain.

Brown is also unconvinced that the CK's findings support the monopsony models of labor markets. Under the monopsony power models, an increase in the

minimum wage that increases employment should decrease product prices as well. However, the CK's results regarding the New Jersey and Pennsylvania fast-food industry employment levels suggest that product prices increase as the minimum-wage increases. These findings puzzle Brown and indicate that further studies are needed to understand the driving forces behind the firms' hiring and production decisions.

Freeman [12] argues that the CK's results contribute to the literature by providing empirical evidence as to whether the changes in the minimum wage have small or large effects on employment. According to Freeman, the CK's findings indicate that an increase in the minimum wage of 10 to 20 percent will have small effect on employment, which supports the position of the proponents of the minimum-wage increase. However, this result does not necessarily hold for larger increases in the wage levels. From this perspective, it is not clear at what level the minimum wage should be set to allow redistribution of income to low-wage workers without sizable negative effects on unemployment. Freeman emphasizes that more research is needed to further understand income redistribution effects and to compare the implications of the minimum-wage laws to other economic policies with similar goals. Freeman notes that it is also important to investigate whether the minimum wage creates insider workers (workers permanently employed at the minimum wage) and outsider workers (workers that remain unemployed for a long time). According to Freeman, these are the questions that future policy debates on the minimum wage should concentrate on.

Hamermesh [13] argues that CK provide strong empirical evidence about the effects of the minimum wage and that the implications of these results should be carefully evaluated. One of the Hamermesh's concerns is that the surveys did not cover sufficient time periods before and after the minimum-wage increase took effect. In the New Jersey-Pennsylvania study, the pre-minimum-wage survey was conducted in February 1992, while the minimum-wage increase took effect in April 1992. Further, since the fast-food restaurants were aware of the potential minimum-wage increase two years before the applicable law was enacted, it is possible that employers commenced adjusting their behavior long before February 1992. Therefore, the CK's methodology may fail to satisfy the conditions of a true natural experiment. A similar critique applies to the CK's findings regarding the Texas minimum-wage increase of 1991. Hamermesh argues that the CK's results simply indicate that the minimum-wage increase will not have an immediate impact on employment, and that their results are not necessarily inconsistent with the competitive models if adjustment costs are present.

Finally, in order to satisfy the conditions of natural experiments, a change in the minimum wage should be the only (the dominant) change observed with no other structural changes occurring. According to Hamermesh, the CK's data sets do not strictly satisfy this condition. Yet, Hamermesh believes that CK contribute to the literature in labor markets by making the researchers realize that

measuring policy effects is a difficult task and that one needs to evaluate empirical evidence carefully.

Osterman [14] argues that CK's book is an important contribution to the empirical literature on minimum wages and to the methodology in labor economics. Even though CK do not present a complete model of labor markets that is consistent with the empirical findings, Osterman believes that the CK's findings advance the understanding of labor markets and will be influential. According to Osterman, the data do not provide systematic explanation regarding the behavior of the firms in labor markets. Some firms might respond to an increase in the minimum wage by decreasing employment, while other firms might change their bonus structure and hire more workers. This inability to make reliable predictions regarding firms' responses does not necessarily negate earlier work and theoretical models but rather reinforces the need for a thorough reconsideration of the traditional methodology.

Welch's [15] critique of the CK's analysis is concentrated on the methodology and data sets. One of the major concerns that Welch has with the New Jersey study is that part- and full-time employment survey questions were not well defined. He argues that, while before- and after-employment comparisons are interesting, the reliability of these findings is conjectural. Another concern expressed by Welch is that the CK's analysis was restricted to the fast-food industry. Specifically, the competitive models of labor markets predict that an increase in the minimum wage should decrease overall low-wage employment but not necessarily employment in a particular sector or industry. Theoretically, it is possible that some restaurants might hire more workers while others hire fewer workers when the minimum wage goes up.

CONCLUSION

The opponents in the debate regarding an increase in the minimum wage argue about possible negative effects of the minimum-wage increase on employment. Earlier time-series studies supported this position since the findings implied that there is a negative relationship between the minimum wage and employment. However, the CK's findings discussed in *Myth and Measurement* challenged this view by providing empirical evidence based on natural experiments methodology. According to CK, the data did not support the prediction that the minimum-wage increase reduces employment. To the contrary, according to the authors, an increase in the minimum wage slightly increases employment. These findings significantly influenced the debate on the minimum wage and questioned the conventional wisdom that the minimum wage decreases low-wage employment. Even the critics of CK find it difficult to argue that small increases in the minimum wage would significantly decrease employment in the short-run. Therefore, in 2006, 650 economists [16] signed a letter stating that a modest increase in the minimum wage would not have strong negative effect on employment, but it can

significantly improve the well-being of low-income workers. However, many economists would agree that large increases in the minimum wage would decrease employment. Based on the CK's analysis, it is not clear how large the change in the minimum wage should be before the negative employment effects become apparent.

The CK's findings are appropriate in the short-run but not necessarily in the long-run. In the long-run, the negative effects of the higher levels of minimum wages might be much stronger because demand elasticity is higher in the long-run than in the short-run. More empirical research, however, is needed to investigate the long-run effects of minimum-wage laws.

The CK's empirical findings indicate that the competitive models of labor markets may not be appropriate to study short-run implications of the minimum wage. The findings, however, do not necessarily imply that monopsony models of labor markets suggested by CK are more realistic. Inability to find a statistically significant relationship between the minimum-wage and low-wage employment may indicate that the effects of the minimum wage are small in the short-run. The findings could also indicate the firm's behavior in labor markets is complex and that no single model of labor markets perfectly fits the data.

It is also important to differentiate employment and income effects of the minimum wage. Even if one accepts the time-series estimates that the minimum wage decreases employment, these estimates imply that the labor demand elasticity is around 0.2, i.e., less than one in absolute value. Elasticities less than one imply that small increases in the minimum wage would increase the overall wage income of workers holding minimum-wage jobs. However, it is not clear how this increase in the overall wage income redistributes wealth among low-wage workers. Therefore, further research and policy debates should also concentrate on how the minimum-wage laws redistribute income and jobs among workers.

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Direct reprint requests to:

Nodir Adilov, Ph.D.
 Richard T. Doermer School of Business
 Neff Hall
 Indiana University – Purdue University Fort Wayne
 2101 East Coliseum Blvd.
 Fort Wayne, IN 46805
 e-mail: adilovn@ipfw.edu