A Literature Review on the Employment Effects of Minimum Wages

M.A. Research Paper

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1. Introduction

For over a century now, minimum wages have been at the center of an ongoing and contentious divide amongst economists. The two schools of thought are often oversimplified into those believing a minimum wage is necessary to prevent exploitation of the lower-skilled laborers, and those who find artificially imposed prices to create excess supply and hence unemployment. However, when sifting through the plethora of economic literature on the topic, it becomes clear that there is far more nuance than these arguments suggest. In this paper, I attempt to thread a connection through the history of thought on the minimum wage, analyzing both sides of the debate as well as the different research methodologies commonly applied to them, and then tie it in to the contemporary conversation.

The discussion of the minimum wages begins as far back as the 19th century, where classical theorists such as John Bates Clark considered the impact on employment legal minimum wages might have. Around the same time, progressive economic voices arose to counter Clark and his contemporaries, suggesting that minimum wages do not in fact seem to reduce unemployment. The classical vein of argumentation was carried on vocally by George Stigler, who in the 1940s argued that higher minimum wages would increase unemployment. By this time, theoretical supply-and-demand models were built to explain why employment could be expected to fall, and advances on these models such as two-sector versions attempted to explain why under some conditions employment might fall more or less. These models were followed with various empirical studies and subsequent analysis into their validity.

As economics advanced throughout the later 1900s, more quantitative empirical studies were conducted on minimum wages. Time-series studies throughout this wave of research confirmed what classical theory taught, that when a given area implemented a minimum wage hike, employment (or at least employment growth) seemed to decrease. Then, in 1994, David Card and Alan Krueger conducted their seminal matching study into the cross-sectional survey data from New Jersey and Pennsylvania's neighboring counties following a New Jersey minimum wage hike. They found that the increased minimum wage did not significantly decrease employment in New Jersey; in fact it they found minor increases in employment in New Jersey following the rise.

Card and Krueger's work led to renewed research into minimum wages utilizing cross-sectional studies comparing regions. Many of these studies confirmed Card and Krueger's findings, though not all were unanimously agreed. Upon further investigation, researchers then found the correlation between study design and results; namely, that cross-sectional studies were more likely than time-series studies to return a negligible or positive employment effect from minimum wages. Those in favor of time-series argue that cross-sectional data failed to account for idiosyncratic differences across states. However, a more recent study by Neumark et al. (2013) demonstrated that time-series results would no longer show negative employment effects once state-specific time trends were added to the data. Thus, it seems that cross-sectional results in the vein of Card and Krueger's are more robust, arguably better informing us on how minimum wages effect employment in reality.

Most recently, politically inspired reinvigoration of the minimum wage hike debate has led to an uptick in studies surrounding the minimum wage and its impact. Many of these new studies sidestep the employment question, attempting instead to find welfare implications or government budget implications that may be used in tandem with past employment results to argue for (or against) minimum wage increases. Throughout the many decades of research, there is much to suggest promise having a minimum wage and increasing it gradually over time, but the degree of ambiguity in the literature leads me to conclude that there is insufficient evidence that an increase by 206.9% (from the current $7.25 to a proposed $15) in the federal minimum wage would be beneficial.

2. Classical Theory

"Congress has just acted to increase unemployment. It did so by raising the legal minimum wage rate". Such a confident declaration is rarely found in economics, or any social science for that matter. Yet, Milton Friedman's confident assertion that a higher minimum wage will undoubtedly lead to greater unemployment is perhaps the purest example of the classical school of thought on minimum wage legislation and its impact on employment rates.

Two decades before Friedman printed those words in *Newsweek*, a paper by George Stigler argued that "[economists] can and should be outspoken, and singularly agreed" on the issue of a minimum wage. Classical theory, beginning with productivity theory and a basic supply-demand understanding of price floor, tends to argue that economists' understanding of the minimum wage was that in most cases it would cause greater unemployment, and hence should be avoided.

2.1 19th Century Foundations

Perhaps the most pre-eminent neoclassical thinker on the minimum wage of the 1800s was John Bates Clark. Clark's marginal productivity theory of distribution is arguably his most notable work, asserting that labor's wages are determined by marginal product, as argued through the lens of a "natural" law of distribution (Clark, 293). In a 1913 essay, Clark made the argument that a minimum wage set above the marginal productivity rate was "risky" at best and "inhuman" at worst (Clark, 297). In viewing the minimum wage rate as anti-competitive, Clark saw such laws as the antithesis to progress, as he believed technological progress was birthed through competition. This was the theoretical foundation for the supply-demand model, as Clark saw problems only in minimum wages set above market equilibrium.

As these earlier theorists had no solid empirical data on the minimum wage, they relied predominantly on theory and reason. Though this did not stop certain progressives like Sidney Webb from attempting to evaluate the results of the minimum wage laws that were in place at the time. In analyzing sixteen years of a legal minimum wage in Victoria, Webb

drew the conclusion that the "number of persons employed…has in all cases, relative to the population, greatly increased" (Webb, 974). This idea would later be put to more rigorous robustness tests and its results seemingly confirmed. The most landmark of these confirmations would come in the 1990s, when David Card and Alan Krueger conducted their seminal study on minimum wage effects along the New Jersey – Pennsylvania border. Echoes of these early progressives are also heard today in arguments that the minimum wage is necessary to prevent widespread exploitation of low-skilled workers.

2.2 Supply-Demand Model

The most simplistic classical model of unemployment is a supply-demand model that treats a minimum wage as a price floor. As shown in Fig. 1, this simple model considers a minimum wage set above the equilibrium wage rate in the jobs market. This price floor creates excess supply, and lowers the employment rate. In Fig. 1 this is represented by a shift from the employment rate at B to that at A. Note though, that if employment was already growing steadily, this may merely slow job growth and not cause outright increased unemployment (Brown et al, 4).

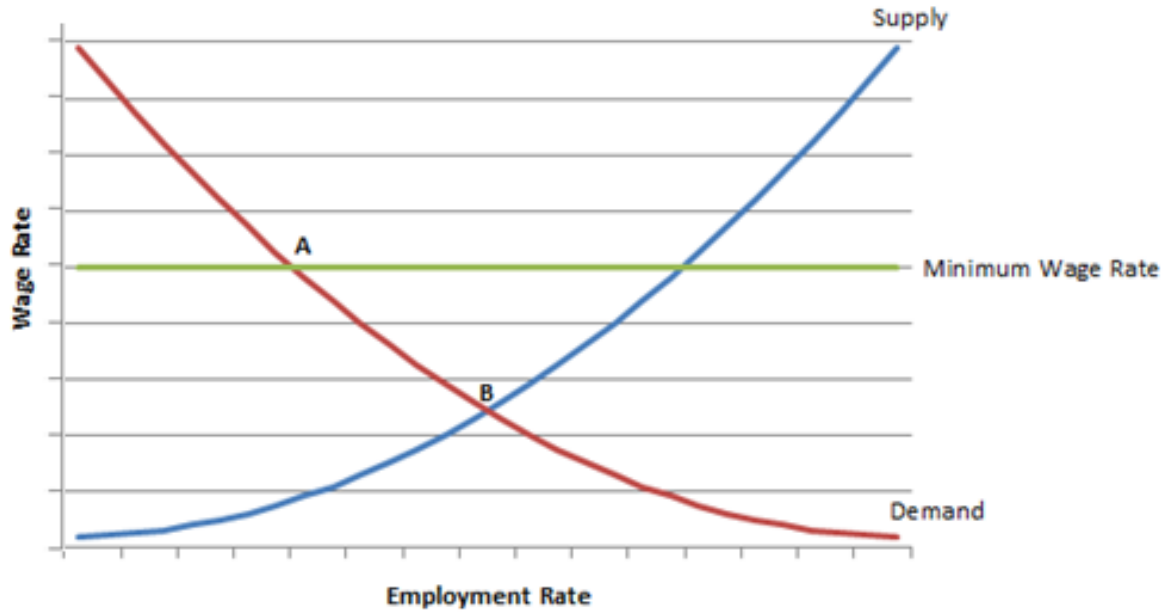

Fig. 1 Supply-Demand Model of Unemployment

2.3 Monopsony Case

Monopsony proves to be a unique exception to this classic supply-demand model, as any single monopsonistic employer will have marginal cost above supply at all levels of employment – see Fig. 2 for a visual representation of this. Monoposony refers to a market with one buyer and multiple sellers, or in this case one employer and multiple workers. A minimum wage could, in this case, thus actually raise employment, by forcing the employer to be a price taker and set wages at the minimum wage rate. This effect is only realized when the minimum wage set is between C and D on the graph shown below. A minimum wage set about the wage rate at D would then begin to decrease employment again. While a unique exception to the theoretical supply-demand model outlined above, the case of monopsony is rarely brought up in minimum wage discussions, as there is "little evidence that it is important in modern-day low-wage labor markets" (Brown et al, 5). Competition has ensured that in modern labor markets there is rarely a sole employer in any one market.

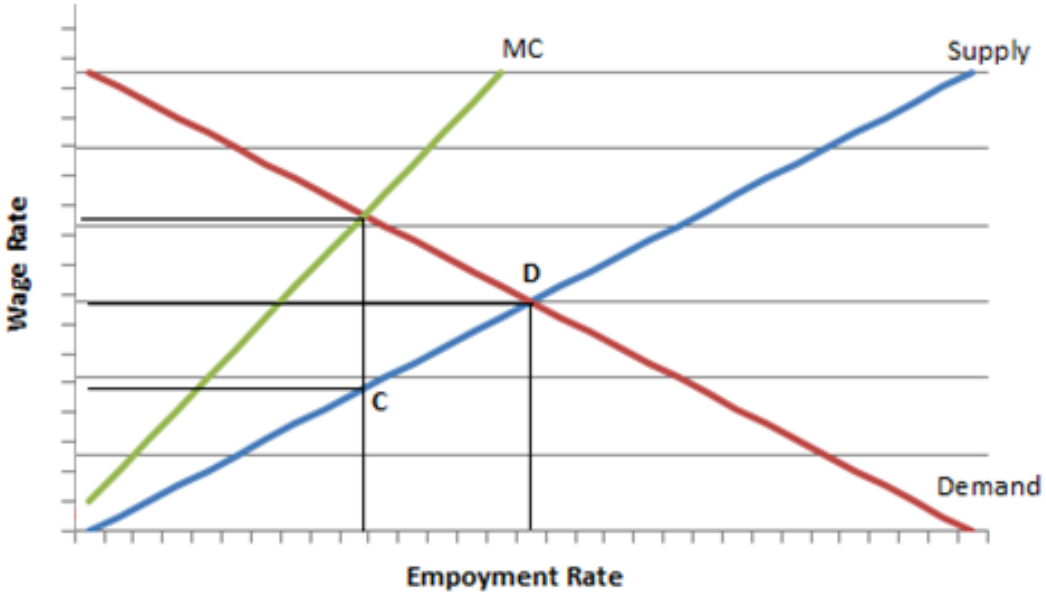

Fig. 2 Monopsony Model

2.4 Productivity Shocks

George Stigler, writing in 1946 after the passing of the Fair Labor Standards Act, argued that an effective minimum wage law would have two direct impacts; firstly the termination of those workers whose marginal product caused them to be valued significantly below the minimum wage rate, and secondly that the productivity of low-wage workers may

in fact increase (Stigler, 358). The first effect will be more pronounced if worker's value (in competitive wage market terms) is significantly below the minimum wage, as well as if the elasticity of demand in the market is higher. In labor markets with more elastic demand, firms will be more strongly responsive to shifts in the price of labor. Hence, if labor becomes more costly, firms will decrease their labor costs by more, meaning those less-skilled workers are more likely to be laid off.

The second result, the shock to productivity, was seen as a somewhat offsetting effect to layoffs by Stigler, as has been agreed upon by many other economists since. Stigler himself noted that these productivity gains could be from low-wage workers fearing poverty, though he acknowledged this seemed unlikely. Much more likely, he asserted, was that entrepreneurs would implement new production techniques. This could be due to the sudden viability of previously unprofitable techniques, as "superior" labor is brought in, albeit in smaller numbers (Stigler, 359). This argument remains popular to this day, with modern day practitioners and pundits suggesting higher retail wages will inevitably lead to the automation of menial roles like checkout clerk or warehouse worker (Rotman). This was the thrust of Friedman's classic argument, as in 1966 he claimed minimum wages "will also induce employers to replaces such workers with other workers…or to produce machinery to do the same work" (Friedman).

Entrepreneurs have been thought by many to be shocked into greater productivity by a minimum wage, this is defined as the appropriately named "shock effects" of minimum wage laws (Brown et al, 5). Stigler argued against shock theory's appropriateness using qualitative arguments of his time, such as that low-wage workers were mainly in manufacturing sectors defined by competition, and that this "competitive nature…argues that the entrepreneurs are not easy-going traditionalists" (Stigler, 359). Thus, he believed that entrepreneurs in manufactured would already have implemented more cost-effective production technology if it were available. The thread of this argument is used today to point out such modernities as automated checkout grocery tellers, despite the implementation of new minimum wages for such workers. Later research into the subject found that such shocks might reduce the impact of minimum wage hikes on employment, but not enough to eliminate the disemployment effects entirely (West and McKee). This dulling of the effect likely comes from employers flexibly adjusting costs wherever it is most effective, meaning their sole response is not always to cut labor costs first.

It seems that the crux of classical theory on minimum wages can be summarized as follows; a legal minimum wage rarely has the intended effect, both because it will theoretically increase unemployment, and because for it to be effective legislators must have an understanding of labor markets beyond even economists. Friedman conceded that minimum wages would help those who earn far greater, as they will no longer face competition from the lesser skilled. Stigler, too, asserted that for a minimum wage to have the intended consequences (of which benefiting the wealthy is certainly not thought to be a member), it must be very carefully selected and should vary with occupation, as well as across firms and times (Stigler, 361). Hence, the classical theorists frequently and vehemently opposed legislative attempts to impose a blanket minimum wage rate.

3. Rebuttal to the Classics

In the ensuing decades, the latter half of the 20th century to be specific, a number of studies sought to flesh out the economic theory on minimum wages, as well as to verify some of these theoretical findings with empirical studies. As economics as a field was becoming more mathematically rigorous, and computing technology advanced, many of these studies employed greater statistical tools than many of the classic theoretical papers. This period in minimum wage analysis can largely be characterized as rebutting the original thesis of classic theorists like those detailed above.

3.1 Two-Sector Models

First and foremost, the 1970s saw an expansion of the theoretical economic models explaining the impact of a new (or higher) minimum wage on employment. In 1973, Finis Welch observed the lack of total coverage across sectors of the Fair Labor Standards Act of 1938. The law often depended upon industry, product line, size of the firm, and for twenty-three years the guidelines went wholly unchanged (Welch, 1). As a response to this observation, he constructed a simplified two-sector model attempting to explain the response of employment across the economy to a wage price floor in only some sectors.

Welch's model had one industry covered by the minimum wage adjust as expected by classical theory; the minimum wage was implemented and hence employment fell in that sector. However, a number of workers migrate over to the uncovered sector of the economy, and so employment in that industry grew following the minimum wage implementation in the covered sector. As not all workers would migrate across industries, depending on their own 'reservation wage', the effect of the minimum wage on total employment across the economy was dependent on the elasticity of labor supply and reservation wage rates, as well as the relative size of the covered and uncovered sectors (Welch, 23).

Welch defines the proportion of employment in the soon-to-be covered sector before the minimum wage is instituted as follows:

$$c = \frac{D_C(W_O)}{D_C(W_O) + D_U(W_O)}$$

Where subscripts C and U refer to the covered and uncovered industries, respectively, and the initial wage rate W_O is the same in both sectors. As this model has only two industries, employment is thus symmetrical, and so $1 - c$ represents the employment in the industry that will remain uncovered.

After the minimum wage is implemented in the covered sector, Welch assumed that each of the workers who will work at the minimum wage rate have equal probability of obtaining a covered sector job, where this probability is given by:

$$f = \frac{D_C(W_M)}{S(W_M)}$$

Where W_M is the minimum wage rate set in the covered sector of the economy (Welch, 28).

While Welch's model may be useful in explaining some of the impact a minimum wage can have on an economy with diverse industry sectors and varying levels of coverage by the minimum wage laws, it does not directly make any claims about unemployment itself. This contribution was added a year later, in 1974, by Jacob Mincer. Welch had originally considered employment in the two sectors, covered and uncovered, as well as non-participation in the labor market. What Mincer added to this formula was remaining (temporarily) unemployed while searching for employment in the sector covered by the minimum wage. This analysis rested on the assumptions of non-perfectly elastic labor supply and partial coverage of a minimum wage (Mincer, 1). Partial coverage of the minimum wage law was the premise of Welch's argument to begin with, and has been fairly well documented. A non-perfectly elastic labor supply curve merely means that workers are responsive to changes in the wage rate, a more than reasonable assumption to make about labor markets, and one back up with empirical research.

Mincer's argument was that through the cross-sector labor adjustments described by Welch, wages in the covered sector would obviously rise to W_M, while wages in the uncovered sector rise to some value W_N through labor market shifts. At an arithmetic level,

which way the labor market shifts (from covered to uncovered or vice versa) depends upon the difference between generated unemployment and the reduction in employment. If $(E_O - E_M) > U$, then workers move to the uncovered sector and depress wages there. However, if $(E_O - E_M) < U$, the opposite occurs (Mincer, 7). He also proves in his paper that $W_M > W_N > W_O$ (Mincer, 2). Thus, a "certain amount of 'waiting' for jobs in the covered sector becomes worthwhile" (Mincer, 3), leading to a fixed amount of unemployment, *U*.

In his paper, Mincer then runs regression analysis on employment data using his two-sector model with waiting, and concluded that the labor-force effects of a minimum wage were in fact overwhelmingly negative. His theoretical argument asserted that the labor-force as a whole could either increase or decrease, but his regression analysis found negative labor-force effects, implying that "low-wage workers who are not employed in the covered sector perceive the minimum wage hike as a deterioration of their wage prospects" (Mincer, 23).

In many ways, Mincer's finding is supportive of classical theory on the minimum wage. His analysis found the largest increase in unemployment was in non-white males and non-white teenagers (Mincer, 23), which echoes the earlier assertion by Milton Friedman that youth unemployment in the African-American community was largely due to federal wage laws (Friedman). The deterioration of wage prospects thus seemingly adversely impacts those who minimum wage laws seek to assist.

Somewhat contrastingly, Brown et al.'s review in 1982 analyzed a number of time-series studies from the late 1970s and early 1980s and found that following a 10% rise in the minimum wage, teenage unemployment rose by around 1% (Brown et al, 41). Though still a negative effect, the results are slightly more muted in Brown et al.'s study, suggesting that the impact may not be as grave as those like Mincer once thought.

Much of the work conducted on minimum wage analysis in the 1970s and 1980s sought to deepen economists' understanding of this very complex issue. Work by Welch, and later Mincer, Brown, and many others, explored the theoretical nuances of minimum wage laws. Beyond the simplistic declarations of mass unemployment by some classical thinkers, these economists studied the cases where employment may in fact increase in some sectors or amongst some demographic groups. Thus, by the mid 1980s there seemed to be an

understanding amongst many who researched minimum wages that there was often a fall in either employment or labor-force participation following a minimum wage hike, but that the effects of such legislation were far more nuanced and misunderstood than previously thought.

3.2 Card and Krueger's Findings

The seminal case study in minimum wage law from the post-classic era has emerged to be Card and Krueger's 1994 paper studying the impact of a regional minimum wage hike in New Jersey and Pennsylvania on employment in the fast-food sector. They begin their paper with reference to the certainty of traditional theorists like Stigler, as well as mention of some of the 1970s work on teenage unemployment cited above. Their conclusion, however, was unique in its direct contrast to this theory. They found "no indication that the rise in the minimum wage reduced employment" (Card and Krueger, 772).

Card and Krueger's study was a multi-year case study analyzing the impact of New Jersey's 1990-92 increase in the legal minimum wage from the newly increased federal minimum of $4.25 an hour to $5.05, making it the highest minimum wage in the country at the time (Card and Krueger, 773). To evaluate the impact of this increased minimum wage, Card and Krueger surveyed fast-food restaurants on both sides of the New Jersey – Pennsylvania state border. Their choice of fast-food businesses was done for the industry's overwhelming reliance on minimum wage labor, relative homogeneity of required skills, and abundance of large franchise chains, all of which make comparison easier and more reliable.

The results surprised many, as Card and Krueger found that following the minimum wage hike the low-wage restaurants in New Jersey actually grew in size relative to those in Pennsylvania by about 13% (2.76 Full Time Equivalent employees, as shown in Table 1).

	Variable	Stores by state			Stores in New Jersey			Differences within NJ	
		PA	**NJ**	**Difference (NJ - PA)**	**Wage = $4.25**	**Wage = $4.26-$4.99**	**Wage ≥ $5.00**	**Low-high**	**Midrange-high**
1	FTE employment before	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	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	- 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	- 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)

Table 1. Average Employment Per Store Before and After the Rise in New Jersey Minimum Wage (from Card and Krueger, p.) *Note: standard errors are shown in parentheses.*

It is also worth noting that throughout 1991-93, northeastern states such as New Jersey and New York experienced a minor recession, with unemployment already trending upwards during this time (Card and Krueger, 779).

To ensure that their results were not merely a unique observation of some fast-food sector anomaly, Card and Krueger used Current Population Survey (CPS) data from 1991-92 to compare employment changes across New Jersey as a whole, as well as the regional northeast and the United States. The data suggested that the New Jersey job market as a whole faired worse than the national average over these years, though interestingly for teenagers the trend is reversed. However, Card and Krueger point out that the observed relative increase in teen employment in New Jersey is too small compared to the standard error to draw confident conclusions (Card and Krueger, 790).

In interpreting their findings, Card and Krueger compare their results to what a range of models would predict. First off, they tackle the classic competitive model outlined in section 2 of this paper. Their findings seem to directly counter the classical model, as they found that employment actually grew "faster as the stores that had to increase wages the most" (Card and Krueger, 791). The monopsony exception explain in section 2 may be able to explain part of the employment effects Card and Krueger observed in New Jersey, if we assume that restaurants are price takers in the end product market but face an upward sloping supply curve in the labor market. However, Card and Krueger also found that "prices rose

faster in New Jersey than in Pennsylvania" (Card and Krueger, 791), which would seem to counter the monopsony price-taker model. Thus, the central takeaway from Card and Krueger's somewhat complicated findings is far more convoluted than many preach it to be, and in essence merely suggests that classical models are inadequate to explain the impact minimum wages have on employment.

3.3 Criticisms of Card and Krueger

Being as influential and counter to classical theory as it was, Card and Krueger's findings immediately begot criticism and instigated other studies into the employment effects of minimum wages. Card and Krueger's landmark study utilized a relatively uncommon study design at the time, what is now referred to as 'matching'. In these studies, a comparison group and an "appropriate match for a treatment group" (Kuehn, 2) are chosen in attempt to mimic a randomized trial. Following this study design, other studies later found results contrary to Card and Krueger's own research.

Singell and Terborg (2007) exploited voter referendum results across the Oregon and Washington state border to study the employment effects of a minimum wage increase. Using a 'matching' method not unlike Card and Krueger's, they instead found a disemployment effect from the minimum wage. Similar results were found from later research. Sabia, Burkhauser, and Hansen (2012) found negative effects on employment when comparing New York's minimum wage laws to neighboring states. Hoffman and Trace (2009) found that a higher minimum wage could lower employment prospects of those most at-risk of unemployment.

With so many studies on the employment impact of a minimum wage hike; it can be difficult to decipher the seemingly contradictory results. A prime approach here is to delve into the study design and compare and contrast varying research methodologies. The way a study is carried out is highly influential on its observed results, and as such it is worthwhile to analyze the main methodologies used in economic studies of the minimum wage.

4. The Significance of Research Methodology

There are largely two broad study designs used when researching minimum wages. The first, referred to above as 'matching', is effectively cross-sectional analysis that seeks to compare two (or more) labor markets to observe their behavior following a rise in one's minimum wages. Card and Krueger's landmark 1994 study on New Jersey and Pennsylvania is a prime example of such a study. The other oft-used form is that of time-series studies, wherein panel data from a given location, say the state level, is used to observe the impact of a minimum wage hike over time in that area. Explorations into the impact of research methodology on result, such as those conducted by Card and Krueger (1995) and Kuehn (2014) find that time-series studies are more likely to lead to the conclusion that minimum wages lower employment, whereas cross-sectional 'matching' studies have been shown to find negligible or slightly positive impacts on employment.

4.1 Cross Sectional

Cross-sectional studies into the employment effects of a minimum wage are grounded in comparing and contrasting a group where the minimum wage rose to at least one other control group or groups. In Card and Krueger's original 1994 paper, New Jersey was the former and Pennsylvania the latter. In the absence of randomly assigned trials, which are of course unworkable in the political reality, cross-sectional studies of easily comparable groups can be fruitful in modeling something similar to a random trial. The key here is that the groups must be fairly similar, as would seem a fair assumption about consumers on either side of the New Jersey – Pennsylvania state border. Not only are demographic similarities important, but even more significant is the similarity of markets in structure and similar exposure to shocks. Comparing New Jersey to, say, a West Coast state would be extremely difficult to draw conclusions from, as these groups would not undergo similar regional economic shocks. Additionally, when focusing only on counties near the state borders, we allow for some degree of flows in both consumers and workers.

Dube, Lester, and Reich (2013) took this cross-sectional approach and applied it to an even larger data set. They compared "every pair of neighboring counties along every state border in the country" (Kuehn, 3) and found that minimum wage hikes were consistently

unassociated with increases in unemployment; meaning that with a larger sample set than Card and Krueger, the same conclusion was reached. In fact, as Table 2 demonstrates, as studies become stronger (i.e. more controls, such as for state differences or even metropolitan area) the more likely they are to suggest minimum wages have either a negligible or a positive effect on employment.

	All County Sample	**Country Pair Sample**
No Matching	- 0.784*	- 0.482**
No Matching, Control for Census Division Differences	- 0.114	-
No Matching, Control for State Differences	0.183	-
No Matching, Control for MSA Differences	0.211	-
County-Level Matching	-	0.079

Table 2. Percentage change in employment for each percentage change in earnings due to a change in the minimum wage (from Card and Krueger, p.) *Note: * denotes statistical significance at the 10% level and ** denotes significance at the 5% level.*

Cross-sectional results are not unanimous, as the earlier cited studies by Singell and Terborg (2007) and Sabia, Burkhauser, and Hansen (2012) both found negative effects on employment. Daniel Kuehn has suggested these studies are open to greater criticism than Card and Krueger or Dube et al.'s research, as these studies use state wide data opposed to neighboring counties. Using state wide data does less to control for differences across states, and does not allow flows (and similar exposure to shocks) the same way studying neighboring counties does. Thus, while certainly not decisively unanimous, it seems that cross-sectional or 'matching' studies on average find that minimum wages do not have a negative employment effect.

4.2 Time Series

In time series studies of the employment effects of minimum wages, data collected for a specific place over time is analyzed to estimate the impact of a minimum wage hike. Such 'fixed effects' models are able to control for idiosyncratic differences that may exist between groups (e.g. states). For this reason, they may give a better understanding of how a given state's minimum wage law impacts its own economy.

However, as minimum wages are not put in place with clear experimental parameters, there is potential for selection bias in time series studies. Fixed-effect time series studies "implicitly treat every state not experiencing a minimum wage increase as a coequal comparison case to every state that does have a minimum wage increase" (Kuehn, 5). As such, there may be an inherent difference between states selecting themselves for minimum wage increases. These differences could be political, with Democratic-majority states more likely to have higher legal minimum wages than Republican-majority ones (NCSL, 2016). They could be economic growth differences; with the Midwest and Northeast more likely to have higher legal wages than the Southwest and Central states that are undergoing swift population growth (Kuehn, 5). Furthermore, time series models have been critiqued for not adequately capturing state-specific time trends, which could lead them further away from the idealized randomized trial tests (Kuehn, 5). Thus, there is a trade-off inherent in focusing only on one group (e.g. a state) over a cross-sectional comparative study.

Previous reviews of time series literature have found that these studies are more likely to find evidence of negative employment effects from a minimum wage. Research from the early 1980s was summarized as finding "a reduction of between 1 and 3 percent in teenage employment as a result of a 10 percent increase in the federal minimum wage. We regard the lower part of this range as most plausible" (Brown et al.). Later research conducted in the 1990s "found an even smaller effect" (Card and Krueger, 238) of the minimum wage on employment. Hence, time series studies by and large have found there to be a small but still discernibly negative employment effect from increasing the minimum wage rate.

More recently, Neumark, Salas, and Wascher conducted a study to address the criticism that panel data studies fail to account for spatial heterogeneity. This refers here to the employment patterns correlated with states that have 'selected' a minimum wage hike. They found that they could replicate earlier findings in a model with only standard state and time fixed effects, but that once either state-specific linear trends or region × quarter interactions were added "the estimated elasticities became statistically insignificant" (Neumark, Salas, and Wascher, 8). These new results led Neumark et al. to conclude that the effects of minimum wages on employment may not be "robust to the type of identifying variation used to estimate these effects" (Neumark, Salas, and Washer, 9), calling into question the true applicability of earlier time-series studies. Hence, when we include state-

specific time trends to move us closer to a randomized trail framework, Neumark et al. found that past time-series results were no longer robust.

4.3 Potential Biases

As mentioned before, time series studies may have their own selection bias problems due to the nature of self-selection from states 'opting into' the minimum wage increase. More broadly, there are other potential biases in minimum wage research, including publication bias and the theoretical presumption bias coming from past economic literature.

Publication bias refers to the argued tendency of economic journals to prefer to publish papers with significant results. This argument has been made a number of times, from Begg and Berlin (1988) to De Long and Lang (1992). With regards to minimum wages, this potential bias is even more troublesome, as many soundly conducted studies into the employment effects of minimum wages find a negligible impact. This has occurred in both directions, though due to the number of well known significantly negative results, not publishing negligible results seems to hurt the pro-minimum wage side of the debate more, skewing the conversation. Thus, those studies that find a significant disemployment effect may perhaps have a greater chance of being published, and so despite the economic literature on the topic being widely diversified in study design and findings, we may not have the best representation of true consensus.

As the classical literature described in section 2 of this paper strongly suggests that minimum wages raise unemployment, there is a well-defined theoretical history of approaching minimum wage issues in economics. This likely impacts current studies into the minimum wage, as theoretical presumptions may bias the research conducted as well as the research published. Journal editors may be biased towards accepting those studies with significant negative effects, and researchers themselves may select control variables, functional forms, or data sets with greater probabilities of confirming their predisposed idea of what impact the minimum wage should have (Card and Krueger, 239).

5. Recent Developments

The recent 'Fight for 15' movement, calling for a $15 federal minimum wage, has reinvigorated the intense discussion on the appropriateness of raising the minimum wage as a method of alleviating poverty. Various districts throughout the nation have begun to raise their own local legal minimum wage, such as Seattle, WA and Richmond, CA (Sheridan). This has intensified the number of economic evaluations of the impact of such ordinances to increase minimum wages, injecting new research into the literature.

David Cooper (2014) has suggested that "raising the minimum wage to $12 by 2020 would directly or indirectly lift wages or 35.1 million workers" (Cooper, 2), in the process suggesting that a higher minimum wage can combat inequality by lifting the purchasing power of the lowest paid workers. However, his briefing paper fails to consider the employment effects of such an increase, primarily asserting that a higher wage rate would help current low-wage workers. Cooper even accepts that "productivity in low-wage work may not have grown as substantially…as overall productivity" (Cooper, 5), so while potentially beneficial from a welfare standpoint, he fails to adequately consider firms' response to the imposition of a minimum wage. This does not in and of itself disqualify Cooper's argument, merely limiting its usefulness to the number of people who could be impacted by a wage hike. Other politically motivated studies like Cooper's, whose report begins by stating the Economic Policy Institute's goal is to make wage growth a political priority, often lack the academic objectivity of a more rigorous study. This suggests that more academic research is needed into the modern minimum wage proposal to bring clarity and data to the conversation.

Many of Cooper's claims were validated in a somewhat earlier study by Lee and Saez (2012) that found minimum wages could be valued for redistribution purposes by the government in spite of the fact that they likely caused greater unemployment. Lee and Saez conclude from their research on competitive labor that:

> "A Pareto improving policy consists of reducing the pre-tax minimum wage while keeping constant the post-tax minimum wage by increasing transfers to low-skilled workers, and financing this reform by increasing taxes on higher paid workers. Those

> results imply that the minimum wage and subsidies for low-skilled workers are complementary policies."
>
> (Lee and Saez, 1)

Their research into the Pareto optimality of minimum wage laws and taxation policies considered together sheds new light on the matter of employment. Minimum wage analysis has long argued that minimum wages have the potential to harm employment rates, and as such must have negative welfare effects – since people value working and the wages they get from that job over being unemployed. Hence, perhaps even if the time-series studies are accurate and minimum wages have negative employment effects, working in tandem with optimal taxation policies they may still have net positive benefits to the lower-skilled working class.

Continuing on from Lee and Saez's evaluation that minimum wages should be paired with ideal taxation policies, the growing number of local ordinances increasing minimum wages has garnered assessments of their fiscal impact on local government and businesses. As many of these laws are recent, academic papers into their longer-term impact are sparse, though much can still be derived from these local-level assessments. Fiscal impact studies by the Political Economy Research Institute (PERI) at the University of Massachusetts have found negligible impacts from increased minimum wages in a number of studies. In analyzing Milwaukee County's wage hike, PERI concluded:

> "The average covered private sector business will itself only experience a modest cost increase from the living wage ordinance. As a result, cost pass-throughs from service contractors to the County will be minimal. Likewise, the living wage will not reduce the County's ability to foster a healthy tax base by either (1) reducing the economic vitality of the GMIA or (2) impeding the County's use of business subsidies to pursue its economic development goals.
>
> The proposed living wage should therefore strengthen Milwaukee County's ability to cultivate decent quality jobs without compromising its capacity to provide quality services."
>
> (Wicks-Lim, 8)

Similarly, in evaluating the likely effect of a minimum wage increase in Sonoma County, CA, the institute reported an estimated annual fiscal cost to the county of only $3 per household (Wicks-Lim, 25).

Additional research from the last half-decade has continued on the thread of net benefits despite potential job losses mentioned above with reference to Lee and Saez. John Schmitt, in a 2013 review of 21st century minimum wage studies, found that adjustment channels such as "reductions in labor turnover… wage compression, and small price increases" (Schmitt, 1) are sufficient to counter the disemployment effects that may arise from increasing the minimum wage rate. Schmitt argues that economists' previous focus on purely employment figures did not adequately account for employer's ability to adjust their business in other ways when facing a now higher labor cost. He cites firm's ability to cut pay for highly skilled workers, reduce workers' hours, cut training, and even to increase productivity (Schmitt, 22) – the latter harkening back to the classical theories of wage legislation 'shocking' productivity. All of these measures account for the flexibility of firms in adjusting costs, their ability to cut hours or reduce training programs – while not necessarily directly beneficial to workers – may mean that more people can stay in jobs.

Over the past several years, newly revived political interest in the matter, as well as noteworthy economic approaches, have allowed for a flourishing of discussion on the minimum wage once again. In this new wave of minimum wage research, many economists seem dissatisfied with yet another study of employment effects and ambiguous results. Though this is not to say there are not still studies re-confirming Card and Kruger's original 1994 finding – e.g. Neumark, Salas, and Wascher (2016). Instead, many of the most recent economic studies on the matter sidestep this core question by suggesting that even if there are moderate disemployment effects, that there may still be net benefits to overall welfare, or that those disemployment effects are tampered by firms' ability to adjust costs beyond merely laying off workers. Further studies have shown that minimum wages can boost welfare (Cooper) and have minimal fiscal impact on local government (Wicks-Lim). When taken together, the wave of recent minimum wage studies have developed a better understanding of its impact beyond employment, though a better understanding of employment effects has not yet been reached.

6. Further Research

As Section 5 of this paper demonstrated, there is a need for renewed rigorous academic analysis into the employment effects of minimum wage hikes. Much of the most recent literature has been to elaborate on the potential benefits of a legal minimum wage beyond its employment effects. Largely, this illustrates a side stepping on the part of economists. Conducting further studies that are predominantly replications of older research is certainly less appealing for those looking to be published than original work, but this kind of research would be the most useful in contributing to the field's understanding of the employment effects of minimum wages.

In Section 4, I outlined the importance of study design in minimum wage analysis. Cross-sectional studies have less potential for surveyor bias as time series studies allow greater discretion on the part of the researcher when selecting control variables. Thus, conducting well set-up cross sectional 'matching' studies with large data sets that look at local level impacts could test whether Card and Krueger's results hold over time and over new geographic regions. Greater confirmation of their results would lead to further consensus on the minimum wage matter from economists.

Though the mechanical differences between time series and cross sectional studies are well known, and their respective designs influence on research results is well documented. Yet, more clarity could be brought to explaining this difference in conclusions. More recent studies have found the disemployment effect to be smaller than previously thought, but time series analysis still consistently finds these negative results. Further research into explaining the different conclusions from the two studies may shed light both on the nature of minimum wages and on which research methodology is more appropriate to focus on when studying wages going forwards.

7. Conclusion

The economic literature on minimum wages and their employment effect is one of many convoluted and chaotic components of economics. For over a century the debate has continued over whether legal minimum wages help low-skilled workers by raising their purchasing power, or hurts them by instigating greater lay-offs, as firms can no longer afford unproductive workers at a higher-than-market cost. The truth it seems, as usual, lies somewhere in between these two camps.

In this paper I surveyed the historical evolution of modeling minimum wages. Beginning with classical theorists as far back as the 19th century, early models were based on reason rather than empiricism, and suggested that higher minimum wages would increase unemployment. These models relied on basic supply-and-demand theory, as well as productivity theory. Together, these suggest that workers who are less productive than the newly enforced minimum wage value them at must either increase their productivity or stand a chance of being terminated due to greater labor costs.

Developments upon this theoretical foundation have suggested that firms have other outlets to cut costs, and as such are more adjustable to rising labor costs and thus may not directly cut workers. Furthermore, research has found that minimum wages do not cost local governments significantly after implementation, and some researchers have suggested that minimum wages can raise welfare regardless of their employment effects.

Empirical evidence seems fairly ambiguous on employment effects at first glance, as there are a number of studies supporting both the hypothesis that minimum wages raise or lower employment rates. However, when one delves deeper into the two primary methodologies used, a consensus begins to emerge. Cross-sectional studies have been found more robust to repeated tests and adjustments, while fixed effects panel data research has been demonstrated to be in line with cross-sectional results when appropriate controls are put in place. Time-series studies may also be subject to a greater number of potential biases. Therefore, from the literature reviewed on the matter, it seems that cross-sectional results more accurately capture the impact of minimum wage hikes on local employment rates.

Further research into robustness tests of both typical cross-sectional and time-series results would be useful in furthering the confidence with which economists can make claims regarding the minimum wage's employment effects. With the new wave of minimum wage increases in cities and states across the United States, there should be plenty of possibilities to test whether results such as Card and Krueger's hold up across time and place.

When applying the lessons from this literature review to the contemporary discussion on a suggested federal minimum wage hike to $15 an hour, the evidence thus far seems to suggest this is a precarious proposal. Though there is empirical evidence that minimum wages may not increase employment, from Card and Krueger to Dube et al. to Neumark et al., there is still contention amongst economists. These results in favor of raising the minimum wage have not been reliably replicated across alternate study designs or in enough unique cases to fully justify a blanket national wage hike of over 200%. Consider, for a moment, that Card and Krueger's study only evaluated a minimum wage hike of roughly 18.8% .The uncertainty in a raise of such magnitude is simply too grand for anyone versed in the literature to state with a reasonable of degree that this will have positive results. The ambiguity in what effects we could expect is simply too high. There have not been enough studies conducted on minimum wage effects across diverse economies (such as the various states and regions of the U.S.) to explain what to expect with such a large minimum wage rise. More research with wider sample groups would shed some more light on what such a rise may mean for employment rates across the country.

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