
Do Minimum Wages Have a Negative Impact on Employment in the United States?

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Salaire minimum, minima sociaux et retour à l'emploi

Minimum wage, social safety net, and return to the labour force

Do Minimum Wages Have a Negative Impact on Employment in the United States?

Stephen Bazen *

Summary

The study by David Card and Alan Krueger of the effect of a rise minimum wage in New Jersey fast-food restaurants (and their subsequent book) had a marked impact on the economics profession. They found that the increase in the minimum wage actually increased employment. However, the 'new economics of the minimum wage' is based on a wider body of evidence than the New Jersey study. In their book, Card and Krueger re-examine earlier studies and present evidence supporting the claim that during the 1980s and early 1990s, minimum wage hikes had no significant negative employment effects in the United States. There have been a number of attempts to examine the robustness of their results and this research has been centred on the following three issues: (a) the validity of the New Jersey study, (b) the apparent absence of effects of federal minimum wage hikes using time series data and (c) the analysis of state and federal minimum wage increases on state employment levels. Based on this evidence it would appear that during the 1980s and 1990s that federal minimum wage increases did have a negative impact on teenage employment while state level increases, such as the one in New Jersey, by and large did not. This suggests that their results do not generalise to

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the point where it is possible to conclude that there is no negative effect of minimum wages on employment in the United States.

Résumé

Les études récentes de l'impact du salaire minimum sur l'emploi mettent en cause un consensus qui s'est établi parmi des économistes. Jusqu'en 1980, il semblerait que les hausses du salaire minimum donnent lieu à une diminution de l'emploi des jeunes travailleurs. Or, l'expérience des années 1980 et 1990 a mis en cause cette conclusion. Dans cet article, nous évaluons la portée des études récentes. Nous avançons l'hypothèse selon laquelle les hausses du salaire minimum ont bien un effet négatif sur l'emploi des jeunes mais les relèvements des salaires minima instaurés par des états individuels n'ont eu aucun impact sur l'emploi. La distinction des deux types de salaire minimum permet de réconcilier les résultats obtenus avant les années 1980 ainsi que ceux des études plus récentes qui n'identifient aucun impact sur l'emploi.

Mots clés : Salaire minimum, emploi des jeunes.

Keywords: Minimum wage, teenage employment.

J.E.L. : J.2

The study by David Card and Alan Krueger of the effect of a rise minimum wage in New Jersey fast-food restaurants (and their subsequent book) had marked impact on the economics profession. They found that the increase in the minimum wage actually increased employment. This finding inspired a new interest in monopsony models of the labour market and their quasi-experimental approach has been emulated in numerous applications. However, not unexpectedly, their results also provoked a number of hostile reactions, not simply because the New Jersey result conflicts with the law of demand but also because the conclusion that there is no negative employment effect is at odds with the results of a large number of earlier studies. The survey by Brown, Gilroy and Kohen (1982) concluded that a 10% increase in the federal minimum wage reduced teenage employment by between 1 and 3 per cent.

However, the New Jersey study was not the only piece of research in which no negative employment effects were found. Earlier papers by Card (1992a,b), Card, Katz and Krueger (1994), Holzer, Katz and Krueger (1991) and Katz and Krueger (1990, 1992), found no significant effects associated with rises in the federal minimum, the state-specific minimum wages set in California and Texas, and rises in both types of minimum in a panel of states. Card and Krueger brought together this material in a book along with a critical re-examination of earlier research – *Myth and Measurement: The New Economics of the Minimum Wage* (1995).

Since the mid 1990s there appears to be a change of attitude among the economics profession. Many economists regarded the findings of Card and Krueger as the advent of a new approach to analysing the operation of the labour market and the abandoning of the competitive model. Others were essentially dismissive of their findings and continue to adhere to a competitive framework especially in the market for low-skill labour, but somehow had to find reasons for dismissing the Card and Krueger results. As Richard Freeman put it: “it has shifted the burden of proof about the employment effects of the minimum wage” (1995, p. 832).

Among researchers working in the area of the impact of minimum wages, there have been a number of attempts to examine the robustness of their results (Card and Krueger encouraged this work by providing free and complete access to the data sets, questionnaires and computer programmes they used). There are essentially two objectives in this work: firstly to understand why their results are different to those obtained in previous research and secondly to assess the extent to which the idea that minimum wage increases have no effect on employment is applicable in the United States. The former concerns research methodology while the latter is a more substantive economic question. This research has been centred on the following three issues: (a) the validity of the New Jersey study, (b) the apparent absence of effects of federal minimum wage hikes using time series data and (c) the analysis of state and federal minimum wage increases on state employment levels. The current paper is organised along these lines and ends with an attempt to explain what lies behind the different research findings.

1. The Impact of 1992 New Jersey Minimum Wage Increase

The federal minimum wage had been frozen at \$3.35 throughout the 1980s following concerns about negative effects on teenage employment and due to an administration hostile to intervention in the labour market. It was subsequently raised to \$4.25 in two stages – to \$3.85 in April 1990 and \$4.25 in April 1991.

Due to the lack of activity on the federal front during the 1980s, a number of states had implemented their own minimum wage increases¹. This continued to a lesser extent after the federal increases of the early 1990s. The state of New Jersey, having left it unchanged throughout the 1980s, increased its minimum wage from \$4.25 to \$5.05 in April 1992, a sizeable increase of 18%. In order to test the hypothesis that increases in the minimum wage reduce employment, David Card and Alan Krueger, both economists at Princeton University at that time, undertook a telephone questionnaire survey of the effects on employment, wages and other variables in a sample of fast-food restaurants between the first and fourth quarters of 1992. Such establishments typically employ a significant part of their workforce on wages equal to or close to the legal minimum wage. In order to ensure that they identify the effect of the minimum wage increase rather than other the impact of other factors that influence employment, they undertook a parallel survey of restaurants in the same chains in the neighbouring state of Pennsylvania where the minimum wage remained unchanged at the federal level of \$4.25. Since employment levels in fast-food restaurants in contiguous states are likely to be influenced by the same general economic environment, any difference that shows up in employment variations over the period can be attributed to the minimum wage increase in New Jersey. Formally this is a quasi-experimental approach, where the New Jersey restaurants constitute the treatment group and those in Pennsylvania the control group.

Their main findings concerning the effect of the minimum wage are best summarised by the results in table 1 which shows the following. Firstly, while 44% of New Jersey restaurants reduced their employment levels over the period covered, the figure was higher in the non affected state (53%). Secondly, average employment per restaurant increased in New Jersey (+0.59 full-time equivalent – FTE – workers). Thirdly the impact of the treatment relative to the control group (average employment fell in Pennsylvania –2.16 FTEs) is given by the difference in differences estimated of +2.75[= 0.59 – (–2.16)]. Thus while employment rose on average by one part-time worker in New Jersey, in the absence of the minimum wage increase it would fallen by more than two full-time workers (i.e. the change in employment in the control group). Overall the impact of the minimum wage rise was to raise average employment by more than two and half full-time workers relative to what it would have been in the absence of the increase. These basic findings stand up to a large number of robustness checks undertaken by Card and Krueger (using the same sample) such as using different weights, adding controls, taking into account ownership and geographical situation.

The study has been criticised on (at least) two fronts. Firstly, it is claimed that it

1. Not all states have minimum wage legislation and those that do have it do not always set minimum rates independently of the federal system.

Table 1 : *Summary of Card and Krueger's Study of Fast-Food Restaurants*

	New Jersey	Pennsylvania
Percentage of restaurants where employment		
Decreases	44.0	53.3
Increases	51.5	41.3
Average employment (FTE) :		
February	20.44	23.33
November	21.03	21.17
Change	+0.59	-2.16
Difference-in-differences	+2.75	
Source: Card and Krueger (1995) Tables 2.2 and 2.5.		

is defective because it comes up with a result that is at odds with the conventional theoretical conclusions and the large amount of evidence that seems to converge on a narrow range of negative elasticities. Secondly it is claimed the way the study was undertaken undermines the conclusion and that had it been done properly, the opposite conclusion would have been obtained (that minimum wage rises reduce the employment of some of those who would have earned less). Some interesting initial reactions from researchers in the area can be found in a review issue of the *Industrial and Labor Relations Review* (1995). Major criticisms concerning the fast-food restaurants study come from Finis Welch who believes that “The New Jersey study is a monument to poor survey methodology” (1995, p. 848), while Richard Freeman expresses a rather different view: “... their analysis is a model of how to do empirical economics” (p. 831).

Dan Hamermesh (1995) expresses the concern that the ‘before – and – after’ methodology is not appropriate for examining the effect on employment since minimum wage increases are debated and/or announced in advance and employers modify the employment levels before the increase becomes effective. Card and Krueger observe and compare employment levels in February 1992 and November 1992. The New Jersey increase was implemented in April 1992 and had been debated in the two years prior to February 1992, and employers would have already adjusted to the expected change. He argues that their “strongest evidence is fatally flawed” (1995, p. 838).

Some of the most trenchant criticisms come from Finis Welch (1995). He argues that the survey questions and coding procedures allow for so much noise that their results are invalid. In particular he points out there may be confusion concerning the definition of part- and full-time workers. He examines their data very closely and finds that large variations in employment between February and November lie behind the relatively small changes in average employment. Furthermore the largest employers all reduced their employment levels while the smallest restaurants increased them. He argues that “there is so much random noise in the data that

they should be dismissed altogether” (p. 845).

The debate was taken to another level with the study by David Neumark and William Wascher who obtained data drawn from payroll records from restaurants in the states of New Jersey and Pennsylvania (Neumark and Wascher, 2000). If there were no negative employment effects, then this should show up in other data. However Neumark and Wascher find that the impact of the minimum wage hike on employment was the opposite of that found by Card and Krueger. Using Zip codes, they were able to find restaurants in the same chains and in the same local areas as the Card and Krueger sample (although a perfect match was not possible because the codes did not correspond to exact addresses), and contacted these restaurants requesting data from their payroll records for the period covered in the CK study. The analysis of these data revealed two major differences. Firstly, there was far more variation in the CK employment data compared to the payroll-based data, and they argue that this is indicative of the presence of large measurement errors in the CK sample. Secondly, they find that in New Jersey employment *declined* relative to employment in Pennsylvania, and that regression estimates suggested that the minimum wage elasticity was around -0.2 .

Card and Krueger (2000) re-analyse the Berman-Neumark-Wascher² (BNW) sample and criticise their conclusions. In addition, they introduce a further data source (made available by the Bureau of Labor Statistics – BLS) which is derived from employer declarations of payroll records made for unemployment insurance purposes and which covers fast-food restaurants in New Jersey and Pennsylvania. These data suggest that it is the BNW sample that may not be representative and that their conclusions are not sound. By contrast, CK’s original data would appear to be more reliable when compared to the BLS data. CK find that: “The differences between the BNW sample and ours are attributable to differences in the BNW sample of Pennsylvania restaurants, which unlike the more representative BLS sample, and our original sample, shows a *rise* in fast-food employment” (p. 1398, *their italics*). Furthermore they discover that: “the differential employment trend in the BNW is driven by data for restaurants from a single Burger King franchisee who provided all the Pennsylvania data in the original Berman sample” (*ibid.*). If the data (which concerned 26 restaurants) from this franchisee are excluded, the employment effect in New Jersey is found to be positive. If these observations are retained and ownership and chain controls are included instead, the New Jersey employment effect is negative but not significant. Card and Krueger find that the BLS administrative data confirm their initial finding of no negative employment effect in New Jersey – the coefficients are positive but not significant as in the original CK study.

2. In fact some of the data were first obtained by Richard Berman of the Economic Policy Institute and Neumark and Wascher added more establishments to his original sample for their study.

There can be few cases of empirical analysis in labour economics, where so much attention was paid to one particular issue³. Three data sources are brought to bear on the consequences of a single minimum wage increase in a single state for employment in a very narrowly defined sector. The weight of the evidence indicates that there were no significant negative effects associated with the 18% increase in the minimum wage on fast-food employment in New Jersey. This is the conclusion that Card and Krueger draw from the re-examination of the episode on the basis of three different data sources. The possibility of positive employment effects is still evoked but the results are less clear-cut. Nevertheless, that a substantial increase in a minimum wage can have no adverse effect on employment is a major finding. However it is not clear that this result generalises to other situations – the effect on employment in other sectors (where there is international competition for example) or in other states.

2. Times Series Evidence

One of the main concerns expressed about Card and Krueger's results is that there existed an apparent consensus, based on essentially time series evidence and summarised in a survey article by Brown, Gilroy and Kohen (1982) – hereafter BGK – that increases in minimum wages had a negative effect on teenage employment with elasticity estimates in the range -0.1 to -0.3 for the period up to 1979. Closer inspection reveals however that the estimated effect may not have been statistically significant due to problems of residual autocorrelation and Gary Solon (1986) found that seasonality had not been appropriately modelled. His proposed solution of interacting seasonal dummies with a quadratic deterministic trend “reinstated” the negative, statistically significant employment effect.

In their book, Card and Krueger re-examine the time series evidence and claim that there had been “publication bias” in favour of studies that found negative employment effects. The basis for this claim was that studies using more data did not find smaller standard errors (or larger absolute t ratios) for the minimum wage coefficient, as would be the case if the effect was well-defined in a statistical sense. Furthermore, they re-estimated the BGK and Solon models on data up to 1993, and found that while the coefficient was still negative, it was both smaller in absolute value and no longer statistically significant. In many ways these results were more important than the one-off New Jersey study, since the finding that time series estimates on a long run of data (over nearly forty years of quarterly data) were

3. The debate over the impact of unemployment benefits on unemployment in the United Kingdom in the inter-war years is similar (see for example, Benjamin and Kochin, 1979; Metcalf, Nickell and Fioros, 1982).

insignificant, undermined the basis of the earlier consensus, a consensus that had probably influenced policy decisions in the United States and elsewhere.

One major difference with the New Jersey study is that time series studies examine the relationship between the federal minimum wage and the aggregate teenage employment-population ratio. The object of the study is completely different. A careful reading of the studies that comprised the basis of the consensus of the early 1980s already revealed a number of concerns. Furthermore the econometric analysis of time series data has undergone a revolution in the period since 1980. The earlier practice of correcting for serial correlation and introducing deterministic trends in order to isolate the effects of economic variables has since been found to be appropriate in only very special circumstances. The pre 1980 time series evidence, and Card and Krueger's updating of this research, has been re-examined by Velayoudom Marimoutou and myself (2002).

After the increase to \$3.35 in 1981 the federal minimum wage was frozen until 1990. If the earlier research findings were correct, an increase in teenage employment relative to trend should be observed since the real and relative values of the minimum had declined. A glance at the path of the teenage employment-population ratio over the period (figure 1) reveals precisely this – an increase over the 1980s and subsequent decrease in the early 1990s when the federal minimum was increased by 28% to \$4.25 (in two steps). However, if the models estimated up to 1979 are used to predict employment over the 1980s, there is substantial and increasing over-estimation of teenage employment – this is the case with Solon's model as well. Furthermore, if the models are estimated over the period 1955-1990 the minimum wage effect is not statistically significant. The basis of the earlier consensus therefore appears fragile – although there may have been structural changes in the labour market that have altered the relationship between teenage employment and minimum wages.

The basic weakness of earlier models can in fact be traced to three specification issues. These were recognised implicitly in the work of BGK and Solon, but their solutions were not appropriate. The standard estimating equation used is a linearised, static version of the following:

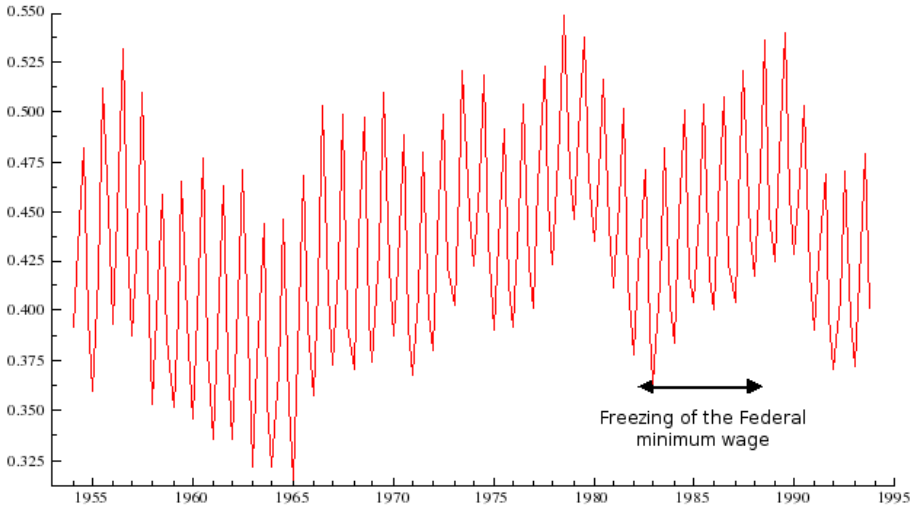
$$EP = g(MWK, X, UR, Time Trend, Time Trend Squared, Seasonal dummies) \quad (1)$$

where EP is the employment-population for 16 to 19 year olds, X a vector of supply side controls, UR is the unemployment rate among males aged 25 to 54 as a proxy for cyclical factors and MWK is the so-called Kaitz index which is defined as follows:

$$MWK = \frac{C \times MW}{AW}$$

where MW is the value of the federal minimum wage, AW is the average manufacturing wage and C is the coverage rate (at first the federal minimum did not apply to all workers and coverage was extended progressively until the early 1970s).

Figure 1 : *Teenage employment-population ratio.*



The first specification issue concerns the use of deterministic trend and seasonal terms. A quadratic trend may be a reasonable local representation of trend factors but can be too restrictive over a long sample period. Furthermore, if the trend is stochastic, then introducing a deterministic trend is not sufficient to de-trend the data. The same is true if seasonality is modelled using (deterministic) dummy variables. Seasonal variations can change over time as Harvey and Scott (1994) show, and a set of deterministic dummy variables can be an inadequate representation. If these factors are not modelled properly, they provoke residual autocorrelation and possibly other specification problems. Secondly, and linked to the former, nearly all early studies used a static estimating equation, but often found that the residual was serially correlated. This led to many using a generalised least squares approach that is a static estimating equation with a “correction” for serial correlation in the error term. However, serial correlation is generally the consequence of misspecifying the dynamics of the relationship between teenage employment and the right-hand side variables, and the use of a “correction” is rarely justified. A third issue relates to the Kaitz index which imposes the restriction that an equal proportional increase in the minimum wage and average wages will have no effect on employment.

Table 2 : *Estimated parameters values in an unobserved components model*

	1954:1 to 1979:4	1954:1 to 1989:4	1954:1 to 1993:4
Lagged dependent variable	0.514 (0.081)	0.543 (0.068)	0.592 (0.060)
Real minimum Wage in logs	-0.101 (0.051)	-0.010 (0.045)	-0.120 (0.040)
Real average Wage in logs	0.540 (0.243)	0.488 (0.180)	0.564 (0.166)
Implied long run minimum wage elasticity	-0.208	-0.217	-0.294
The dependent variable is the log of the employment-population ratio. All equations include stochastic trend, seasonality and cyclical components. Source: Bazen and Marimoutou (2002). Adapted from Table 2.			

In Bazen and Marimoutou (2002), the cycle (ψ_t) trend (μ_t) and seasonal (φ_t) terms are each modelled with a stochastic component and minimum and average wages are entered as separate variables. The restrictions that would give rise to deterministic trend and seasonal terms are found to be rejected by the data. The same is the case for entering the minimum wage and average wage as a ratio. Finally lagged variables were included in the model, though only the lagged dependent variable was significant. Table 2 presents the estimated coefficients of the following model:

$$E_t = \varphi_1 + \varphi_2 E_{t-1} + \varphi_3 M_t + \varphi_4 W_{t+1} + \psi_t + \gamma_1 + v_t \quad (2)$$

The estimated model (over the period 1954-79) that emerges satisfies the standard specification tests and very successfully predicts what happens to teenage employment over the period 1980-93. In addition, the effect of minimum wages is found to be negative and statistically significant – the estimated short run elasticity is -0.1 rising (in absolute terms) to -0.21 in the long run. Furthermore the short run elasticity remains stable when the estimation period is extended to 1993 (in contrast to Card and Krueger) and is always statistically significant. The long run elasticity increases to 0.29 in absolute value due to an increase in the coefficient on the lagged dependent variable. Thus although the earlier findings are found to hold over a longer data run, the reason CK and others found that the effect became insignificant was due to the rigid specification of the seasonal, trend and minimum wage terms and the lack of attention paid to dynamics in the earlier research. Finally, we tested the model out-of-sample and the impact of the increases in the federal minimum implemented in 1996 and 1997 on teenage employment are accurately predicted.

The time series evidence therefore tells a very different story from the three New Jersey studies. However it is important to bear in mind that the former concerns a

large number of federal rises while the New Jersey studies relate to a single rise implemented at state level. In this light, that two different conclusions are found does not necessarily mean the results are conflicting. Minimum wages can have different effects on employment in different contexts.

3. Panel Data Evidence on the Impact of State and Federal Minimum Wage Increases

Combining cross section and times series information by using panel data on states over time would appear to be particularly appropriate in the light of the different results obtained in the case study compared to the time series approaches. Furthermore the effects of both state and federal minimum wages can be assessed in a single empirical framework. David Neumark and William Wascher (1992) use annual data from the Current Population Survey for the period 1973 to 1989 and estimate an equation similar to (1) above, replacing time trends with time dummies, and introducing state fixed effects:

$$E_{st} = \theta_s + \theta_1 U_{st} + \theta_2 P_{st} + \theta_3 S_{st} + \theta mwk_{st} + \lambda_t + v_{st} \quad (3)$$

where v_{st} is the error term, s refers to the state and t to a month/year. E is the teenage employment–population ratio, U is the rate of unemployment among prime-age males, P is the proportion of the state population which is aged 16 to 19, S is the proportion of 16 to 19 year olds enrolled in school and mwk is the state level Kaitz index. The equation is estimated with state fixed effects θ_s and fixed time effects λ_t . They report a negative, significant effect of minimum wages on teenage employment so long as the school enrolment rate is included among the control variables. If it is excluded the effect of the minimum wage is positive and not significant. Card, Katz and Krueger (1994) and CK in their book (1995) question the exogeneity of the enrolment rate and its almost mechanical link to the dependent variable (the employment–population ratio). In line with their criticisms of the Kaitz index, they also show that the minimum wage and average wage variables should be entered separately.

Richard Burkhauser, Kenneth Couch and David Wittenberg (2000) used monthly as opposed to annual data from the CPS for 1979 to 1992 to estimate the impact of state and federal minimum wage increases on teenage employment. During the period when the federal minimum wage was frozen at \$3.35 (1981 to 1989) twelve mainland states raised their own minimum rates above \$3.35 and a number of these (mainly in the New England division) implemented several increases in

the 1980s – see table 3. Burkhauser *et al.* use the same specification as preferred by CK i.e. without the school enrolment rate and with the minimum and average wages entered separately:

$$E_{st} = \theta_s + \theta_1 U_{st} + \theta_2 P_{st} + \theta_3 w_{st} + \theta_4 m_{st} + \lambda_t + \nu_{st} \quad (4)$$

w is the logarithm of average usual earnings of adult workers and m is the logarithm of the prevailing minimum wage – the higher of the state or federal minima. Their estimates throw up an interesting finding that goes some way to explain why CK find no evidence of negative effects in their analysis of these data. When the equation is estimated with time dummies as CK do, the minimum wage elasticity estimate is -0.07 but not significant ($t = -1$), whereas when they are excluded it is larger in absolute value (-0.4) and highly significant ($t = -10$). Burkhauser *et al.* show that this difference is due to the almost perfect correlation between the time dummies for years when the federal minimum wage was raised and the minimum wage variable.

Although they do not mention it, these results suggest that the state level minimum wage increases implemented during this period had no significant effects on teenage employment. In order to explore the hypothesis that only federal minimum wage increases have a negative effect on teenage employment Julie Le Gallo and myself (2005) use annual panel data from the Current Population Survey. Between 1982 and 1989 the only minimum wage increases in the United States were implemented by a small minority of mainland states, and these occurred from 1985 onwards. The equation is estimated in first differences in order to eliminate the fixed effect for each state, and without time dummies:

$$\Delta E_{st} = \beta_1 \Delta U_{st} + \beta_2 \Delta P_{st} + \beta_3 \Delta w_{st} + \theta \Delta m_{st} + \Delta \varepsilon_{st} \quad (5)$$

When equation (3) is estimated over the period 1985-89 without the time dummies, the minimum wage coefficient is positive and statistically significant. However, the same model estimated over 1990-91 when the federal minimum was raised from \$3.35 to \$4.25 produces a negative, statistically significant coefficient. These two findings stand up to a number of specification checks (estimating the model recursively and using dummies to represent the minimum wage increases). In the period 1992-95 there were only six state minimum wage increases (including the New Jersey increase) and when estimated over this sub-period the model produces a small positive, though statistically insignificant, coefficient. For the 1996-97 increases in the federal minimum (from \$4.25 to \$5.05) we again find a negative coefficient but this time it is not statistically significant. These results, which are also implicit in the findings of Burkhauser *et al.*, suggest that in the period since 1982 only federal minimum wage increases have had a negative impact in teenage employment. State minimum wage increases by and large had no effect on employment.

Table 3 : *State-level minimum wage increases 1985-89*

State (year of increase)	Previous minimum rate	New minimum
Maine (1985)	3.35	3.45
Maine (1986)	3.45	3.55
Massachusetts (1986)	3.35	3.55
Rhode Island (1986)	3.35	3.55
Vermont (1986)	3.35	3.45
Connecticut (1987)	3.37	3.75
Maine (1987)	3.55	3.65
Massachusetts (1987)	3.55	3.65
New Hampshire (1987)	3.35	3.45
Rhode Island (1987)	3.55	3.65
Vermont (1987)	3.45	3.55
Vermont (1988)	3.55	3.65
Iowa (1988)	3.35	3.55
New Hampshire (1988)	3.45	3.55
Minnesota (1988)	3.35	3.55
California (1988)	3.35	4.25
Rhode Island (1988)	3.65	4.00
Connecticut (1988)	3.75	4.25
Massachusetts (1988)	3.65	3.75
Massachusetts (1989)	3.65	3.75
Pennsylvania (1989)	3.35	3.70
Minnesota (1989)	3.55	3.85
Oregon (1989)	3.35	4.25
Washington (1989)	3.35	3.85

Table 4 : Panel data estimates of the effects of state and federal minimum wages increases

	1984-9	1990-1	1984-91	1991-5	1996-7	1991-7
State minimum wage in logs	0.168 [0.141]	-	0.173(*) [0.074]	0.009 [0.267]	-	0.009 [0.179]
Federal minimum wage in logs	-	-0.173 (**) [0.069]	-0.223 (**) [0.074]	-	-0.109 [0.069]	-0.111 [0.091]
Unemployment rate	-0.0053 [0.0032]	-0.0095 [0.0062]	-0.0067 [0.074]	-0.0019 [0.0065]	-0.0012 [0.017]	-0.0019 [0.0025]
Teenage population ratio	-0.634 [0.648]	+0.183 [1.024]	-0.412 (**) [0.074]	0.345 [1.221]	0.174 [0.783]	0.276 [0.579]
Average adult earnings	0.085 [0.089]	-0.094 [0.186]	0.050 [0.074]	0.122 [0.145]	0.128 [0.188]	0.121 [0.070]
Uncentred R ²	0.115	0.339	0.212	0.077	0.071	0.075
Number of observations	240	96	336	192	96	288
Bootstrap standard errors in square brackets. (*) (**) significant at 5% (1%).						

Source : Bazen and Le Gallo (2005), Tables 2, 5, 6 and 7.

4. Assessment

The results of Card and Krueger's New Jersey study provide serious evidence that minimum wages can be increased without having deleterious effects on employment. This conclusion stands up to outside observation and re-analysis. What is less clear is that there are positive effects on employment as was initially claimed. Their New Jersey results do not however generalise to minimum wage increases at the federal level. Time series analyses examine the effects of federal minimum wage increases and when the econometric model is appropriately specified a significant negative effect is found⁴. In a panel data analysis, however, state minimum wage increases are found to have no negative effect on employment whereas federal increases do, at least in the period the 1984-97. This empirical conclusion provides an answer to the apparent puzzle that CK find no evidence of significant negative employment effects in a variety of contexts where individual states have increased their minimum wages, whereas the time series data (when properly modelled) suggest that minimum wages do have a negative impact on teenage employment.

Why then should federal minimum wage increases have a negative effect on teenage employment and state-level increases have none? An obvious candidate for the absence of an effect is that state-level increases are generally (but not always) limited in size, whereas the federal hikes are more substantial. In Table 3, between 1985 and 1989 half of the increases are less than twenty cents (an increase of less than 6%) and only four are greater than fifty cents (a rise of more than 10%).

4. A similar conclusion is reached by Williams and Smith, 2001, using a VAR approach.

Federal hikes tend to be in the range 10 to 15%. It is also possible that the minimum wage is not binding or is only weakly so in the states concerned. If the minimum wage has little or no effect on the wage structure it will not have a discernible effect on employment. Indeed, policy-makers may set the figure precisely in order to avoid any negative employment consequences⁵. It is true that compared to minimum wage levels in other countries such as France or the Netherlands, the United States minima are low relative to median earnings. However, a number of studies show that minimum wages do “bite” in that they have a statistically significant effect on both the earnings levels of affected groups and on their earnings relative to other higher paid groups (see Card and Krueger, 1995; Manning, 2003 and Neumark, Schweitzer and Wascher, 2004).

It is also important to bear in mind also that this evidence relates to increases in an existing minimum wage and not its introduction. That no employment effects are found for the relatively small increases implemented by individual states does not mean that minimum wages have not had an effect on employment. The increases implemented through the 1980s were simply maintaining the presence of a wage floor that been established at an earlier date and there may have been a once-and-for-all reduction in employment when the minimum wage was introduced. There may have been a sizeable employment effect for example when the state and federal minimum wage levels were increased by substantial amounts at in the period before 1982.

States that increase their minima during the 1980s tend to do so several times. Only twelve states used their own legislation between 1984 and 1989, and seven increased their minimum more than once (four of these did so three times or more). The majority of the increases were therefore relatively small and concentrated in a small number of states (in the New England division). Regular increases in the minimum wage ensure that it represents an ongoing binding constraint on employer behaviour. In the absence of such a constraint employers could substitute low wage labour for capital – an example of this would be in contract cleaning where there are clear technological choices available – or higher skilled labour. Teulings (2002) for example describes how a decrease in the minimum wage can increase the employment of minimum wage workers relative to those just above the minimum. In the case of states with no local minimum wage, the clear signal from the administration in the 1980s was that the federal minimum wage would not be uprated in the Reagan presidency. Employers in these states were therefore able to expand employment at low wages. The regularity of increases in the other states meant the minimum wage remained a binding constraint and so firms could not use the slack federal constraint to adopt a strategy based on employing more

5. There is evidence that this was the aim when the national minimum wage was introduced in the United Kingdom in 1999 (see Metcalf, 2002).

low-wage labour. They were therefore not affected in the same way by subsequent federal minimum wage hikes.

By 1990, states that had implemented increases, had minimum wages of between \$3.55 and \$4.25, and the increase in the federal minimum in 1990 from \$3.35 to \$3.85 had relatively little impact on employers in these states. In contrast low-wage employers in states without local legislation, during the period in which the federal minimum was frozen, may have adopted different approach to recruitment and retention. When this regime came to an end and an effective wage floor was reinstated, employers found their employment levels unprofitable. For example, there is a suggestion by that one of the reasons that there were no negative employment effects associated with the rise the New Jersey minimum wage in 1992 was that employment had already fallen substantially as a result of the federal hikes implemented in 1990 and 1991. The teenage employment-population ratio decreased from 0.47 in 1988 to 0.36 in 1991. Sporadic hikes in the federal minimum create abrupt regime changes in states without a binding local minimum wage and as a consequence have adverse effects on employment. A gradualist approach in which minimum wages are raised regularly by small amounts thereby maintaining a floor to wages may not give rise to a significant employment impact as firms operate within a stable regime.

5. Conclusions

The controversy surrounding the work of Card and Krueger represents an interesting episode in the history of empirical research in labour economics. Their work will have a lasting impact on how the question of the employment impact of minimum wages is treated both in teaching and research, and their quasi-experimental method has become a standard tool in empirical analysis. They found evidence that conflicted with one of the major tenets of the conventional view of how the labour market operates. This challenged the economics profession either to come up with an explanation for this evidence or find fault with their research. This paper has shown the extent to which their research was repudiated, replicated and re-assessed. There can be few examples in the history of labour economics where so much attention has been paid to a very specific issue, but in view the consequences for economists' beliefs and for labour market analysis it is perhaps not surprising. What emerges from the more serious attempts to assess the validity of their work is that their results apply only to state level minimum wage increases and not federal hikes. Their results are not therefore refuted – they cannot be generalised to the aggregate level.

Références

- Bazen, S. and J. Le Gallo. 2005. "The Answer to the US Minimum Wage Puzzle? Only Federal Minimum Wage Hikes Have a Negative Effect on Teenage Employment", Paper presented at the LoWER Annual Conference, ZEW Mannheim, Germany, April, issued as IREGE Discussion Paper N° 06-11, Université de Savoie.
- Bazen, S. and V. Marimoutou. 2002. "Looking for a Needle in a Haystack? A Re-examination of the Time Series Relationship between Teenage Employment and Minimum Wages in the United States", *Oxford Bulletin of Economics and Statistics*, Vol 64, 699-725.
- Benjamin, D. and L. Kochin. 1979. "Searching for an Explanation of Unemployment in Inter-War Britain", *Journal of Political Economy*, Vol 87, 441-478.
- Brown, C., C. Gilroy and A. Kohen. 1982. "The Effect of the Minimum Wage on Employment and Unemployment", *Journal of Economic Literature*, Vol 20, 487-528.
- Brown, C., C. Gilroy and A. Kohen. 1983. "Time Series Evidence on the Effect of the Minimum Wage on Teenage Employment and Unemployment", *Journal of Human Resources*, Winter, Vol 18, 3-31.
- Burkhauser, R., K. A. Couch and D. C. Wittenberg. 2000. "A Reassessment of the New Economics of the Minimum Wage Literature Using Monthly Data from the CPS", *Journal of Labor Economics*, October, Vol 18, 653-702.
- Card, D. 1992. Using Regional Variation in Wages to Measure the Effects of the Federal Minimum Wage, *Industrial and Labor Relations Review*, Vol 46, 22-37.
- Card, D. and A. Krueger. 1994. "Minimum Wages and Employment: a Case Study of the Fast-Food Industry in New Jersey and Pennsylvania", *American Economic Review*, Vol. 84, 772-793.
- Card, D. and A. Krueger. 1995. *Myth and Measurement: The New Economics of the Minimum Wage*, Princeton University Press, New Jersey, 1995.
- Card, D. and A. Krueger. 2000. "Minimum Wages and Employment: a Case Study of the Fast-Food Industry in New Jersey and Pennsylvania: Reply", *American Economic Review*, Vol. 90, 1397-1420.
- Deere, D., K. Murphy and F. Welch. 1995. "Employment and the 1990-1991 Minimum Wage Hike", *American Economic Review, Papers and Proceedings*, Vol 85, 232-237.
- Harvey, A. and A. Scott. 1994. "Seasonality in Dynamic Regression Models", *Economic Journal*, Vol 104, 1324-1345.

- Holzer, H., L. Katz and A. Krueger. 1991. "Job Queues and Wages", *Quarterly Journal of Economics*, Vol 106, 739-68.
- Katz, L. and A. Krueger. 1990. "The Effect of the New Minimum Wage Law in a Low-Wage Labor Market", *Industrial Relations Research Association Proceedings*, Vol 43, 254-65.
- Katz, L. and A. Krueger. 1992. "The Effect of the Minimum Wage on the Fast Food Industry", *Industrial and Labor Relations Review*, Vol 46, 6-21.
- Kennan, J. 1996. "The Elusive Effects of Minimum Wages", *Journal of Economic Literature*, Vol 33, 1949-1965.
- Manning, A. 2003. *Monopsony in Motion*, MIT Press, Cambridge MA.
- Metcalf, D. 2002. The National Minimum Wage: Coverage, Impact and Future, *Oxford Bulletin of Economics and Statistics*, Vol 64, 567-582.
- Metcalf, D., S. Nickell and N. Fioros. 1982. "Still Searching for an Explanation of Unemployment in Inter-War Britain", *Journal of Political Economy*, Vol 90, 386-399.
- Neumark, D., M. Schwarzer and W. Wascher. 2004. "Minimum Wage Effects Throughout the Wage Distribution", *Journal of Human Resources*, Vol 39, 425-453.
- Neumark, D. and W. Wascher. 1992. Employment Effects of Minimum Wages and Subminimum Wages: Panel Data on State Minimum Wage Laws, *Industrial and Labor Relations Review*, Vol 46, 55-81.
- Neumark, D. and W. Wascher. 2000. "Minimum Wages and Employment: a Case Study of the Fast-Food Industry in New Jersey and Pennsylvania: comment", *American Economic Review*, Vol 90, 1362-1396.
- Solon, G. 1985. "The Minimum Wage and Teenage Employment: the Role of Serial Correlation and Seasonality", *Journal of Human Resources*, Vol 20, 292-297.
- Teulings, C. 2003. "The Contribution of Minimum Wages to Increasing Wage Inequality", *Economic Journal*, Vol. 113, 801-833.
- Williams, N. and J. Mills. 2001. "The Minimum Wage and Teenage Employment: Evidence from Time Series", *Applied Economics*, Vol 33, 285-300.