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THE MINIMUM WAGE, TEENAGE UNEMPLOYMENT, AND THE BUSINESS CYCLE

MICHAEL C. LOVELL*
Wesleyan University

While many economists speak with conviction when discussing the minimum wage, there is little consensus within the profession concerning its effects. Section I of this paper discusses some of the issues in the controversy. Unfortunately, two recent empirical studies, reviewed in Section II, have reached diametrically opposed conclusions concerning the teenage unemployment effects of the minimum wage. Although preliminary regressions reported in Section III suggest that both the minimum wage and the business cycle have a substantial impact on teenage unemployment, it is shown in Section IV that the minimum wage effect washes out when the changing composition of the work force is taken into account. The implications of the analysis are summarized in the concluding Section.

I. THE CONTROVERSY

A poll of university economists conducted in 1967 by Chase Manhattan Bank found 61% opposed to raising the minimum wage.[1] Of those opposed to the increase, just slightly more than half, 54%, objected as a matter of principle. While 19% objected that the proposed boost was too large, 1% were opposed because the increase was too small! And 26% objected because the timing was inappropriate. Conceivably, an increase of appropriate magnitude at the right time might receive support from the majority of our profession.

Most elementary economic textbooks discuss the minimum wage, but what the student is told depends on which textbook his instructor happens to adopt. The following statements on the employment effects of the minimum wage are culled from three popular texts:

> Unemployment must result if minimum wage legislation is to be effective —if it raises wages above the competitive level [10, p. 271].

> Before the enactment of minimum-wage legislation there have usually been dire predictions of ruin by employers in low-wage industries, prophecies of closed plants and mass unemployment. These predictions seem never to be realized . . . [14, p. 527].

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1. Of 500 faculty members in the sample, 320 returned completed questionnaires [19].

> Before 1956 the unemployment rate among both white and Negro boys was around 8 to 11 percent. After the minimum wage rose from 75 cents to $1 an hour, unemployment among white boys went up to 14 percent and for Negroes to 24 percent and stayed at this level year after year [5, p. 599].

Another textbook suggests that the employment effects of the minimum wage may not be deleterious:

> This decline of employment in the formerly low-wage firms is a positive effect of wage regulation [for] it is not desirable that some employers be allowed to pay less than competitive wage rates and so be encouraged to absorb additional labor [13, p. 498].

Readers of another text are asked to consider the payroll effect of the minimum wage:

> Lowering the minimum wage will move us down along *dd*, as shown by gold arrows, increasing employment. (If *dd* is elastic, total wage payrolls rise though the hourly rate falls!) [16, p. 373].

However, no estimate of the elasticity of demand is presented. A few texts discuss productivity and exploitation:

> Higher wages need not come out of profit, but may come partly from a forced-draft increase in productivity . . . [13, pp. 318-19].

> . . . if employers were "exploiting" labor before the law by paying wages below labor's marginal productivity, the minimum-wage law may simply boost wages without reducing employment [2, p. 508].

Many textbook authors focus on the competitive case and fail to mention, even in a footnote, the contrary implications of monopsony. Although most readers are given the impression that the minimum wage issue is a settled matter free of professional debate, one textbook does provide its readers with a hint at empirical controversy:

> Independent empirical studies of the effects of minimum wage increases on employment tend to show that unemployment does result when wages are forced up, as might be expected in competitive markets. The most comprehensive studies, however, are those made by the U.S. Department of Labor, which administers the minimum wage law, and these studies have been criticized for their methods of analysis [17, p. 131].

The diversity of arguments offered by textbook authors stems in part from the fact that this is a relatively neglected area of research. The debate between Joan Robinson and Edward Chamberlin concerning the theoretical question of whether factors of production are "exploited" when they are not paid the value of their marginal product has suffered

from benign neglect for many years.[2] The few available empirical studies of the impact of the minimum wage on unemployment do not display a consistent picture of the effects of wage legislation. A number of investigators have simply looked at how the unemployment rate has changed in the months immediately following legislative adjustments in the minimum wage. Such an approach is fraught with danger: other influences can alter the outcome, the effect is sensitive to the choice of the time period used in making the comparison [4], and the response of unemployment may involve a considerable lag. When attention has been focused on individual states, more observations are available; however, there is still a problem in drawing inferences about the nationwide unemployment effect on the basis of regional evidence. An increase in the minimum wage in one state could shift employment to teenagers in other regions where the minimum wage has not gone up; thus, the elasticity of demand for teenage workers could be negligible at the national level even if it were shown to be quite strong at the state level.

II. TWO RECENT EMPIRICAL STUDIES

Two recent econometric studies have done much to redress the neglect of empirical research concerning the economic effects of the minimum wage. At the Bureau of Labor Statistics an attempt was made in *Youth Unemployment and Minimum Wages*:

> . . . to develop relevant quantitative relationships between teenage unemployment and minimum wage rates in order to discern whether and by how much the latter affect the former [20, pp. 32-33].

And in the *Journal of Political Economy* Thomas G. Moore considered as his basic hypothesis:

> Theory would suggest that when the minimum wage is raised, the impact would be felt most strongly by the unskilled, the inexperienced, and those facing discrimination. Thus teenagers, especially nonwhite teenagers, would be expected to suffer most from a rising minimum wage [9, p. 898].

Although executed independently, the two studies resemble each other more than they resemble earlier attempts to pinpoint the effects of the minimum wage.[3] Not only do both studies focus on teenage unemploy-

2. In her *Theory of Imperfect Competition* Joan Robinson [14] showed that with product differentiation workers are paid less than their marginal product, which constitutes "exploitation" as defined by such classical writers as Pigou. Edward Chamberlin [3] argued that this definition of exploitation is inappropriate, for under monopolistic competition capitalists as well as workers are paid less than their marginal product.

3. Because of a longer publication lag, Moore's article was published in the year following that in which the BLS study appeared; a preliminary draft of Moore's paper is mentioned in the BLS study. The empirical literature on the minimum wage is reviewed in the BLS study [20, pp. 30-32] and in Peterson and Stewart [12, pp. 157-65].

ment; both employ standard least-squares single-equation regression analysis on time series data covering the years 1954 through 1968.

Unfortunately, these studies have not served to resolve the controversy. Indeed, they reach diametrically opposed conclusions. Moore concludes that the unemployment effects of the minimum wage are substantial, predicting that an increase in the minimum wage to $2.00 would ultimately cause the teenage unemployment rate to double; making coverage universal would add an additional 9.7% to the teenage unemployment rate. But the Bureau of Labor Statistics' study concludes:

> . . . the most important factor explaining changes in teenage employment and unemployment has been general business conditions as measured by the adult unemployment rate . . . . When all variables that have a legitimate claim to consideration are included [in the regression], the measures of minimum wage not infrequently have the wrong sign and/or are not statistically significant at conventional levels. . ." [20, p. 45].

Why do two studies employing quite similar methodologies reach such different conclusions? Certain factors differentiating the two studies could conceivably give rise to quite different results:

(1) *The Data Base:* Although both studies were based on seasonally adjusted data from 1954 through 1968, Moore used monthly data while the BLS study relied on quarterly observations.[4] While this might contribute to a discrepancy, the BLS reported that their results were not seriously affected when their regressions were rerun on annual data. A second difference in the data base could conceivably be critical. Moore's data were divided into five partially overlapping categories: nonwhites 16-19, whites 16-19, males 16-19, females 16-19, and males 20-24. The BLS study involved eight non-overlapping categories; their data were partitioned by both sex and race; and in each of these four categories, 16 and 17 year-olds were separated from those 18 and 19. If the homogeneity assumption implicit in Moore's use of overlapping categories is valid, it would be legitimate to pool the BLS data in order to have more degrees of freedom.

(2) *Measuring Unemployment:* The dependent variable used by Moore was the familiar unemployment rate, the number unemployed divided by the labor force. The unemployment ratio, the unemployment level divided by the relevant non-institutional population, was used by the BLS. This approach avoids the labor-force concept, which may be particularly tenu-

4. While there is a tendency for seasonal adjustment to cause a loss of degrees of freedom and to generate exaggerated claims of significance, both studies are susceptible to this problem; and in any case, this factor is of marginal importance, given the number of observations available [7].

ous for younger workers; it circumvents the discouraged worker effect.[5]

(3) *Measuring the Minimum Wage:* Both studies distinguished between statutory changes in the minimum wage and fluctuations in its purchasing power; specifically, the statutory dollar minimum was divided by average hourly earnings in manufacturing. This procedure replaces flat steplike movements of nominal minimum wages with a ratchet effect resulting from the gradual tendency of inflation to offset the statutory increases. But quite different procedures were used in taking extensions of coverage into account. Moore introduced a separate coverage variable into his model. In contrast, the BLS study used a single variable, consolidating the effects of changes in the minimum wage and extensions of coverage. The BLS first computed the ratio of the minimum wage to average hourly earnings in each industry; then they consolidated the industry ratios into an overall average, where each industry's contribution to the average was weighted in proportion to its contribution to total teenage employment. While the Moore approach is more flexible in that it does not presume that proportional increases in the minimum wage and coverage have equivalent effects, it is a gross measure unweighted by industry composition.

(4) *Speed of Adjustment:* Moore allowed for a delayed response to changes in the minimum wage while the BLS study involved the assumption that adjustment takes place within the observation period. Since Moore estimated that even after twelve months the adjustment process is less than fifty percent completed, it certainly is conceivable that the BLS assumption of prompt adjustment concealed the influence of the minimum wage. Unfortunately, Moore's results may be subject to distortion because he only allowed the lag to influence the adjustment to the dollar change in the statutory minimum; he implicitly assumed that the adjustment to changes in coverage and to changes in average hourly earnings was instantaneous.[6]

III. REPLICATION

Evidence presented in Table 1 suggests that none of these distinguishing features serves to explain the different conclusions reached in the two studies. The simple model is of the form

5. How the use of the unemployment rate affects Moore's results depends in part upon how the labor force responds to changes in the minimum wage. The unemployment rate will change by less than the change in the ratio used by the BLS if the labor force participation rate declines; and this could happen if the discouraged worker effect of any decline in job opportunities generated by the increase in the minimum wage swamps a tendency of the higher wage to attract more teenagers into the work force. See Hashimoto and Mincer [8] concerning the supply effects of the minimum wage.

6. This point has also been noted by Adie [1]. The primitive methodology of several earlier studies looking at the direction of change in unemployment rates immediately after increases in the minimum wage is subject to serious question if adjustment lags are as long as Moore suggests.

Table 1 — Cyclical and Minimum Wage Effects on Unemployment

Unemployment Rate		β_0	β_1	β_2	$\bar{R}^2$	d
Nonwhite		7.76	.530**	−.13	.83	.52
		(.51)	(.038)	(1.72)		
White		3.60	.271**	−.06	.84	.51
		(.25)	(.019)	(.85)		
All		3.97	.304**	.17	.85	.47
		(.27)	(.020)	(.92)		
Unemployment Ratio						
M-W	16-17	5.37	.154**	2.59*	.27	1.40
		(.44)	(.033)	(1.48)		
M-NW	16-17	3.97	.402**	17.65**	.24	1.26
		(1.33)	(.099)	(4.51)		
M-W	18-19	7.49	.468**	−3.28*	.82	1.18
		(.51)	(.038)	(1.74)		
M-NW	18-19	8.84	.898**	11.69*	.43	.95
		(1.87)	(.139)	(6.32)		
F-W	16-17	2.39	.114**	6.14**	.18	1.76
		(.49)	(.036)	(1.66)		
F-NW	16-17	1.68	.093*	17.32**	.31	1.34
		(1.04)	(.077)	(3.51)		
F-W	18-19	2.77	.195**	9.23**	.28	0.84
		(.60)	(.045)	(2.03)		
F-NW	18-19	4.86	.287**	23.94**	.30	1.37
		(1.36)	(.101)	(4.61)		

Note: * indicates the regression coefficient is larger than its estimated standard error.
** indicates the regression coefficient is at least twice its estimated standard error.

$$U_t = \beta_0 + \beta_1 GAP_t + \beta_2 MWAGE_t + \epsilon_t \tag{1}$$

where U is an unemployment measure, $MWAGE$ is the minimum wage measure employed by the BLS, and the intensity of the business cycle is measured by GAP, the percentage gap between potential and actual GNP as reported in the *Economic Report of the President*.[7]

The first three regressions use the unemployment rate as the dependent variable. These three regressions are in conformity with Okun's Law concerning the tendency of fluctuations in GNP about its potential level to be much greater than the movements of unemployment; as expected, the business cycle affects nonwhite unemployment with a vengeance.

7. Arthur Okun kindly provided an updated time series on potential GNP. See Okun [11] for a discussion of the *GAP* concept. The *GAP* is preferred to the adult unemployment rate as an estimate of the overall slack in the economy. Although the latter concept was used in both the Moore and the BLS studies, any tendency for an increase in the minimum wage to lead to a substitution of adult for minority group workers distorts the adult unemployment rate as a measure of cyclical movements.

Although the minimum wage effect on the aggregates is negligible, the teenage regressions on the bottom half of the table suggest that both the minimum wage and the business cycle have a substantial effect on the unemployment ratio of the young, nonwhites, and females.[8] The evidence in Table 1 is consistent with the proposition that the minimum wage shifts employment opportunities away from unskilled younger workers.

The teenage regressions follow the BLS rather than Moore's procedure with regard to the four distinguishing features enumerated in the preceding section: the adjustment process is assumed to be completed within the three-month period, the unemployment ratio serves as the dependent variable, and no adjustment is made for autocorrelated error terms. Yet the results are consistent with Moore's study rather than with the evidence presented by the BLS. For only one category, older teenage white males, is an increase in the minimum wage associated with a fall in unemployment, and it is conceivable that this group benefits when younger and/or minority group workers can no longer be hired at a discount, once the minimum wage is raised.

Table 1 suggests that *both* the minimum wage and the business cycle have substantial effects on most categories of minority teenage employment. Over the 1954-68 sample period the minimum wage variable ranged from .170 to .408. For nonwhite males in the 16-17 age cohort, this involved a swing of 4.2% in the unemployment ratio. In the same period the GAP fluctuated over a range of 11.2%, generating a 4.5% swing in the unemployment ratio for 16-17 year-old nonwhite males. For female nonwhites in the 18-19 age category the minimum wage was more important, causing a swing of 5.7% in the unemployment ratio; in contrast the fluctuation in the GAP led to a movement of 3.2%. For male nonwhites ages 18 and 19, however, the cyclical movements in the gap caused a swing of 10% in the unemployment ratio compared with the 2.8% movement resulting from the movements in the minimum wage. Of course, these estimates are sensitive to sampling and specification error.

The low values of the Durbin-Watson statistics reported in Table 1 are suggestive of autocorrelated error terms; alternatively, they may arise because of misspecification involved in assuming immediate adjustment. Table 2 indicates that the use of an autoregressive transformation to correct for low Durbin-Watson statistics does not substantially weaken

8. For F/NW/16-17 the estimated β_2 is small relative to both F/NW/18-19 and M/NW/16-17. Also, F/W/18-19 has a larger β_2 than F/W/16-17. But all the other pairwise comparisons indicate that the unemployment effects of age, sex and race are cumulative. The regression coefficient standard errors and $\bar{R}^2$ have been calculated with 57 degrees of freedom, no adjustment having been made for the loss occasioned by seasonal adjustment; however, adjustment for seasonal in accordance with the suggestions of Lovell [7] would not materially change the results.

Table 2—Autoregressive Transformation

		$(1-\rho)\beta_0$	β_1	β_2	$\bar{R}^2$	d
Unemployment Rate						
Nonwhite		8.42	.505**	-2.43	.61	1.70
		(.86)	(.059)	(2.90)		
White		3.89	.268**	-1.27	.64	1.49
		(.43)	(.029)	(1.44)		
All		4.41	.294**	-1.53	.65	1.42
		(.46)	(.031)	(1.54)		
Unemployment Ratio						
M-W	16-17	5.30	.151**	2.76*	.17	1.89
		(.56)	(.041)	(1.87)		
M-NW	16-17	3.91	.395**	17.74**	.14	1.60
		(1.83)	(.134)	(6.16)		
M-W	18-19	7.46	.468**	3.27*	.69	2.07
		(.73)	(.053)	(2.45)		
M-NW	18-19	10.07	.896**	7.59	.26	1.90
		(2.82)	(.204)	(9.53)		
F-W	16-17	2.31	.115**	6.37**	.17	1.97
		(.54)	(.040)	(1.82)		
F-NW	16-17	1.93	.094	16.34**	.17	1.93
		(1.39)	(.102)	(4.69)		
F-W	18-19	3.85	.151**	5.35*	.05	2.02
		(.95)	(.068)	(3.22)		
F-NW	18-19	5.88	.232**	20.52**	.14	2.03
		(1.80)	(.132)	(6.08)		

Note: Autocorrelation parameter ρ estimated from the residuals of regression 1.

the apparent case in support of the minimum wage effect on teenage unemployment.[9] Table 3 allows for the Koyck distributed lag adjustment; specifically, it is assumed that unemployment adjusts a fraction of the way toward the equilibrium level

$$U_t - U_{t-1} = \delta(U_t^e - U_{t-1}) + \epsilon_t \tag{2}$$

where the equilibrium level in turn is now taken as the level specified in equation (1). Again, the minimum wage variable appears to be significant in most of these regressions. And the estimated δ's suggest a considerable delay in adjustment to changes in the minimum wage.

IV. DEMOGRAPHIC AND OTHER COMPLICATIONS

Why do the regressions reported in these tables differ in their policy implications from those presented in the BLS study? An essential differ-

9. While Moore used an autoregressive transformation to adjust for autocorrelation, the BLS made no attempt to correct for this problem, arguing that the serial correlation arose from the 4-8-4 (4 months in, 8 months out, 4 months in) sampling pattern used in the *Current Population Survey* [20, p. 47].

Table 3 – Delayed Adjustment Behavior

		$\delta\beta_0$	$\delta\beta_1$	$1-\delta$	$\delta\beta_2$	$\bar{R}^2$	d	δ	β_0	β_1	β_2
Unemployment Rate											
Nonwhite		3.38	.293**	.534**	.21	.93	1.54	.466	7.25	.63	.45
		(.57)	(.035)	(.057)	(1.09)						
White		1.57	.156**	.515**	.27	.93	1.06	.485	3.24	.32	.56
		(.28)	(.018)	(.057)	(.55)						
All		1.71	.172**	.524**	.38	.94	1.00	.476	3.59	.36	.80
		(.28)	(.018)	(.053)	(.57)						
Unemployment Ratio											
M-W	16-17	3.65	.118**	.292**	2.25*	.35	1.96	.708	5.15	.17	3.18
		(.76)	(.034)	(.117)	(1.41)						
M-NW	16-17	2.37	.276*	.344**	12.26**	.33	1.56	.656	3.62	.42	8.68
		(1.35)	(.105)	(.125)	(4.82)						
M-W	18-19	4.71	.335**	.337**	−1.58	.85	1.99	.663	7.10	.51	2.38
		(.86)	(.050)	(.091)	(1.61)						
M-NW	18-19	5.08	.549**	.431**	6.31*	.58	1.81	.569	8.92	.96	11.09
		(1.91)	(.143)	(.104)	(5.47)						
F-W	16-17	2.04	.105**	.105	5.78**	.20	1.97	.895	2.28	.12	6.46
		(.58)	(.039)	(.133)	(1.87)						
F-NW	16-17	1.08	0.71	.342**	1.47**	.37	1.97	.658	1.64	.11	17.43
		(1.03)	(11.47)	(.128)	(4.00)						
F-W	18-19	.93	.102**	.609**	3.91**	.57	2.24	.391	2.37	.26	10.01
		(.56)	(.038)	(.100)	(1.83)						
F-NW	18-19	3.39	.181	.359**	14.35**	.36	2.15	.641	5.29	.28	22.38
		(1.43)	(.104)	(.132)	(5.59)						

ence is that the BLS regressions included eight additional explanatory variables. Four dummies, one for each year from 1965 through 1968, were introduced to capture the effect of federal manpower programs and changes in the Current Population Survey questionnaire. The BLS regressions also included the proportion of the relevant population category enrolled in school, the proportion in the armed forces, and the proportion employed in agriculture. To capture the effects of the substantial shift in the supply of teenage workers resulting from the changing age composition of the population, the ratio of the particular sex/race/age population to the over-20 population of the same sex was also included. Since there are 58 quantity observations available for the study, the loss of eight additional degrees of freedom need not be critical, but if the eight added variables are collinear with the minimum wage, the magnitude of that variable's t coefficient can change substantially. Of course, where it can be agreed that a prima-facie case exists for a variable's playing a causal role, it must be included; but the BLS argument appears stronger for some of the variables than for others. The problem is compounded in a single-equation model when the line of causation is not clear-cut. For example,

an increase in unemployment, conceivably induced by a rise in the minimum wage, may lead to an increase in school enrollments and higher armed forces enlistments.[10] And the annual dummies may in part be capturing the effects of statutory adjustments in the minimum wage that took place in 1965, 1967 and 1968.

Has the true effect of the minimum wage been diluted in the BLS study by the introduction of superfluous variables, or has Moore been deceived into thinking he had uncovered a statistical minimum wage effect that might better be attributed to the role of other variables that were inappropriately left out of his analysis? This is the nub of the controversy concerning the new evidence on the role of the minimum wage. But it turns out that one of the eight additional variables used by the BLS suffices to account for the difference in results; and it is one that Moore himself discusses in his paper:

> As is well known, unemployment rates of teenagers relative to those of adults have risen in the postwar period. It is sometimes argued that this has resulted from a rise in the relative supply of teenagers in the labor force. Therefore, the model developed tests this hypothesis [9, p. 898].

While Moore agrees with the BLS that this demographic effect should be taken into account, he includes a relative labor force variable in only the nonwhite 16-19 regressions; there it serves to make the variable reflecting the extent of coverage of the minimum wage insignificant, although the ratio of the minimum wage to average hourly earnings remains significant at the 0.01 level.

Table 4 incorporates the BLS demographic variable reflecting the rapid expansion in the supply of teenagers:

$$U_t = \beta_0 + \beta_1 GAP_t + \beta_2 MWAGE_t + \beta_3 RS_t + \epsilon_t \tag{3}$$

The new variable, denoted *RS*, measures the relative importance of younger workers; it is the ratio of the population of the indicated age/sex/race category to the over-20 population of the same sex. This ratio has increased by roughly 50% over the sample period in each category. Inspection of the regressions reveals that this relative supply variable has a sizable *t*-coefficient in six of the eight regressions; it has the anticipated sign in seven of eight regressions. Although the cyclical effect of general economic slack, as measured by the GNP *GAP*, is quite robust with respect to the inclusion of the relative supply variable, this cannot be said for the minimum wage. Once the *RS* variable is added, the minimum wage coefficient is of the wrong sign as often as not. The minimum wage variable appears with a *t*-coefficient that is large relative to its standard error only

10. Precisely this issue is discussed in Appendix B, p. 54, of the BLS report.

Table 4 – Cyclical, Minimum Wages, and Relative Labor Force Effects

		β_0	β_1	β_2	β_3	$\bar{R}^2$	d
M-W	16-17	4.01 (.69)	.151 (.032)	–.81 (2.89)	.45 (.18)	.33	1.51
M-NW	16-17	–3.05 (2.08)	.511 (.092)	–3.35 (6.61)	17.02 (4.09)	.41	1.63
M-W	18-19	7.86 (.79)	.463 (.040)	–2.44 (2.44)	–.14 (.24)	.80	1.10
M-NW	18-19	1.69 (3.20)	.968 (.137)	–6.45 (9.72)	19.75 (7.44)	.48	1.06
F-W	16-17	.06 (.79)	.108 (.033)	.61 (2.12)	.66 (.23)	.33	2.03
F-NW	16-17	–4.68 (1.74)	.171 (.071)	1.53 (5.12)	15.72 (3.70)	.46	1.70
F-W	18-19	–1.41 (1.05)	.233 (.040)	.40 (2.89)	1.53 (.33)	.47	1.01
F-NW	18-19	1.72 (3.23)	.308 (.104)	20.48 (8.23)	6.81 (7.55)	.32	1.44

in the female/nonwhite/18-19 regression.

Inclusion of the demographic factor dilutes the minimum wage effect because the two time series are highly collinear, the correlation between the *MW* and *RS* ranging from .75 to 90 depending on which sex/race/age category one considers. It is unfortunate that "nature" has not conducted a more appropriate experiment. As it stands, the evidence in Table 4 suggests that variations in the gap between potential and actual output constitute a major source of movement in all categories of teenage unemployment, that the profound increase in the relative supply of teenagers has had a sizable impact on unemployment in all categories except M/W/18-19, and that the effect of changes in the minimum wage has been limited to the F/NW/18-19 category.

A variety of "experiments" with alternative specifications was run in an unsuccessful attempt to uncover support for the minimum wage hypothesis. The inclusion of lagged unemployment in order to allow for delayed adjustment only served to dilute further the influence of the minimum wage variable.[11] Furthermore, an attempt was made to double the effective number of observations by pooling the data into only four categories distinguished by race and sex but not by age; as Table 5 indicates, the minimum wage variable is insignificant, even with 110 degrees

11. For F/NW/18-19 the *t*-ratio for the minimum wage falls to 1.5 when the data are subjected to the autoregressive transformation; introduction of lagged unemployment reduced the *t*-coefficient below 0.5.

Table 5—Pooled Regressions

	$\delta\beta_0$	$\delta\beta_1$	$\delta\beta_2$	Age Dummy	$1-\delta$	$\delta\beta_3$	$\bar{R}^2$	d	F
M-NW	4.64	.337	8.41	-2.75	.472		.52	1.72	3.0524
	(1.28)	(.086)	(3.61)	(.56)	(.078)				
M-W	2.80	.150	.61	-.70	.575		.71	1.99	12.7415
	(.62)	(.031)	(1.19)	(.18)	(.067)				
F-NW	4.07	.110	12.24	-3.44	.365		.59	2.06	.2817
	(.99)	(.060)	(3.21)	(.58)	(.089)				
F-W	1.76	.099	4.58	-.80	.435		.64	2.20	3.5653
	(.45)	(.028)	(1.35)	(.18)	(.082)				
M-NW	1.54	.464	-4.29	-4.92	.345	13.25	.51	1.66	2.7767
	(1.51)	(.089)	(5.02)	(.82)	(.082)	(3.76)			
M-W	2.75	.147	.46	-.73	.574	.03	.68	1.99	11.2008
	(.69)	(.031)	(1.58)	(.24)	(.068)	(.15)			
F-NW	..75	.168	3.61	-4.41	.278	10.62	.55	2.00	.8127
	(1.44)	(.060)	(4.09)	(.64)	(.090)	(3.39)			
F-W	.16	.125	1.40	-1.24	.266	.80	.61	2.06	4.4368
	(.60)	(.027)	(1.51)	(.20)	(.087)	(.20)			

Note: The F statistics in the top half of the table have 3/110 degrees of freedom; the bottom four regressions have 4/110 degrees of freedom.

of freedom, when the demographic growth variable is included.[12] In addition, a large number of regressions was run with employment rather than unemployment as the dependent variable, but the results were not encouraging. Although the conclusion that cyclical movements are a major source of fluctuations in unemployment held up under a wide variety of "experiments" with alternative specifications, the strongest minimum wage effect is that already reported in Table 1.

V. SUMMARY AND CONCLUSIONS

To sum up, the proposition that the minimum wage materially affects the level of unemployment receives support provided one is willing to assert as part of the *maintained* hypothesis that the substantial increase in the teenage population relative to the rest of the labor force has not materially influenced the teenage unemployment problem; but this is a dubious proposition. An optimist can hope that as additional observations accumulate it may eventually be possible with more sophisticated simultaneous equation estimation techniques to segregate adequately the effects

12. I initiated this study prior to the appearance of Moore's article in an attempt to see whether pooling the data would provide enough degrees of freedom to reverse the BLS results. Data pooling invokes the homogeneity postulate that all parameters are the same, with the possible exception of the intercept. The F statistics reported in Table 5 indicate that age apparently makes a difference with white males. Because Moore's data are based on four overlapping categories, the homogeneity postulate is implicit in his analysis.

of such factors. Pending the results of further study, it seems more reasonable to accept, tentatively and reluctantly, the null hypothesis that the minimum wage has no impact on teenage unemployment.

While no one factor may suffice to explain why the minimum wage has a negligible impact on unemployment, the combined effect of a number of factors may account for it. Under certain conditions the imposition of a minimum wage will lead a profit-maximizing monopsonist to increase employment, although Stigler [17] is not alone in emphasizing that this case is more likely the exception than the rule.

What evidence there is on the question of enforcement indicates that in agricultural regions in particular the law is often deliberately violated or evaded through convenient loopholes [6]. Perhaps hippie aversion and the draft, as well as the relative number of teenagers, may have been quite highly correlated with the upward movements in the minimum wage over the 1954-68 sample period. Employers have not fully utilized opportunities under the Fair Labor Standards Act to employ learners and full-time students at 85% of the minimum wage; a survey conducted for the BLS in 1969 revealed that employers who had troubled to apply for exemption certificates utilized less than half of the authorized number of man-hours [20, Chap. 8]. The BLS reports [20, Chap. 4] that another survey concerning reasons for not hiring teenagers indicated that employers found the following factors, rather than the minimum wage, of primary importance: lack of experience, training and education; teenagers considered unreliable and immature; legal restrictions on hazardous work and hours of employment; uncertainty over the draft; high labor turnover. Such factors may explain why, in spite of a low money wage, teenagers may be regarded as requiring an efficiency wage that is prohibitively high relative to the terms on which older workers can be hired.

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