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PARTIAL RETIREMENT AND WAGE PROFILES OF OLDER WORKERS

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Abstract

Older workers are likely to face different wage offers for work while not retired than for work while partially retired. Conventional analyses of wage profiles pool all wage observations without distinguishing among individuals according to retirement status.

Our empirical analysis suggests the following conclusions. 1) Wages for work while not retired and for work while partially retired are significantly different from one another. 2) Wage offers facing older workers may vary considerably between those who do and do not face lower limit constraints requiring full-time work or none at all on their main job. 3) Failing to distinguish between wages paid to the partially retired and to the not retired causes a sizable exaggeration of the decline with experience in the wage offer for work while not retired.

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This paper will raise and attempt to answer a number of questions concerning the relation of wage rates for older males to their job tenure and labor market experience. From past research it is known that at higher levels of experience the earnings profile turns down, with much of the explanation for the downturn due to a decline in work time. Somewhat less is known about wage rate profiles, expecially about wage rate profiles for older workers. Recently, researchers have focused on this subject, studying wages for older workers directly (Carliner, 1982) or as a by-product of a study of retirement behavior (Gordon and Blinder, 1980).

There is a potential problem with what we will call the "conventional approach" to computing wage profiles for older workers. These workers face at least two simultaneous alternatives. They may work at relatively high wages while not retired, or they may partially retire,[1] frequently receiving a lower wage.[2] According to the conventional approach, wage profiles are computed using the wage for whatever job the individual currently holds. These wages are then related statistically to tenure on that job and to overall experience. As a result, the conventional approach mixes together wage data for continued work while not retired with data for work while partially retired, using weights that are determined by the frequency with which these simultaneously available alternatives are chosen. While the conventional approach may be adequate for describing the wage path currently traveled by older workers, it is not adequate for describing the opportunity set they face.

In section I of the paper, separate wage profiles are estimated for older workers who are not retired and for those who are partially retired. Tests are performed to determine whether these equations are significantly different from one another. These tests indicate that there are significant differences in intercept and slope, and therefore that it is improper to use a single profile calculated from pooled wage data as in the conventional approach. Section II discusses the implications of these findings for the wage offers facing older workers - contrasting predictions based on the conventionally calculated wage-tenure profile with those from an opportunity set consisting of two separate, simultaneouly available wage profiles. It is shown that in some circumstances the conventional approach provides wage predictions that are quite misleading. Section III of the paper demonstrates that the wage-experience profile, as computed in the conventional approach from pooled date for the partially and non-retired, exagerates substantially the downturn in the wage offer for continued work in the job held while not retired. A major reason is that the probability of partial retirement is much higher for those with the highest levels of experience. Therefore, the weight given to the low wage rates of individuals who are partially retired rises with experience. In that section, selectivity bias in the experience profile is also discussed. Findings are summarized in the final section and conclusions are presented.

I. Wage Equation Estimates

The wage equations we estimate are all of the form:[3]

$$(1) \quad \ell n\ W = a + bTen + cTen^2 + dExp + eExp^2 + fX + \varepsilon$$

where W = The hourly wage rate (deflated to 1967 dollars by an index of usual hourly earnings)

Ten = Years of tenure

Exp = Years of experience (age - years of educ. - 6)

X = A set of control variables

ε = A random error term

The equations are estimated using data from the 1969, 1971, 1973 and 1975 waves of the Retirement History Survey. Only white males who are not self employed and for whom required data were available in at least one survey year are included in the sample.[4] Individuals in the sample were 58 to 63 years old in the initial survey year.

For any individual, only the last wage observed while working for a particular employer is included. Thus if an individual reported in an early year of the survey that he was not retired and working full time, and in a later year that he retired partially on another job, two observations are included. But if he reported that he worked for the same employer for all four years, only one (the last) wage rate observation is included.[5]

There is some loss in efficiency from using only one wage observation for each job. In view of the large sample size avialable to us, this loss should not be too great. Moreover, the correlation between year to year wage observations within the same job is high. For those who are not retired and are working for the same employer, the correlation is .69. It is .56 for those who are partially retired in more than one year and are working for the same employer.[6] In addition, the longitudinal feature of the data is not required to isolate vintage effects, which we do estimate and are discussed below. Accordingly, given the costs of adjusting for serial correlation in the face of a truncated sample with a larger number of observations, and the limited benefits to be expected from such an adjustment over the procedure we do follow, we chose the alternative procedure of using only the last observation from each job. Note also that although it would be easier to implement than the procedure we follow, pooling all possible wage observations while ignoring serial correlation would be an inappropriate procedure. Our major interest is in testing for differences in parameter estimates among wage equations estimated for those falling in alternative retirement categories. The biases in estimated standard errors created by serial correlation would seriously undermine the validity of such tests; while the problems created by the procedure we follow are not nearly so severe.

The independent variables included in the vector X in equation 1, a number of which correspond to those used by Gordon and Blinder (1980), are as follows:

(1) A set of four dummy variables defined for broad occupational categories.

(2) A dummy variable indicating coverage by a private pension plan on the current job.

(3) A dummy variable indicating coverage by a public pension plan on the current job.

(4) A variable equal to 10 minus years to mandatory retirement age, or equal to zero if there is no mandatory retirement.

(5) A dummy variable indicating a short term health problem.

(6) A dummy variable indicating a long term health problem.

(7) A dummy variable indicating that a health problem ended the last job.

(8) A dummy variable equaling 1 if the father grew up outside of a farm.

(9) Years of formal schooling.

(10) A variable equaling 0 if education is ≤ 8, otherwise equal to ed-8.

(11) A variable equaling 0 if education is ≤ 12, otherwise equal to ed-12.

(12) A dummy variable equaling 1 if ed ≥ 12.

(13) A dummy variable equaling 1 if ed ≥ 16.

Table 1 reports the coefficient estimates for the tenure and experience variables, and some relevant statistics pertaining to the regressions for those in the main job and not retired at all, for those who have partially retired, and for both groups pooled.[7] Coefficients of other standardizing variables are reported in the appendix. Using standard F tests, we find that the tenure variables are jointly significant at the 1% level in all three wage equations.[8] The same is true for the experience variables. The signs of the experience variables differ between the equation for the not retired and for the partially retired, but it will be seen below that this change in sign does not mean that wages are positively related to experience in one case, but negatively related in the other. At high levels of experience, all three profiles appear to decline as experience increases, but the rates of decline differ depending on retirement status, and as we shall see,

Table 1 - Regression Results*

	(1) Not Retired	(2) Partially Retired	(3) Pooled Results (Conventionally Estimated Profile)
Coef. of Exp.	.096 (2.40)	-.257 (-1.77)	.125 (3.37)
Coef. of $Exp.^2$	-.00112 (-2.57)	.00217 (1.46)	-.00158 (-3.99)
Coef. of Ten.	.0068 (3.59)	.0144 (2.19)	.0101 (5.31)
Coef. of $Ten.^2$	-.000027 (-.66)	-.000124 (-.80)	-.00008 (-1.94)
R^2	.300	.242	.327
Stand. Error	.4398	.6516	.4825
No. of Obs.	3955	696	4651
Expon. of log $\bar{W}$	\$2.93	\$1.82	\$2.73
$\overline{Exp.}$ (SD Exp.)	46.2 (3.81)	49.2 (4.00)	46.6 (3.98)
$\overline{Ten}$ (SD Ten.)	18.5 (13.8)	10.3 (12.7)	17.3 (14.0)

*t-statistics are in parentheses

differ in an important way.[9]

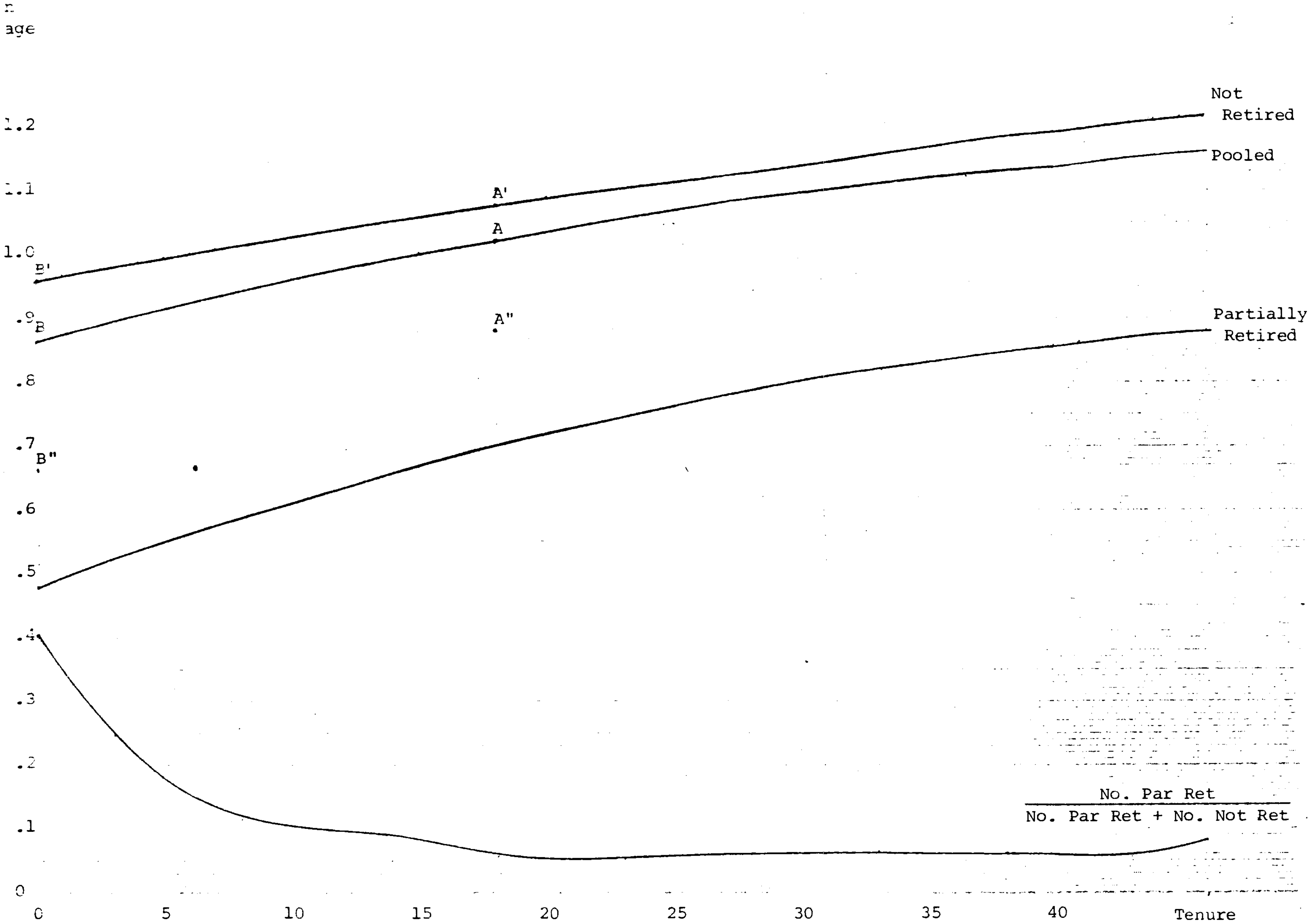
Turn now to the question of central concern to this paper. Are the separate wage equations based on data for those who are not retired and for those who are partially retired significantly different from one another? The first step in answering this question is to test whether the two equations have significantly different intercept terms, constraining the equations to have equal slope coefficients. This test is performed by adding a dummy variable for partial retirement to the pooled equation. This dummy is found to be highly significant, indicating a substantial difference in the intercept terms for the two equations.[10]

The second step tests whether the experience and tenure variables can be constrained to have the same values for the not retired and for the partially retired.[11] This test involves adding four additional variables to the pooled equation: the four tenure and experience variables multiplied by a dummy variable indicating partial retirement. These four variables as a group are found to be significantly different from zero, indicating that a simple intercept dummy is not sufficient to capture the differences between the not retired and the partially retired individuals.[12]

II. Tenure Profiles

The tenure profiles implied by the coefficients in the three wage equations in Table 1 are pictured in Figure 1. Also pictured in the bottom of that figure is a curve plotting the ratio of the number partially retired to the total of those not retired and partially retired - the probability of partial retirement - against years of tenure. It can be

FIGURE 1


n
age
1.2
1.1
1.0
.9
.8
.7
.6
.5
.4
.3
.2
.1
0
B'
B
B"
A'
A
A"
Not
Retired
Pooled
Partially
Retired
No. Par Ret
No. Par Ret + No. Not Ret
0
5
10
15
20
25
30
35
40
Tenure

seen from that figure that the probability of partial retirement peaks at very low tenure. This reflects the behavior of those who partially retire outside the job they held while not retired. The probability of partial retirement is relatively constant at higher levels of tenure, reflecting the behavior of those who phase into partial retirement in the same job they held while not retired. This probability does, however, rise again at very high levels of tenure (not pictured in the figure), levels at which there are very few observations.

What are the differences in predicted wages between the wage profile computed following the conventional approach and the wage profiles which recognize the existence of simultaneous offers for work while not retired and work while partially retired? Table 2 presents information useful for answering this question, while in Figure 1 we illustrate points pertaining to the information in Table 2. Consider a worker with

Table 2: Wage Predictions from Alternative Wage Equations

Wage Equation	Years of Tenure: 0	Years of Tenure: 18 years
Conventional Approach (pooled)	(B) $2.38	(A) $2.78
Not Retired	(B') $2.62	(A') $2.94
Partially Retired	(B") $1.94	(A") $2.41

average characteristics for the sample as a whole, which are very close in value to average characteristics for the not retired. If he keeps working as not retired, according to the conventional (pooled) wage equation his earnings, corresponding to point A in Figure 1 (at around 18 years of job tenure), would be equal to $2.78. In contrast to the conventional approach, the differences in wage paid to nonretirees and to partial retirees may be recognized. The respective predicted wage for an individual with average characteristics for the not retired, who is in fact not retired, is $2.94, and corresponds to point A' in Figure 1.[13] Point A" represents the predicted wage of an individual with average characteristics of the not retired, who is in fact partially retired. This predicted wage, equal to $2.41, lies above the wage tenure profile for the partially retired, which is drawn holding variables measuring health, education, father's status and experience at values appropriate for the partially retired group.[14] The predicted wages associated with not retired and partially retired individuals with similar characteristics (points A' and A") differ from the predictions from the pooled wage equation (point A) by 5.8% and -13.3% respectively. The single wage prediction obtained from the conventional approach for a job which is newly secured (i.e. with 0 tenure) is $2.38 for our typical individual (corresponding to point B). When work while not retired and work while partially retired are distinguished, the wage offers at zero tenure, corresponding to points B' and B" in Figure 1, are $2.62 and $1.94 respectively. These differ from the conventional estimates by 10.1% for work while not retired, and -18.5% for work while partially retired.[15] Thus the conventional approach may underpredict the wage for those who are not retired and overpredict the wage for those who are partially retired by sizeable amounts.

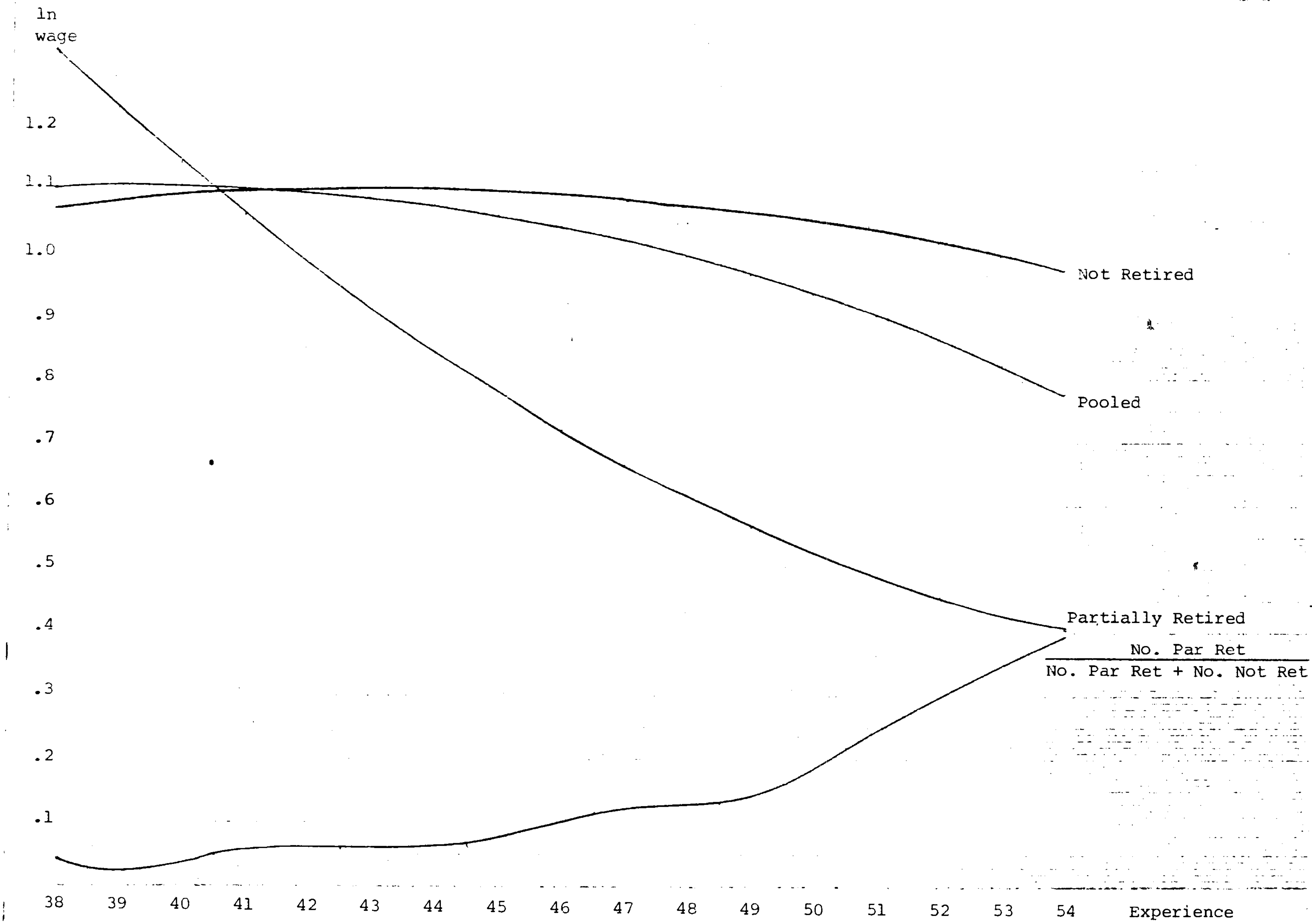
Moreover, the conventional approach is simply not appropriate for analyzing variation in the relative wages offered for work when partially retired and not retired - variation that depends on the institutional constraints facing the older individual. More specifically, our estimates suggest that there are three factors affecting the relative wage offers between work when not retired and work when partially retired: a) A lower wage is paid to those who are partially retired than to those not retired, even if they partially retire on their main job and hence do not lose their accumulated tenure; b) those who face a lower limit constraint on hours of work on the main job must forego accumulated tenure to partially retire, reducing the wage commensurately; c) when one changes jobs, either because partial retirement is not available on the main job or because age of mandatory retirement has been reached, the new job may differ from the old one in characteristics that bear a relation to the wage offer - e.g., pension coverage, years to mandatory retirement and occupation.[16] The conventional approach picks up the combined effects of these three factors without distinguishing among them. For example, continuing with the data in Table 2, if an individual can partially retire in the main job, the <u>dominant</u> set of offers - that is the best single offers - are \$2.94 for work when not retired and \$2.41 for work when partially retired, a 22% difference in the wage for work when not retired and when partially retired. If the individual must change jobs in order to partially retire, the dominant offers are \$2.94 and \$1.94, a 52% difference in the wage. Here, to partially retire the individual must leave the main job.[17] Clearly, the difference in wage offers for work when partially retired and when not retired varies substantially depending on the institutional constraints facing the worker. Yet the conventional approach cannot be used to describe the effects on the wage offer set of these different constraints.

The best available structural analysis of retirement behavior, that of Gordon and Blinder (1980), relies on the conventional approach to analyzing the wage equation. Their analysis ignores the role of the wage differential between work when not retired and when partially retired, assuming instead that all workers face, at a moment in time, a single dominant wage offer. In particular, they assume that all workers are free, in the absence of mandatory retirement, to phase into retirement by reducing hours on the main job from full-time work to zero. The consequences of this assumption for parameter estimates in structural retirement models are discussed in a companion piece (Gustman and Steinmeier, forthcoming). Consequences of adopting an alternative assumption, that all workers must work full time or not at all on <u>all</u> jobs, is also discussed in that paper.[18]

III. <u>Wage-Experience Profiles</u>

Figure 2 pictures the three wage-experience profiles derived from the equations in Table 1. Also pictured in that diagram is a curve indicating the probability that a wage observation will be for a person who is partially retired, as a function of labor market experience. Given the continuous positive relation between that probability and experience, the fact that the average wage is substantially lower for those who are partially retired, and the influence of the "significantly" more negative slope of wage equation for the partially retired, the experience profile as computed in a pooled regression, which does not

FIGURE 2


ln
wage
1.2
1.1
1.0
.9
.8
.7
.6
.5
.4
.3
.2
.1
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
Experience
Not Retired
Pooled
Partially Retired
No. Par Ret
No. Par Ret + No. Not Ret

distinguish between those who are and are not partially retired, will exhibit a slope that over-states the decline in the wage paid for continued full time work in the main job with increasing experience. For the "pooled" sample, the mean experience is 46.6 years. Plus or minus two standard deviations (of four years) it ranges from 38.6 to 54.6 years. According to the pooled results, from 39 to 55 years of experience the wage declines from $3.02 to $2.08, or 31% over the 16 year period.[19] The wage rate decline over the same period for those who are not retired (from $2.95 to $2.58) is about 12.5%.[20]

These results suggest that the measured decline of the wage for older workers with increasing experience implied by a conventional estimate of the wage equation may overstate the decline with increasing experience in the wage offer for work while not retired by as much as 60 percent. This finding should be of considerable interest to those studying the productivity wage profile relation, depreciation of human capital contracts and related topics.

In the standard analysis of wage profiles, the selectivity bias one worries about results from the fact that there are no wage observations for those who are fully retired. If, however, the analysis distinguishes between partial retirement and nonretirement, then current wage observations for the not retired equation are not available either for those who are currently retired or for those who are partially retired. The analogous situation holds for observations of wages when partially retired.

The experience profile examined above has not been corrected for the effect of selectivity bias. A full correction required the estimation of a complete structural model, explaining the probabilities of nonretirement, partial retirement, and full retirement. Such a model should deal explicitly with the role of lower limit constraints on hours of work affecting those in a majority of main jobs. In an earlier study using these same data grouped into categories, we took a less complete approach to test for selectivity bias. Using retirement equations with outcome categories that distinguished between those who were not retired and those who were partially retired, we found that correction factors analogous to the Mill's ratio were significant, but did not have a sizable influence either in wage equations for work on the main job or for work while partially retired. Carliner (1982), using the Parnes data for older workers and distinguishing only between those who were not retired and those who were, came to a similar conclusion.[21]

Construction of a more complete structural model for purposes of refining the estimates of selectivity bias is a task that would take us beyond the scope of this paper. However, we can use the longitudinal nature of the wage data to examine one aspect of the selectivity problem, whether those individuals with wage observations in various categories in later years of the survey had wage residuals while not retired in earlier survey years that were higher or lower than average.[22] Table 3 reports on residuals from the wage equations for those who are not retired and for those who are either partially or not retired (the pooled wage equation). Since, given their standard deviations, the residuals are not significantly different from zero, the discussion that follows is mainly speculative.

Consider the wage equation for the not retired group. At a relatively low level of experience, say below 37 years, the sample is probably

Table 3

Average Wage Residuals Two Years Earlier by Level of Experience*

Experience in Current Year	Wage Eq. for Not Retired			Pooled Wage Equation		
	Two years earlier	No. of Obs.	Cumulative effect	Two years earlier	No. of Obs.	Cumulative effect
38-39	.015 (.55)	113	.010	.030 (.55)	117	.020
40-41	.013 (.43)	200	.015	.011 (.48)	219	.021
42-43	.029 (.43)	461	.030	.020 (.44)	505	.027
44-45	.022 (.40)	649	.034	.011 (.41)	725	.025
46-47	-.006 (.38)	723	.019	-.018 (.39)	834	.005
48-49	.018 (.37)	636	.025	.008 (.39)	762	.009
50-51	.016 (.36)	406	.027	-.018 (.36)	546	-.006
52-53	-.052 (.40)	165	-.017	-.054 (.39)	233	-.040
54-55	-.023 (.36)	65	-.026	-.094 (.46)	95	-.089

*Standard deviations for the residuals at a given experience level are in parentheses.

young enough that almost everyone is still working full time, and selection is not yet a problem. Now look at the group with 38 to 39 years of experience. According to the table, two years earlier this group had average wages that were 1.5% greater than would be have been predicted from the wage equation. Evidence cited earlier (see page 3) suggests that perhaps two-thirds of this residual persists from one observation to the next, so that the group still has wages that are 1.0% greater than the average for everyone, including the individuals who have partially or completely retired in the meantime. In other words, the experience curve drawn in Figure 2 would be about one percent lower at 38-39 years of experience if the wage equation included observations for everyone, including those for whom wages were not available.

For the next group, with 40 to 41 years of experience, we see that they had a residual two years earlier that was 1.3% relative to the group that was included in the regression then. We have already seen, though, that the group two years earlier, with 38 to 39 years of experience, had wages that were on the average 1.0% higher than we would have expected to find had the regression included wage for partially and completely retired individuals. So, for the group with 40 to 41 years of experience, the wage two years previously was about 2.3% (1.0% + 1.3%) above what might have been found had the regression considered wages for the partially and completely retired. Again, if two-thirds of the residual persists over time, we would expect that not retired invididuals with 40-41 years of experience would have wages that were about 1.5% above what would be found had the sample also included partially and completely retired individuals. This implies that the true experience curve for all individuals probably lies about 1.5% below the curve calculated from a regression based solely on individuals who are not retired.

These calculations were continued for greater levels of experience, and also for the pooled wage equation, with the results being found in the "cumulative effect" columns of Table 3. These results indicate that the curves, corrected for selection problems, would probably lie below the estimated curves for low levels of experience and would rise above the estimated curves for high levels of experience. In other words, the curves, corrected for selectivity problems, would probably be flatter that the estimated curves, and the correction would be slightly greater for the pooled wage equation than for the equation including only the not retired.[23]

V. Conclusions

Older workers are likely to face at least two wage offers which they view as competing, pay for work while not retired and pay for work while partially retired. The conventional approach to the analysis of wage profiles pools all wage observations without distinguishing those who are partially retired from those who are not retired. Wage profiles based on the conventional approach are constructed as if there were a single wage offer for those with given experience and tenure, whatever their retirement status.

Based on our empirical analysis, we reach the following conclusions. First, the wages for work while not retired and for work while partially retired are significantly different from one another. Second, the wage offers facing older workers may vary considerably with the institutional limitations they face - i.e., between those who do and do not face lower limit constraints requiring full-time work or none at all on their main job.

Third, selectivity bias aside, failing to distinguish between wages paid to those who are partially retired and those who are not retired causes the decline in wages with experience to be greatly exaggerated. At highest levels of experience, the relative number of wage observations for those who are partially retired and receiving a low wage is greatest. The resulting bias is so large that the slope in wage experience profiles as conventionally estimated may overstate the decline with experience in wage offers for work while not retired by as much as 60 per cent. In addition, there is some suggestion that wage profiles which do not correct for selectivity bias may overstate the degree of decline in the wage with experience, with the correction for the pooled wage equation being slightly greater than the correction for the wage equation for the not retired. Since selectivity bias has relatively similar effects on the wage profile as conventionally estimated and on the wage profile for those who are not retired, a conventionally estimated wage profile, even corrected for selectivity bias, may overstate the decline in the slope of the wage-experience profile.

Appendix - Coefficient Estimates for Control Variables Standardized for in Computing Table 1*

	(1) Not Retired	(2) Partially Retired	(3) Pooled Results (Conventionally Estimated Profile)
Occupation 1	.181 (8.78)	.218 (2.68)	.194 (9.18)
Occupation 2	-.035 (-1.45)	.177 (2.53)	-.0002 (-.017)
Occupation 4	-.162 (-6.21)	-.082 (-1.07)	-.161 (-6.35)
Private Pensions	.277 (15.55)	.297 (3.27)	.293 (15.90)
Public Pensions	.213 (9.61)	.136 (1.03)	.234 (10.11)
Mandatory Retirement Horizon	.003 (1.30)	.023 (1.71)	.006 (2.49)
Short Term Health Problem	-.042 (-1.01)	-.167 (-1.28)	-.075 (-1.84)
Long Term Health Problem	.084 (-4.51)	-1.04 (-1.81)	-1.06 (-5.77)
Health Problem Ended Last Job	-.060 (-1.34)	-.157 (-1.48)	-.100 (-2.40)
Nonfarm Father	.101 (6.40)	.138 (2.52)	.107 (6.73)
Years of Ed.	-.001 (-.17)	.022 (0.73)	-.019 (-2.23)
Years of Ed. >8	.029 (2.05)	.017 (.35)	.038 (2.66)
Years of Ed. >12	-.006 (-.37)	-.038 (-.63)	-.0035 (-.22)
High School Grad.	.0013 (.04)	-.225 (-1.80)	-.027 (-.77)
College Grad.	.107 (1.88)	-.08 (-.37)	.088 (1.51)

* t-Statistics are in Parentheses

FOOTNOTES

[1]In this study, an individual is classified as partially retired if he says that he is. (For a comparison with other definitions of partial retirement based on declines in wages or hours of work, see Gustman and Steinmeier, 1981.)

[2]Notice that we refer in this paper only to the wage, not to compensation. Returns to work, especially for older workers, are influenced importantly by provisions of both private retirement programs and by Social Security. They may also be influenced by compensating differentials for difficulty of work. For a relevant analysis of pensions, see Lazear (1982). On Social Security see Blinder, Gordon and Wise (1980 and 1982) and Burkhauser and Turner (1982). Quinn (1977) analyzes nonpecuniary aspects of jobs.

[3]This form of the wage equation, with the wage measured in logs and quadratic effects of tenure and experience, has been adopted here to conform with wage equations estimated in the related literature.

[4]All wages are deflated to 1967 using the index of hourly earnings from the Economic Report of the President, 1981, Table B-36. Wage observations which implied an hourly wage above $100 or below 25¢ per hour were eliminated from the sample. Most of the latter observations appear to be the result of an inconsistent response to a question that asked the individual to report wage per unit of time, and then asked that, except in the case of an hourly wage, cents be rounded to the nearest dollar. It appears that in some cases the hourly wage was also rounded. Accordingly, a response such as 2, meaning $2 per hour, may

have been coded as 2 cents per hour.

[5]Since only the last wage observed for each employer is included, truncation of the survey in 1975 and inclusion of all wage observations for that year mean that the probability of a wage observation being included in the regression is not strictly reflective of its probability in the population. In addition, the inclusion of the last wage received from an employer means that for some individuals who retire partially on a job previously held while not retired, the wage paid while not retired at all is undersampled. A comparison of the probabilities of partial retirement computed directly from the survey with the probabilities of observing a wage for an individual in the sample who is partially retired suggests that our procedure slightly understates the probability of partial retirement, with the degree of understatement being greater at highest rather than lowest levels of experience. Analogously, there is relative over-sampling of the wage observations for those who are not retired and who experience frequent job turnover. Fewer than 10% of those observed as not retired have more than one employer during the period of the survey. As a result of the lower weight given to the partially retired, especially at higher levels of experience, the wage-experience profile computed from pooled observations using only a single observation for each job understates, but not to a significant degree, the decline in the wage profile that would be calculated from a pooled cross-section profile which included all wage observations.

[6]The correlation between wage residuals in main and partial retirement jobs is .31.

[7]In this study, the main job is defined as any job held full-time by an individual who reports he is not retired. In our earlier study (Gustman and Steinmeier, 1981), we defined main job as the job held full-time at age 55. Of those who are partially retired and for whom appropriate data are available, 53% have partially retired on jobs they held previously while not retired. However, only 32% of these partially retired individuals are in jobs they previously held at age 55.

Observations for individuals who are partially retired in jobs where they are self employed were eliminated from the sample, even if the "main job" held by the individual did not involve self employment. On the one hand, this procedure avoids inflating the opportunity wage while partially retired by the returns to own capital. On the other hand, it disregards some obviously superior opportunities while partially retired available to some workers not self employed on their main job, causing the return to partial retirement to be understated.

[8]When added to the wage equation for those who are not retired, a linear term reflecting year of birth has a coefficient equal to .01, indicating that real wages are higher by about 1% for each year earlier the individual is born. This variable reflects the combined effects of vintage and year of observation. There is only slight effect on the coefficients of the experience and tenure variables from including a measure related to year of birth.

[9]If the partially retired group is divided according to whether or not the individuals had previously considered themselves to be not retired at all in their current jobs, significant differences are found between the two groups. However, for a considerable number of partially

retired individuals, it is impossible to ascertain whether or not they had previously considered themselves not retired in the job. In order to avoid dropping these observations, we do not distinguish between various groups of partially retired individuals and instead concentrate on the differences between partially retired individuals and individuals who are not retired at all.

[10]The estimated coefficient of the dummy variable is -0.19, with a t-statistic of 8.14. This coefficient does not, however, represent the full effect of partial retirement on the wage. As we discuss in section II below, the actual wage difference between those not retired and those partially retired will be larger than this coefficient, reflecting the effects of differences in the characteristics of jobs held by those in each retirement category. These job related characteristics, reflecting pension coverage, mandatory retirement provisions and occupations, bear a systematic relation to the wage.

One might infer from the above result that the addition to a conventional wage equation of a variable measuring hours of work, a variable which is likely to be correlated with an indicator of whether the individual is partially or not retired, might help to avoid some of the bias in the conventional approach. However, Zabalza, Pissarides and Barton (1980, p. 258) report that such a variable was not significant in wage equations which they fit in a sample of workers in the U.K. Clark, Johnson and Sumner (1981) also reported mixed results on the use of an hours variable. Questions as to whether a different specification from the ones employed in these studies, or whether other dimensions of partial retirement, such as lowered difficulty of work or limited responsibility, could explain the negative impact of partial retirement on the wage remain the subject for future investigation.

[11] Theoretical considerations in addition to those related to the effects of minimum hours constraints on the choices facing older workers fail to prescribe identical coefficients on the independent variables in the two wage equations. Indeed, while in practice full-time work has been the more remunerative, theory does not determine whether the hourly wage for part-time work or for full-time work should be highest. There are a number of forces on both the supply and demand sides of the market which are working in opposite directions. On the supply side, the existence of fixed costs of working leads one to expect a higher supply price (higher reservation wage) for jobs that offer the opportunity to work only a limited number of hours. In contrast on the supply side, some people, especially those who are competing with older workers for part-time jobs, have a discontinuous marginal cost of time. Most importantly, time available after school or during the summer has a low opportunity cost for youth, while for some parents with school age children, still primarily women, time during school hours may have a relatively low opportunity cost. On the demand side, fixed hiring, bookkeeping and start up costs of working to the firm would lead one to expect a lower wage offer for part-time than for full-time work. On the other hand, firms facing demand patterns which are characterized by clear peaks and valleys (e.g., restaurants and retail establishments) will find that the hourly productivity of part-time workers, whose employment can be targeted on peak demand, is relatively high.

[12]The F statistic for the significance of these four variables as a group is 16.31 with (4, 4525) degrees of freedom. The critical value for a 1% significance test is 3.32

[13]By "average characteristics of the not retired" we mean that the individual has the average values for the not retired in the health, education, whether the father worked on a farm and experience variables.

[14]No adjustment is made for occupation, pension coverage or mandatory retirement variables. These are job related differences which would differ between those who are partially retired and those who are not, even if the jobs were held by the same individual. It will be seen below that the difference in wages between the not retired and the partially retired varies considerably with the level of experience. The difference in the average experience between the not retired and partially retired groups is only three years. But this higher level of experience for the partially retired group is associated with a reduction in the log wage of .15, representing 80% of the distance between A" and the wage profile for the partially retired.

[15]A caveat should be noted. The predicted wage for employment while not retired but working on a new job is influenced by the wages of those who are not retired and have low levels of job tenure. A significant proportion of those with low levels of tenure are employed in jobs that are characterized by high turnover. They have skills that are more likely to be industry or occupation specific rather than firm specific - e.g., construction workers. Considerations such as these, and differences in remaining work life between prime age and older workers,

create doubts that tenure will play similar roles in wage equations for older and for prime age workers. Thus the wages received by those with low job tenure may not provide a good basis for predicting the opportunity wage for a newly separated older worker. This brings up the issue of availability of jobs, at alternative wages, to older workers, the determinants of search time until receiving a job offer, and related questions which have yet to be answered for older workers who are job losers but do not wish to retire.

[16]Gordon and Blinder (1980, p. 290) discuss the desirability of older workers changing jobs. One reason they give for a job change, which is not consistent with the specification of their model, is to reduce hours of work. In evaluating the desirability of such a change, they note that the wage offer would be reduced on the new job both as a result of changes in job characteristics (e.g. change in pension coverage) and because of a loss in job tenure. Given the size of the loss, they state that on balance, the typical wage loss from a job transition late in life appears to be quite severe. They find it doubtful, therefore, that many older workers will want to make such transitions voluntary.

[17]An implication of work by Borjas (1981) and by Carliner (1981) is that the wage offer is lowered even further if the job held does not correspond to longest job. When a dummy variable indicating whether or not current occupation corresponds to longest occupation is entered in our wage equations, it has negative and significant coefficients (with t-statistics of over 5) in the wage equations for those who are

not retired and in the pooled result, indicating a decline in the log wage of about .09 if the individual is employed in an occupation other than his longest. The coefficient is -.02 in the equation for the partially retired, with a t-statistic of 0.33. When this variable is entered in the three equations in Table 1, the tenure coefficients all decline, while the tenure squared coefficients all increase. The fact that occupation change from longest job is of such importance increases the potential effect of a lower limit constraint on hours of work on the wage offers facing a given worker. To understand more fully the effect of job change on wages, the relation for older workers of wage offers to reason for job change would have to be analyzed.

[18]For such a model, see for example, Burbidge and Robb (1980).

[19]The wage decline with experience indicated by the pooled results would be even steeper if as in many studies of earnings profiles, we did not standardize for occupation. Instead, we follow the Gordon and Blinder specification, which does standardize. As is well known, earnings profiles covering the full life cycle do not standardize for occupation when attempting to isolate the returns to education because some of these returns are realized through choice of occupation. The goal of wage equations used in retirement studies is to obtain the best prediction of wage offers, predictions that are enhanced by inclusion of the occupational variable.

[20]It can be seen in Figure 2 that at lower levels of experience the predicted wage based on the pooled wage equation slightly exceeds the wage predicted from observations for those who are not retired. In

this range there are relatively few observations. The wage-experience profiles at these extremes are influenced by the curvature of the log wage profiles, which is constrained to be parabolic.

[21]Gordon and Blinder (1980) tested for selectivity bias in the context of their model of retirement behavior. They found that compared to coefficients in a linear approximation of the market wage equation which is not corrected for selectivity bias, for some variables the correction for selectivity bias turn out to be sizeable. Their tests and correction make use of a maximum likelihood procedure which estimates jointly the retirement and wage equations. Accordingly, their correction is conditional on the specification of their entire model. We have argued elsewhere (Gustman and Steinmeier, forthcoming) that this specification is incorrect because it does not allow for the fact that most people are not free to reduce hours of work below full-time on their main job.

[22]Another type of selectivity bias would result if those who kept working in later years experienced less deterioration in their wages than those who left the sample would have experienced. We do not examine this type of selectivity bias.

[23]The correction would at first appear to be particularly great for the pooled equation at 54 to 55 years of experience. However, the high negative residual of -.094 represents only 95 observations. Were an adjustment for selectivity bias done, this observation is expected to exert an influence on the curvature of the wage equation that reflected its sample size, which is small compared with the sample sizes for the other levels of experience.

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