

Industrial & Labor Relations Review

Volume 60, Issue 3

2007

Article 1

Work Hours, Wages, and Vacation Leave

Joseph G. Altonji*

Emiko Usui†

*Yale University,

†Wayne State University,

Copyright ©2007 Cornell University. All rights reserved.

Work Hours, Wages, and Vacation Leave

Joseph G. Altonji and Emiko Usui

Abstract

Using the Panel Study of Income Dynamics, the authors provide a set of facts about vacation leave. They show that on average, vacation time taken rises one-to-one with paid vacation; annual hours worked fall by about one full-time week with every week of paid vacation; the amount by which vacation time taken exceeds time paid is highest for women, union members, and government workers; paid vacation weeks are positively associated with hourly wage rates and, to a lesser extent, with nonwage compensation; and vacation time taken is weakly countercyclical. Vacation leave seems to be determined by broad employer policy rather than by negotiation between the worker and the firm. In particular, it is strongly related to seniority but depends very little on labor market experience, and for job changers it is only weakly related to vacation on the previous job.

KEYWORDS: work hours, wages, vacation leave use

WORK HOURS, WAGES, AND VACATION LEAVE

JOSEPH G. ALTONJI and EMIKO USUI*

Using the Panel Study of Income Dynamics, the authors provide a set of facts about vacation leave. They show that on average, vacation time taken rises one-to-one with paid vacation; annual hours worked fall by about one full-time week with every week of paid vacation; the amount by which vacation time taken exceeds time paid is highest for women, union members, and government workers; paid vacation weeks are positively associated with hourly wage rates and, to a lesser extent, with nonwage compensation; and vacation time taken is weakly countercyclical. Vacation leave seems to be determined by broad employer policy rather than by negotiation between the worker and the firm. In particular, it is strongly related to seniority but depends very little on labor market experience, and for job changers it is only weakly related to vacation on the previous job.

Empirical research on work hours is dominated by the massive labor supply literature, which assumes that people can choose hours at a wage that is set by the labor market.¹ However, casual empiricism suggests

*Joseph G. Altonji is Thomas DeWitt Cuyler Professor of Economics at Yale University, and Emiko Usui is Assistant Professor of Economics at Wayne State University. This research was supported by the Institute for Policy Research, Northwestern University, the Economic Growth Center, Yale University, and the National Science Foundation under grants SES-0112533 and SES-0301142. The authors thank Derek Neal, Christopher Taber, and participants in seminars at the Federal Reserve Bank of Chicago, LSE, the Midwest Economic Association Meetings, NBER, Northwestern, the Universitat Pompeu Fabra, and the Ujjohn Institute for helpful comments.

Copies of the computer programs used to generate the results presented in the paper are available from Joseph G. Altonji at Department of Economics, Yale University, P.O. Box 208264, New Haven, CT 06520-8264; e-mail, joseph.altonji@yale.edu.

¹See Killingsworth (1983), Pencavel (1986), and Blundell and MaCurdy (1999) for comprehensive surveys. Hanoch (1980) and subsequent studies have modified the basic framework to accommodate fixed costs, so that worker preferences and budget parameters influence the form in which work hours are packaged. Rosen (1976), Biddle and Zarkin (1989), and Moffitt (1984) are early examples of labor supply studies in which workers choose hours and wages according to a market locus.

that firms have strong preferences about employee hours, and there is a good basis in theory for believing this to be the case. The models of Ehrenberg (1971), Rosen (1968, 1969), and Deardorff and Stafford (1976) emphasized the effect of startup costs, fatigue, and hiring and training costs that are fixed per employee in shaping the hours preferences of firms. They also considered nonlinearities in compensation that are induced by fringe benefits, payroll taxes, and overtime pay as well as the costs of coordinating workers who work different hours. Rebitzer and Taylor (1995), Landers et al. (1996), and Sousa-Poza and Ziegler (2003) provided a different class of models in which firms regulate hours because hours requirements influence the quality of a firm's work force.²

²Their basic assumptions are that (1) work preferences are heterogeneous and unobserved by the firm and either are correlated with skill or directly influence productivity by affecting current and future effort levels or turnover decisions, and that (2) pay cannot be tied directly to the productivity of a worker. The difficulty in matching pay to productivity may arise because productivity is unobservable or because of problems in devising and enforcing multi-period contracts, particularly when turnover is a key issue. This will lead to reluctance on the part of highly productive workers who happen to

The theoretical presumption that the hours choices of workers are constrained by employers is backed by substantial empirical evidence. For example, Altonji and Paxson (1986), Martinez-Granado (2005), and Senesky (2005) have shown that the variances of changes in hours are much larger across jobs than within jobs. This evidence suggests that work time is to an important extent a job-specific phenomenon. Studies of the labor market for older workers have stressed restrictions on going part-time with one's current employer, as well as a large wage penalty associated with giving up a full-time job for part-time work in another firm (for example, Gustman and Steinmeier 1984; Blank 1990; Hurd 1996; Aaronson and French 2004).³ In summary, restrictions on choice of hours in a given job appear to be a key feature of the labor market.

Firms regulate days of work by establishing fixed holidays, paid and unpaid vacation and personal days (hereafter, vacation days), and provisions for excused absences due to illness or family considerations, sometimes with pay. Strictly from a budget point of view, there is no meaningful economic distinction between "paid" and unpaid vacation. One can always adjust the wage rate paid for time worked to achieve a given level of annual compensation for a given amount of time worked over the year. However, adjusting time off without leaving an employment relationship involves authorized leave.⁴ Indeed, a number of countries, particularly in Europe, regulate work time by requiring employers to provide

a minimum number of paid vacation days. Consequently, data on paid vacation days and other forms of regular leave provide a direct measure of the work requirements imposed on the worker by the firm or by law. Leave policy is of interest in its own right and as a window on how hours are determined in the labor market. Analyzing it may help inform the contentious debate over whether Americans work more than the optimal amount given preferences and productivity, as is implied by some of the adverse selection models of hours determination mentioned above.⁵ Since little is known about this important job characteristic, we fill the gap by providing a set of facts about vacation leave and its relationship to hours worked, wage rates, worker characteristics, labor market experience and job tenure, occupation, industry, and labor market conditions.⁶

Specifically, we use the Panel Study of Income Dynamics (PSID) to address the following questions about vacation leave:

—What are the distributions of weeks of paid vacation received and vacation weeks actually taken, and how do they relate? In particular, what is the effect of weeks of paid vacation on weeks actually taken?

—How are weeks worked per year, hours per week, hours per year on the main job, and annual hours on all jobs influenced by weeks of paid vacation and weeks actually taken? Do workers offset vacation on the main job by working longer hours?

—How are personal characteristics that influence wages and hours preferences related to vacation time?

—How are hourly wage rates and weeks of paid vacation related?

—How does vacation time vary with labor market experience and seniority?

—Does vacation time on a previous job influence vacation time on subsequent jobs? We use this question to provide indirect evidence on the issue of whether workers negotiate over vacation time when taking new jobs.

have strong leisure preferences to bargain for more vacation time. As a result, vacations will tend to be set by firm-wide policy rather than tailored to individuals. Too little vacation may be offered out of a fear of attracting less productive workers.

³See also the substantial literature using self-reported measures of unemployment, underemployment, and overemployment (for example, Ham 1986; Kahn and Lang 1995; Altonji and Paxson 1988). Note that we abstract from preferences of firms and workers regarding the timing of work over the day and the week. See Hamermesh (1996, 1998, 1999) for evidence.

⁴Both firms and individuals also care about the daily work schedule. See Hamermesh (1999) for analysis of the distribution of work hours by time of day and days of the week.

⁵See Altonji and Oldham (2003) for a brief discussion of theoretical arguments for vacation laws. See Schor (1991), Kniesner (1993), and Stafford (1992) for conflicting views on trends in hours in the United States.

⁶Beam and McFadden (1998) and Maniaci (2001) discussed employee leave policies from a personnel management perspective.

—How do weeks of paid vacation and weeks actually taken vary with job characteristics such as union membership, government employment, occupation, and industry? Do they depend on the percent female in an occupation? Has the relationship between the percent female and vacation time weakened over time?

—Is vacation time countercyclical, as predicted by some equilibrium business cycle models?

1 Data

Most of our analysis is based on the Panel Study of Income Dynamics (PSID). Our measure of annual weeks of vacation taken, *VT*, is set to zero for those who answered “no” to the question: “Did you take any vacation or time off during 19XX?” For those who answered “yes,” *VT* is the response to the follow-up question: “How much vacation or time off did you take?” Heads of household were asked the questions in all years and wives were asked in 1976 and from 1979 on. We use data for the calendar years 1975–91. Information about weeks of paid vacation (*VP*) was collected in 1975–77 and 1984 for household heads and in 1976 and 1984 for wives. In 1975–77, the respondent was asked, “How many weeks of paid vacation do you get each year?” In 1984, respondents who answered “yes” to the question “Not counting holidays like Christmas and Labor Day, do you get paid vacation or personal days?” were asked: “How much paid vacation or personal time do you get each year?”⁷

In addition, we use PSID data on wage rates, weeks worked per year and hours worked per week on the main job, hours worked on all jobs, union membership, government employment, industry, occupation, region, city size, education, marital status, gender, race, labor market experi-

ence, job seniority, quits, and layoffs. The measures of quits, layoffs, job seniority, and labor market experience are taken from Altonji and Williams (2005). The coding of most of the other variables used in the study is reasonably straightforward and is summarized in the Appendix.

Our analysis of the effects of occupation uses information on occupational characteristics from the *Dictionary of Occupational Titles* (DOT) aggregated to the three-digit Census occupation category. The measure of gender composition of the occupation is the proportion of female workers in the worker’s three-digit Census occupational category. The estimates below use the proportion female based on the 1980 Census.⁸

We focus on persons who worked 35 or more hours per week on their main job, were between the ages of 19 and 59, had left school and not returned, had not retired, and were not self-employed. We do not condition on weeks worked per year. To ensure that reports of vacation time over the year refer to persons in the same job for the entire year, we also restrict the analysis to individuals with at least .5 years of seniority at the time of the survey and exclude observations in a given year if the current job ended prior to the next interview. Means of the main variables used in this study are reported in Table A1 of Altonji and Usui (2005).

2 Empirical Results

2.1 The Distributions of Weeks of Paid Vacation Received and Weeks of Vacation Taken

What are the distributions of paid vacation time and unpaid vacation time? Did people use all of their paid vacation time? Was there substantial unpaid vacation time? How do the two measures interrelate? To answer these questions, we start by displaying the distributions of weeks of paid vacation (*VP*) and weeks of vacation taken (*VT*). In Section 2.2 we discuss trends in vacation leave and

⁷In 1984, respondents reported *VP* either in days per year, weeks per year, hours per year, or other (combination). We converted days per year and hours per year to 5-day weeks, assuming 8 hours per day, and rounded to the nearest integer. Based on a regression for men containing the control variables in Table 1, column (4) and a dummy for 1984, we find that *VP* was only .174 weeks higher in 1984. Thus there is little evidence that the change in format of the questions in 1984 made much difference.

⁸We obtain similar results when we linearly interpolate using information from the 1980 and 1990 Censuses.

in Section 2.3 we use regression methods to examine the relationship between the two vacation measures and work hours.

Figure 1 presents the distributions of paid vacation weeks (*VP*) and vacation weeks taken (*VT*) for men based on the years when both are available. (The distribution of *VT* using 1975–91 is similar.) We find that 10.7% of the men reported no paid weeks, 11.9% reported 1 week, 34.3% reported 2 weeks, 19.4% reported 3 weeks, 14.1% reported 4 weeks, 6.4% reported 5 weeks, and 3.2% reported 6 or more weeks. The distribution of *VT* is similar. The distributions of *VP* and *VT* for women are similar to those for men (Figure 2). However, 10.0% of women reported 8 or more weeks of vacation taken, while only 2.1% reported 8 or more paid weeks.

Figure 3 presents the distribution of *VT* – *VP*. The difference is zero for 51.7% of the men and 46.2% of the women. For men the distribution between the values of –4 and 4 is skewed to the left, indicating that vacation time taken was more likely to fall short of vacation time paid than to exceed it. This is also true for women, although the skewness is less pronounced. Taken at face value, the figures suggest that in a given year many workers took less vacation or more vacation than they were paid for. A substantial part of this probably reflects measurement error or respondents' confusion about whether to count regular holidays as *VP* or *VT*. Part may reflect decisions to carry over paid vacation across years. Part may reflect decisions to "buy" additional vacation days by workers in firms that permitted this practice.⁹ Finally,

part may reflect the presence of occupations with a seasonal component to the work year. For men and women combined, teachers account for only 3.4% of the sample, but for 38.7% of the cases in which *VT* exceeded *VP* by more than two weeks.

2.2 Time Trends in Weeks of Paid Vacation and Weeks of Vacation Taken

We have estimated a full set of year dummies in regressions for *VT* that also contain a detailed set of control variables. These consist of demographic characteristics, experience, seniority, union membership, government employment, and industry and occupation dummies. The year dummies (not reported) show an inverted U-shaped pattern in which *VT* rises by about one day between 1975 and 1983 and then slowly returns to mid-1970s levels by the early 1990s. In the PSID we do not have enough years of data to study trends in *VP*. The U.S. Department of Labor's *Employee Benefits Surveys* (EBS) for 1982 and 1988 show little change in paid vacation days for full-time workers in medium and large firms when coverage changes in the survey are taken into account. Between 1988 and 1993 paid vacation increased by about .5 days, with the largest increase for professional and administrative employees. Between 1993 and 1997 *VP* rose by about .2 days for those having seniority of 10 years or less, with a small decrease for higher seniority levels.¹⁰ It is difficult to make comparisons after 1997, because the published tables for full-time workers are no longer broken down by firm size. However, the available information suggests that any changes are small.

2.3 The Effect of Weeks of Paid Vacation on Weeks of Vacation Taken, Weeks Worked, and Annual Hours Worked

The effect of weeks of paid vacation on weeks of vacation taken. In Altonji and Usui (2005), Table A2, we reported the means of *VT* and

⁹Tabulations from the 1997 Employee Benefits Survey in U.S. Department of Labor (1999) indicate that 52% of full-time workers in medium and large private establishments who received paid vacation for whom data are available could neither carry over nor cash in vacation. Fourteen percent of all workers could cash in vacation days but not carry them over, 11% could either cash them in or carry them over, and 24% could only carry them over. The U.S. Department of Labor (1989) reports values of 15%, 5%, and 25%, respectively, for 1988, suggesting a temporal increase in flexibility of vacation leave. In Altonji and Usui (2005), we discussed the implications of vacation policy for the tradeoff between earnings and hours that workers face.

¹⁰See U.S. Department of Labor (1983, Table 8; 1989, Tables 5 and 108; 1994, Table 11; and 1999, Table 13).

Figure 1. Distribution of Vacation Weeks for Men.

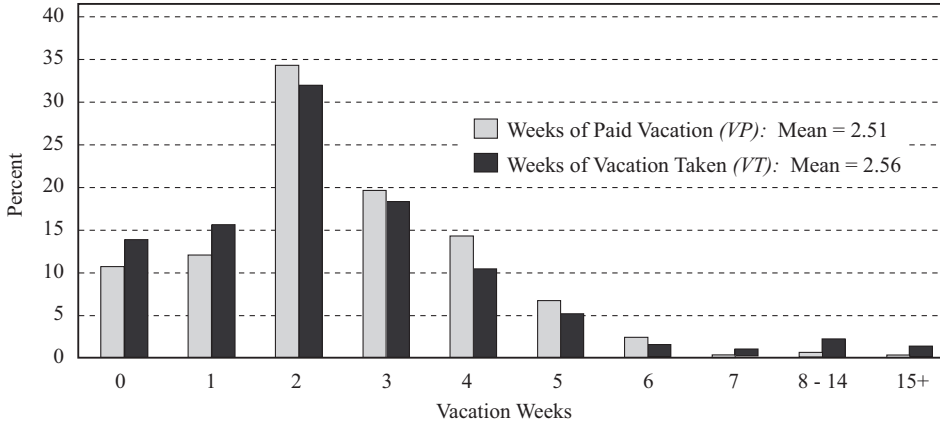


Figure 2. Distribution of Vacation Weeks for Women.

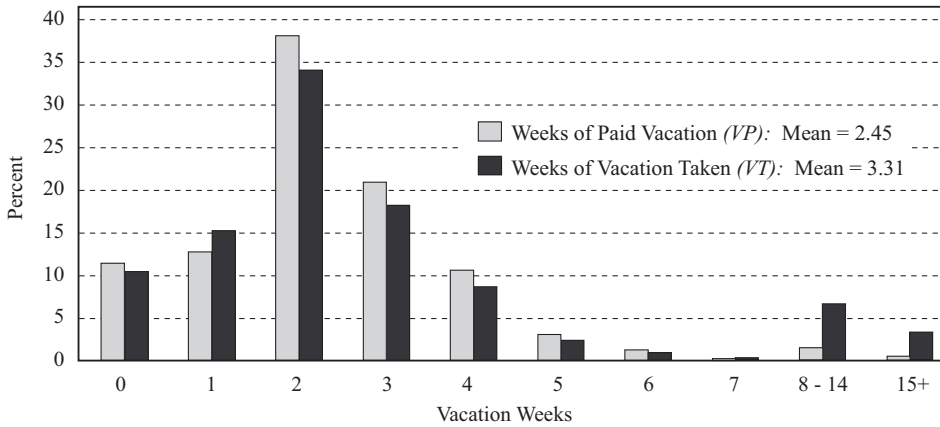
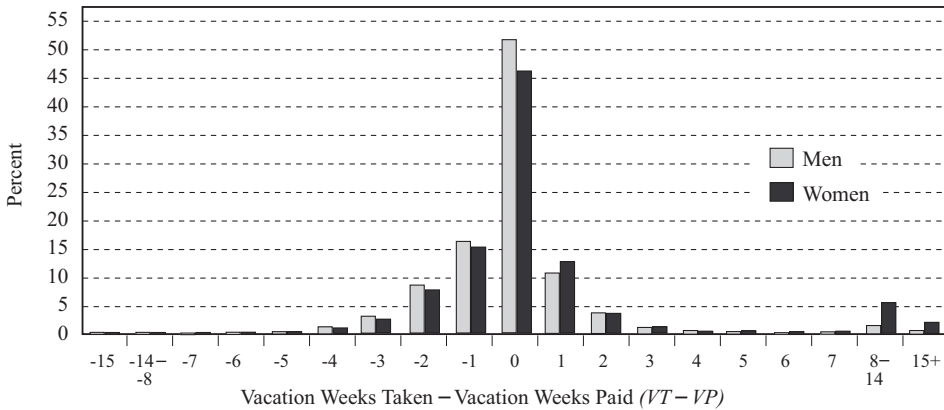


Figure 3. Distribution of Vacation Weeks Taken – Vacation Weeks Paid.



Notes: The sample contains observations for a given year on individuals who worked 35 or more hours per week in their main job, were between the ages of 19 and 59, had left school and not returned, had not retired, were not self-employed, had at least .5 years of seniority at the time of the survey, and were in jobs that did not end before the next interview.

Table 1. The Effect of Vacation Weeks Paid on Vacation Weeks Taken.
(Dependent Variable: *VT*)

Estimation Method	Explanatory Variable	Control Variables			
		None		Add Demographic Variables	Add Tenure, Union, and Government
		(1)	(2)	(3)	(4)
OLS	<i>VP</i>	0.470 (0.032)	0.802 (0.030)	0.675 (0.033)	0.434 (0.045)
	$I(VP > 0)$		-2.808 (0.209)	-2.632 (0.186)	-2.161 (0.182)
IV, Tenure Used <i>VP</i> as Instruments		0.846 (0.045)	0.985 (0.049)	1.279 (0.060)	
	$I(VP > 0)$		-3.305 (0.254)	-4.169 (0.258)	

Notes: The top panel reports OLS estimates of the effects of *VP* and $I(VP > 0)$ on *VT*. The second panel reports IV estimates with a cubic in tenure as the excluded instrumental variables. The column headings identify the controls. Column (1) includes only an intercept. Column (2) includes an intercept and an indicator equal to 1 if a worker receives paid vacation. Column (3) adds a set of demographic characteristics: education, experience (a quartic and an interaction between education and experience), dummies for sex, marital status, residence in an SMSA, residence in a city with more than 500,000 people, and disability status, two race dummies, three regional dummies, and calendar year dummies. Column (4) adds tenure (a cubic) and dummies for union membership and government employment. The sample size for the OLS and IV estimates is 10,734. The sample contains observations for a given year on individuals who worked 35 or more hours per week in their main job, were between age 19 to 59, had left school and not returned, had not retired, were not self-employed, had at least .5 years of seniority at the time of the survey, and were in jobs that did not end before the next interview. Robust panel standard errors are in parentheses.

various measures of hours worked for a given value of weeks of *VP*. For men who reported 0 paid weeks, vacation taken averaged 2.39 weeks. Surprisingly, weeks taken fall to 1.38 for persons reporting one paid week. Weeks taken then rise with paid weeks. Women show the same pattern. Weeks worked on the main job more or less mirror the pattern of vacation weeks taken. These facts suggest that there are some 35+ hours per week jobs that allow for substantial amounts of “unpaid” time off but do not provide paid leave. Many of these jobs are in education—38.9% of K12 and college and university teachers reported positive *VT* and 0 *VP*. Of the individuals in the education services industry, 28.2% reported positive *VT* and 0 *VP*. As noted in Section 2.1, some jobs with 0 paid vacation weeks may have a strong seasonal component to demand, such as construction work. For seasonal jobs, the implicit employment contract may be structured so that vacation is taken during

the off season, perhaps with a subsidy from the unemployment insurance system.¹¹

Regression analysis provides a clearer picture of the relationship between *VP* and *VT*. The first row of Table 1 reports OLS estimates

¹¹A regression containing the controls in Table 1, column (3) plus industry dummies indicates that mining and extraction, agriculture, forestry and fishing, durable goods, and educational services all have unusually large amounts of *VT* relative to *VP* (not reported). Effort by the PSID interviewer to ensure that reports of vacation weeks, weeks worked on the main job, weeks lost due to illness, and so on sum to 52 may build in a negative correlation between measurement error in *VT* and weeks worked. Consequently, one cannot directly examine the link between vacation weeks and unemployment weeks, because they are mutually exclusive categories in the survey. Instead, we examine the link between *VT* and employment status at the survey date. The mean of *VT* is 1.28 for individuals who were unemployed at the survey date in a given year, 3.12 for persons on temporary layoff, and 2.93 for those who were employed.

Table 2. The Effect of Vacation Weeks Taken on Hours Measures.
(Coefficient (SE) on *VT*)

	<i>Dependent Variable</i>				
	<i>Weeks Worked, Main Job</i>	<i>Hours / Week, Main Job</i>	<i>Overtime Hours, Main Job</i>	<i>Annual Hours Worked, Main Job</i>	<i>Annual Hours Worked, All Jobs</i>
<i>Controls</i>	(1)	(2)	(3)	(4)	(5)
1. None	-1.029 (0.026)	-0.087 (0.037)	-0.591 (0.365)	-54.615 (1.990)	-44.420 (2.147)
2. Add Demographic Variables	-1.089 (0.027)	-0.199 (0.040)	0.721 (0.390)	-60.312 (1.988)	-51.821 (2.038)
3. Add Tenure, Union, and Government	-1.046 (0.029)	-0.072 (0.044)	-0.023 (0.397)	-52.891 (2.048)	-45.436 (2.112)
N	55,380	55,485	30,078	33,638	55,485

Notes: The first specification includes only an intercept. The second specification contains a set of demographic characteristics: education, experience (a cubic and an interaction between education and experience), dummies for sex, marital status, residence in an SMSA, residence in a city with more than 500,000 people, and disability status, two race dummies, three regional dummies, and calendar year dummies. The third specification adds seniority (a cubic) and dummies for union membership and government employment. We have fewer observations for columns (3)–(4) because data are available only from 1984 on. The sample selection criteria are described in the notes to Table 1.

of the coefficient of the regression of *VT* on *VP* and alternative sets of control variables for the pooled sample of men and women. (To reduce the influence of outlier observations and reporting error, we recoded the approximately 1% of observations reporting more than 7 paid weeks to 7.) The regression coefficient on *VP* is only .470 (standard error = .032) when we exclude all controls. However, when we add a dummy $I(VP > 0)$ for whether the worker received paid vacation, the coefficient on *VP* rises to .802 (.030) (row 1, column 2). The coefficient on the dummy $I(VP > 0)$ is -2.81 (.209). Part of this effect is related to the difference in nature between jobs that offer paid vacation and jobs that do not.¹² When we include $I(VP >$

$0)$ and add controls for education, a quartic in experience, the interaction between education and experience, marital status, disability status, sex, race, city size, region, and calendar year, the coefficient on *VP* falls to .675 (.033). Thus, OLS estimates indicate that *VP* has a strong influence on *VT*, but the effect is not one-to-one. The coefficient falls to .434 (.045) when we add controls for seniority (a cubic), union membership, and government employment. Intertemporal substitution in the use of *VP* cannot easily explain the shortfall, because such substitution is likely to introduce a mean zero error into the model. However, reporting error in *VP* could explain the shortfall.

We address reporting error in two ways. First, we exploit the fact that *VP* depends strongly on job tenure by re-estimating the models in columns (1)–(3) using the first three powers of tenure as the instrumental

¹²For men, 33.6%, 12.4%, and 13.6% of jobs with no paid vacation were in construction or agriculture, forestry and fisheries, or educational services (respectively), while only 3.9%, 1.2%, and 4.4% of jobs with paid vacation were in these industries. Men in jobs with no paid vacation had lower tenure and were less educated, less likely to be married, more likely to be black, and less likely to be unionized than men who received at least a week of paid vacation. Few women were in agriculture and construction, which are the source of many of the

VP = 0 observations for men. In contrast, for women educational services accounted for 42.4% of the jobs with no paid vacation, but only 10.5% of the jobs with paid vacation. Personal services accounted for 8.6% and 3.8%, respectively.

Table 3. The Effect of Weeks of Paid Vacation on Hours Measures.
(Controls: Demographic Variables)

Vacation Variable	Dependent Variable				
	Weeks Worked, Main Job	Hours / Week, Main Job	Overtime Hours, Main Job	Annual Hours Worked, Main Job	Annual Hours Worked, All Jobs
	(1)	(2)	(3)	(4)	(5)
OLS: Coefficient (SE)					
Paid Vacation (VP)	-0.631 (0.049)	-0.014 (0.079)	1.714 (1.493)	-4.972 (6.134)	-25.013 (4.911)
$I(VP > 0)$	4.934 (0.299)	-1.474 (0.368)	10.120 (6.140)	116.889 (35.945)	135.395 (23.544)
N	10,743	10,751	3,489	3,489	10,751
IV Using Tenure, Tenure², and Tenure³ as Excluded Instruments: Coefficient (SE)					
Paid Vacation (VP)	-1.097 (0.116)	-0.301 (0.198)	-0.539 (3.612)	-81.139 (14.477)	-60.501 (12.005)
$I(VP > 0)$	6.119 (0.394)	-0.744 (0.573)	16.391 (10.539)	328.875 (48.843)	225.703 (35.421)
N	10,743	10,751	3,489	3,489	10,751

Notes: The top panel reports OLS estimates of the effects of *VP* and $I(VP > 0)$ on various hours measures. The equations include the demographic controls used in Specification 2 of Table 2. The bottom panel reports IV estimates, with weeks of paid vacation treated as endogenous and $I(VP > 0)$ treated as exogenous, with the tenure variables as the excluded instruments. We have fewer observations for columns (3)–(4) because only observations from year 1984 are available. The sample selection criteria are described in the notes to Table 1. Robust panel standard errors are in parentheses.

variables. This requires the assumption that seniority does not have a direct influence on *VT* given *VP*. When we control for $I(VP > 0)$, the coefficient on *VP* is .985 (.049) with no other controls and 1.28 (.060) with controls. Second, we re-estimated the models in columns (1)–(4) using a two-step estimator in which we first predict weeks of paid vacation using weeks of paid vacation in the previous year and the other variables in the model (not shown). When we control for $I(VP > 0)$, the coefficient on paid weeks is 1.13 (.052) without controls and 1.02 (.102) with the controls used in column (4) of the table.

Overall, the regressions of *VT* on *VP* indicate that, on average, *VT* rises about one-for-one with weeks of paid leave even though *VT* fluctuates around paid weeks for a given year.

Vacation time and hours and weeks worked. Table 2 presents OLS estimates of the relationship between *VT* and various work time

measures. Each coefficient (standard error) in the table refers to a separate regression. The column headings identify the dependent variable and the row headings indicate the controls used. When all controls are excluded, the coefficient of *VT* on annual hours worked on all jobs is -44.4 (2.1), which indicates that an extra week of vacation is associated with about one less week of work (column 5, row 1). The coefficient is -51.8 (2.0) when the demographic controls are added and -45.4 (2.1) when tenure, union membership, and government employment are added. Almost all of the effect is through weeks worked on the main job. The relationships between *VT* and hours/week and *VT* and annual hours on extra jobs are weak.¹³

¹³When we include the basic set of controls, we find that hours per week on the main job dropped by .199 (.040) with each extra week of vacation (column 2, row 2). This amounts to an annual reduction of about 10 hours

Table 4. Personal Characteristics and Vacation Time.

Explanatory Variable	Dependent Variable	
	Vacation Taken (VT) (1)	Vacation Paid (VP) (2)
Female	1.039 (0.097)	0.127 (0.052)
Education	0.456 (0.036)	0.175 (0.019)
Marital Status	0.221 (0.095)	0.020 (0.050)
Disability Status	-0.372 (0.087)	-0.034 (0.061)
Black	-0.302 (0.079)	-0.257 (0.044)
Non-White, Non-Black	-0.088 (0.161)	-0.315 (0.104)
Residence in SMSA	-0.071 (0.081)	0.196 (0.047)
Union Membership	0.487 (0.075)	0.184 (0.043)
Government Employment	1.205 (0.096)	0.673 (0.054)
R ²	0.177	0.239
N	10,734	10,734

Notes: The models control for experience (a cubic and an interaction between education and experience); tenure (a cubic); and dummy variables for union membership, government employment, residence in an SMSA, residence in a city with more than 500,000 people, three regions, and three calendar years. The sample selection criteria are described in the notes to Table 1. Robust panel standard errors are in parentheses.

In Table 3 we present estimates of the effects of *VP* on the hours measures controlling for demographic variables and the dummy $I(VP > 0)$. There is a substantial positive difference in weeks worked between persons who received one paid week and persons who received no paid vacation. The coefficient on *VP* is $-.631$ (.049) for weeks worked and -25.0 (4.91) for annual hours on all jobs (Table 3, columns 1 and 5). 2SLS estimates of the effect of *VP* on

for someone working 50 weeks. However, the coefficient on *VT* is only $-.072$ when seniority, union membership, and government employment are controlled for.

weeks worked using the first three powers of tenure as the excluded instruments are more negative than but reasonably consistent with the OLS estimates of the effect of *VT* in Table 2 and the OLS estimates of the effect of *VP*, especially when sampling error is kept in mind. Basically, an extra week of paid vacation is associated with a reduction in weeks worked on the main job with no offset or even a small reduction in the other dimensions of work hours.

It is interesting to compare our results for vacation time at the individual level to the cross-country analysis of Altonji and Oldham (2003). Altonji and Oldham regressed annual work hours on the minimum number of weeks of paid vacation and holiday required by law for a panel of several European countries and the United States. When they controlled for year and country, they found that an additional week of legislated paid vacation reduced annual hours worked by 51.9 (11.7) hours. This estimate in conjunction with other estimates for alternative specifications in their paper implies that mandating an extra week of paid vacation translates approximately one-for-one into a reduction in weeks worked. It suggests that the laws are binding for vacation time and that there is little or no offset through other dimensions of hours.

2.4 Personal Characteristics and Vacation Time

In Table 4 we display the coefficients on personal characteristics, union membership, and government employment in regressions for *VT* and *VP*. Controls for labor market experience (a cubic), education * experience, tenure (a cubic), city size, region, and calendar year are also included in the regression models (not reported).

Women took 1.039 (.097) more weeks of vacation than men but received only 0.127 (.052) more paid vacation. *VT* was .22 weeks higher for married than for single people, but the two groups did not differ in *VP*. Blacks received and took about .30 fewer weeks of vacation than whites.

Perhaps surprisingly, those with a health problem that hindered work took about 0.372

(0.087) fewer weeks of vacation but received about the same amount of paid vacation. One might speculate that health problems boost sick time but reduce reported vacation time taken for a given number of weeks of paid vacation. Paid sick leave might lead to a reduction in vacation time taken to recover from illness.¹⁴

2.5 The Relationship between Wage Rates and Weeks of Paid Vacation

Assume that a worker is on her labor supply curve and works 50 weeks a year. Then by the envelope theorem she should be willing to reduce weeks worked by one week in exchange for a reduction in pay of about 1/50th, or 2%. Alternatively, suppose the worker must choose between a job that offers two paid weeks of vacation with no unpaid leave permitted and a job offering one paid week and one unpaid week of vacation. The worker will be indifferent between the two jobs if they provide the same annual compensation. This will occur if the hourly wage rate for the job with two paid weeks is approximately 2% lower than the hourly wage for the job offering only one paid week of vacation. This prediction follows from the budget constraint. It is sharper than the predictions one normally obtains from the theory of compensating differentials because in most applications one does not know how the job attribute is valued, while

in the second example the person works fifty weeks in both jobs.¹⁵

On the other hand, the search theoretic models of Hwang, Mortensen, and Reed (1998), Lang and Majumdar (2004), and Dey and Flinn (2005) are consistent with a positive relationship between vacation weeks and wages. One possibility is that heterogeneity across firms in the value of a match leads some firms to adopt high wages and fringe benefits to increase offer acceptances and reduce turnover. The most likely story is that the amount of vacation leave that best balances preferences of firms and workers is increasing in the skill level of the jobs and is positively associated with wages. Wages and vacation time tend to move together as job changers move up and down the job quality ladder as a result of random search outcomes and employer learning about worker quality.

In Table 5 we report estimates of the effect of paid weeks of vacation on the log hourly wage rate. The sample consists of men and women and the regression models contain a full set of controls. Columns (1)–(2) report results for the combined sample of hourly and salary workers. Columns (3)–(4) are for hourly workers and columns (5)–(6) are for salary workers. The models in columns (1), (3), and (5) contain the linear term VP and the dummy $I(VP > 0)$. In contrast to the

¹⁴The Health and Retirement Survey (HRS) provides data on VP , on days of work missed due to health problems, and on the number of days of paid sick leave at full pay the individual earns each year, which we have converted to 5-day weeks. The data are only obtained for persons who are with new employers or who have changed positions with an employer. In a regression of weeks lost due to illness on VP , paid sick weeks, dummies for $I(VP > 0)$ and $I(\text{paid sick weeks} > 0)$, controls for demographic variables, seniority, union membership, and government employment, the coefficient on VP is $-.044$ (.029) and the coefficient on paid sick weeks is $.212$ (.053). Thus, there is little evidence that employees used paid vacation as sick leave. In a similar regression for paid sick weeks, the coefficient on paid vacation weeks is $.242$ (.031). This positive value is consistent with the view that the generosity levels of the various benefits that firms offered were positively correlated. We return to this issue in Section 2.5.

¹⁵If workers are over-employed at the standard level of vacation weeks, as some proponents of minimum vacation laws argue, the compensating differential for giving up a week of paid leave and working should be even larger than 1/50. To see this, assume that workers are not hours-constrained at a job offering the wage rate $w(VP^*)$ and VP^* paid weeks of vacation. Let $w(VP^{**})$ for some $VP^{**} < VP^*$ be the wage rate at which the individual is indifferent between working $52 - VP^*$ weeks and receiving $52 \cdot w(VP^*)$ and working $52 - VP^{**}$ weeks for $52 \cdot w(VP^{**})$. Following along the lines of Abowd and Ashenfelter's (1981) analysis of hours constraints, one can show that

$$\frac{w(VP^{**}) - w(VP^*)}{w(VP^*)} \approx .5 \frac{1}{e} \cdot \frac{(VP^* - VP^{**})^2}{52 \cdot (52 - VP^*)} + \frac{VP^* - VP^{**}}{52}$$

where e is the compensated labor elasticity. If e is .2 and VP^* is 5, then $w(2)$ should exceed $w(5)$ by about 6.7% of the $w(5)$ wage. If $VP^* = 5$, $w(2)$ should exceed $w(3)$ by about 2.3% of the $w(2)$ wage.

Table 5. The Effect of Weeks of Paid Vacation on the Log of the Hourly Wage.

Explanatory Variable	Sample					
	Hourly and Salary		Hourly Only		Salary Only	
	(1)	(2)	(3)	(4)	(5)	(6)
VP	0.054 (0.004)		0.077 (0.006)		0.028 (0.006)	
$I(VP > 0)$	-0.049 (0.019)		-0.131 (0.021)		0.109 (0.032)	
VP = 0		-0.068 (0.017)		-0.032 (0.020)		-0.156 (0.027)
VP = 1		-0.125 (0.012)		-0.110 (0.013)		-0.158 (0.027)
VP = 3		0.084 (0.010)		0.080 (0.013)		0.087 (0.015)
VP = 4		0.152 (0.013)		0.157 (0.018)		0.129 (0.018)
VP = 5		0.209 (0.020)		0.216 (0.026)		0.173 (0.028)
VP = 6		0.050 (0.035)		0.186 (0.036)		-0.032 (0.047)
VP = 7+		0.090 (0.027)		0.214 (0.055)		0.014 (0.030)
R ²	0.518	0.528	0.512	0.514	0.527	0.544
N	9,483	9,483	5,728	5,728	3,755	3,755

Notes: The table reports OLS regression coefficients relating the log hourly wage rate to measures of weeks of paid vacation. The wage measure is based on direct questions about rate of pay and refers to the main job at the time of the survey. In columns (1), (3), and (5) the vacation variables are the number of weeks (VP) and an indicator for $VP > 0$. Columns (2), (4), and (6) contain dummy variables for each number of weeks of paid vacation, with $VP = 2$ as the reference category. All models include education, a cubic in experience, education * experience, a cubic in seniority, dummies for sex, marital status, union membership, government employment, residence in an SMSA, residence in a city with more than 500,000 people, and disability status, two race dummies, three regional dummies, and calendar year dummies. The sample selection criteria are in the notes to Table 1. Robust panel standard errors are in parentheses.

simple compensating differentials story, for the hourly worker sample the coefficient on VP is .077 (.006), which is positive rather than negative. The value for salaried workers is .028 (.006).

Note, however, that the coefficient on $I(VP > 0)$ is large and negative for the combined sample and for hourly workers, although it is positive for salary workers. Columns (2), (4), and (6) report estimates of a model containing dummy variables for each vacation category, with $VP = 2$ as the reference category. As one can see, the move from 0 to 1 week is associated with a decrease in wages in all three samples, as predicted by the theory of compensating differentials, but the decrease is unreasonably large for hourly

and salary workers combined and for hourly workers. After that, wages rise substantially with additional weeks through the 5th week. We have already documented that the occupation and industry distribution of jobs with $VP = 0$ differed substantially from that of jobs offering paid vacation. We have also shown that VT was higher and annual weeks worked lower in jobs with $VP = 0$.

Presumably, the positive wage coefficient reflects bias from unobserved skills of the worker, characteristics of the job that influence wages and paid vacation in the same direction, or both. Such bias in wage level regressions is widely discussed in the compensating differentials literature. Adding two-digit occupation controls and two-digit

industry controls reduces the coefficient on $I(VP > 0)$ by about half but has little effect on the VP coefficient (not reported). A number of papers have used job changes to examine the link between wages and job characteristics, including early papers by Brown (1980) and Duncan and Holmlund (1983) and recent papers by Usui (2004) and Villanueva (2004). Using a sample of 747 job changers from the Health and Retirement Survey, we estimate wage change regressions of the form

$$(2.1) \quad \Delta W_{it} = a_0 + a_1 L_{it} + a_2 Q_{it} \Delta VP_{it} + a_3 Q_{it} \Delta [1(VP_{it} > 0)] + a_4 L_{it} \Delta VP_{it} + a_5 L_{it} \Delta [1(VP_{it} > 0)] + a_6 \Delta OCC_{it} + a_7 \Delta Z_{it} + u_{it},$$

where Δ is the first difference operator across time, W_{it} is the log wage, Q_{it} is 1 if the person changed jobs between surveys due to a quit and L_{it} is 1 if the person changed jobs due to a layoff, OCC_{it} is a vector of occupation dummies, and Z_{it} consists of a cubic in tenure, a quartic in experience, education * experience, health limitation dummies, and dummies for marital status, union membership, government employment, region, and year. We restrict the sample to persons who were under age 60, were not retired, and worked more than 35 hours per week in both the current and previous survey years. The mean of age in our regression sample is about 55, so the results may not be representative of the work force as a whole. (Details about variable construction for the HRS sample are available in Altonji and Usui 2005.)

For the combined sample of hourly and salary workers, the estimate of a_3 is .038 (.012) and the estimate of a_4 is .046 (.017). The positive coefficients cannot easily be attributed to bias from unobserved variation in worker skill and are also hard to square with a simple story about bias due to heterogeneity in wage offers across job matches for a given value of VP .

The positive association between wages and VP is mirrored in the relationship between VP and fringe benefits. Using fringe benefits data from the 1984 wave of the PSID, we obtain substantial positive coefficients when we regress dummies for whether the employer

provided health insurance, paid sick days, dental benefits, life insurance, and a pension plan on VP and the full set of controls (not shown). In the HRS we also find a strong positive association between VP and presence of a pension plan. We have also used the HRS to study the relationship between changes in benefits and changes in VP following a quit or a layoff using a regression specification analogous to (2.1). For both quits and layoffs, the change in the probability of having a pension plan is positively related to the change in the number of weeks of VP . The change in the probability that the worker got sick leave is also a positive function of VP in the case of quits.

In summary, we find that the wage and other job benefits vary positively with VP .

2.6 The Effects of Experience, Seniority, and Job Mobility on Vacation Time

In this section we measure the effects of experience and seniority on VP and VT , establish that vacation time is largely a function of tenure rather than labor market experience, and provide suggestive evidence that vacation time reflects broad firm policy rather than the preferences and bargaining power of individual workers.

OLS and instrumental variables estimates of the experience and tenure profiles. In Table 6 we present estimates of the effects of labor market experience and tenure on VT and VP . The estimates are based on regression models with a cubic in tenure, a quartic in experience, the interaction between experience and education, and a set of control variables. Column (1) presents OLS estimates of the effects of 2, 5, 10, and 20 years of tenure and 5, 10, 20, and 30 years of experience. The results show that VT rose by .312 (.027) over the first two years on the job, 1.28 (.071) over the first 10 years, and 2.07 (.086) over the first 20 years. The relationship between VT and experience is flat.¹⁶ Column (2) uses

¹⁶Simple crosstabs of VP by experience and seniority in the previous year for full-time men also indicate that VP and VT rose by about 2 weeks over the first 15 years on the job and that VP had little to do with experience conditional on tenure (not shown).

Table 6. The Effects of Tenure and Experience on *VT* and *VP*, OLS and IV Estimates.

<i>Tenure and Experience</i>	<i>Panel I</i> <i>Weeks of</i> <i>Vacation Taken (VT)</i> <i>1975–1991</i>		<i>Panel II</i> <i>Weeks of</i> <i>Vacation Taken (VT)</i> <i>1975–1977, 1984</i>		<i>Panel III</i> <i>Weeks of</i> <i>Paid Vacation (VP)</i> <i>1975–1977, 1984</i>	
	<i>OLS</i> <i>(1)</i>	<i>IV</i> <i>(2)</i>	<i>OLS</i> <i>(3)</i>	<i>IV</i> <i>(4)</i>	<i>OLS</i> <i>(5)</i>	<i>IV</i> <i>(6)</i>
2 Years of Tenure	0.312 (0.027)	0.285 (0.029)	0.313 (0.046)	0.259 (0.075)	0.338 (0.027)	0.257 (0.053)
5 Years of Tenure	0.723 (0.053)	0.640 (0.061)	0.722 (0.091)	0.618 (0.162)	0.769 (0.052)	0.601 (0.110)
10 Years of Tenure	1.280 (0.071)	1.073 (0.095)	1.272 (0.120)	1.143 (0.270)	1.319 (0.068)	1.080 (0.170)
20 Years of Tenure	2.071 (0.086)	1.590 (0.157)	2.082 (0.120)	1.941 (0.480)	2.066 (0.077)	1.818 (0.271)
5 Years of Experience	-0.124 (0.133)	-0.101 (0.136)	0.154 (0.243)	0.233 (0.257)	-0.302 (0.177)	-0.210 (0.185)
10 Years of Experience	-0.187 (0.170)	-0.124 (0.174)	0.156 (0.305)	0.260 (0.333)	-0.388 (0.218)	-0.245 (0.236)
20 Years of Experience	-0.171 (0.157)	0.014 (0.167)	0.086 (0.268)	0.202 (0.347)	-0.320 (0.190)	-0.133 (0.237)
30 Years of Experience	-0.080 (0.168)	0.235 (0.191)	0.098 (0.290)	0.278 (0.458)	-0.297 (0.214)	-0.077 (0.301)
R ²	0.187	0.185	0.177	0.176	0.240	0.238
N	55,485	55,485	10,734	10,734	10,734	10,734

Notes: The reported estimates of the effects of tenure and experience on *VT* and *VP* are calculated from regression models containing the variables listed in Specification 3 of Table 2. The IV results in columns (2), (4), and (6) treat both the time dummies and the tenure variables as endogenous and are based on Altonji and Shakotko's (1987) methodology. The deviation of the tenure variables from their job means are used as instruments, along with the deviation of the time dummies from their means for each individual. The sample selection criteria are described in the notes to Table 1. Robust panel standard errors are in parentheses.

Altonji and Shakotko's (1987) instrumental variables strategy to deal with the possibility that tenure is correlated with unobserved person-specific and job-specific heterogeneity that also influences *VT*. The estimated effects of seniority on *VT* are about 20% smaller than the OLS estimates, and the estimates of the effects of experience are close to zero.

The second panel of the table reports estimates for *VT* for the sample used to study *VP*. The estimates of the effects of seniority on *VT* are very similar to estimates for the full set of years, although the standard errors are much larger in the IV case.

The third panel reports estimates of the effects of tenure and experience on *VP*. The OLS and IV estimates of the effects of 10 years of tenure on *VP* are 1.319 (.068) and 1.080 (.170), respectively. In general, the

choice between the OLS and the IV estimators makes much less difference for vacation time than for wages. *VP* varies very little with experience. For both the OLS and the IV estimates, *VP* rises a bit more rapidly with tenure than does *VT*.

Tabulations of the 1997 EBS indicate that vacation days increased by an average of about one-half day per year over the first 20 years and very little after that.¹⁷ The EBS is very consistent with the PSID-based estimates of the tenure profile of *VP*.¹⁸

¹⁷See U.S. Department of Labor (1999), Table 13. Buckley (1989) presented summary tables on paid vacation time using the Employee Benefits Survey for 1983–86.

¹⁸In their study of the effect of tenure on wages using PSID data, Altonji and Williams (2005) used both a

Table 7. The Link across Jobs in Vacation Weeks Taken, Hours Worked per Week, and Hourly Rate of Pay.

<i>Explanatory Variable</i>	<i>All Job Changers</i> (1)	<i>Quits</i> (2)	<i>Layoffs</i> (3)
Effects of Vacation Taken in Previous Job on Vacation Taken in New Job			
Average of VT in Last Two Years	0.092 (0.069)	0.145 (0.092)	0.176 (0.087)
R ²	0.199	0.259	0.316
N	1,268	767	347
Effects of Hours Worked Per Week on Previous Job on Hours Worked Per Week in New Job			
Average of Hours/Week in Last Two Years	0.269 (0.045)	0.304 (0.066)	0.306 (0.069)
R ²	0.236	0.224	0.363
N	1,286	774	350
Effects of Hourly Rate of Pay on Previous Job on Hourly Rate of Pay in New Job			
Average of Log Wage in Last Two Years	0.668 (0.031)	0.689 (0.041)	0.643 (0.063)
R ²	0.713	0.744	0.754
N	1,078	636	303

Notes: The models include 27 dummies for occupation in the previous job, with missing occupation treated as a separate category. All models control for education, experience (a cubic and an interaction between education and experience), seniority (a cubic), and dummies for sex, marital status, union membership, government employment, residence in an SMSA, residence in a city with more than 500,000 people, disability status, two race dummies, three regional dummies, and calendar year dummies. The sample selection criteria are described in the notes to Table 1. Robust panel standard errors are in parentheses.

The link between vacation weeks across jobs. If vacation time can be bargained over, then workers who had long vacations on their previous job will use this as a bargaining chip for more vacation time on the new job in much the same way that wage rates on a previous job influence reservation wages for any new job. Furthermore, if the amount of paid and unpaid leave is to some extent at employees' discretion, then those who chose relatively long vacations on a previous job are likely to choose long vacations on the new job. On the other hand, if vacation time is set by rigid firm-wide policy, then prior vacation time will have little influence on the vacation in the new job, other than through job selection.

wage measure based on direct questions about hourly or weekly, monthly, or yearly wages and earnings divided by total hours worked. Our estimates of the tenure profile of vacation weeks suggest that use of the direct wage measure will lead one to understate the effect of tenure on the log hourly wage by about .02 over ten years.

In Table 7 we report the coefficient of the regression of VT in the current job on the average of VT during the last two years of the previous job and a full set of controls, including occupation of the previous job, current seniority, and experience.¹⁹ We average VT to reduce the effects of reporting error and random variation in the timing of vacation taken on the previous job. The coefficient on past VT is only .092 (.069). When we restrict the sample to cases in which the previous job ended due to a quit, we obtain .145 (.092). The corresponding estimate for layoffs is .176 (.087). Measurement error in the two-year averages probably biases these estimates downward. Regressions for VP yield qualitatively similar results.

Taken at face value, the results suggest that prior vacation had only a small effect on vacation in the new job. Some relation-

¹⁹We continue to drop an observation if tenure at the survey date is less than .5 or if it is the last observation on the job.

ship would be expected to arise through the effect of vacation time in the old job on the reservation locus of job characteristics to induce a job change. It is fully consistent with the fact that tenure in the previous job had little to do with vacation time in the new job.²⁰ Evidently, people who had a lot of vacation in their old job were unable or unwilling to bargain for similar vacation in the new job. To a large degree, vacation policy was set firm-wide.

To put the results in perspective, the middle panel of Table 7 reports regressions of hours per week in the current job on the average of hours per week in the last two years in the previous job. For all job changers the coefficient is .269 (.045). The coefficients are larger than the corresponding values for vacation time, but suggest that work hours were heavily influenced by the specific job and not easily amenable to bargaining. In contrast, the bottom panel presents regressions of the log of the hourly wage rate in the current job on the average for the last two years in the previous job. The coefficient for all job changers is .668 (.031). Part of the difference probably reflects a more important role for fixed individual heterogeneity in the determination of wage rates than in the preferences for hours. That is, even if people are perfectly free to choose hours per week and vacation time, there might be less heterogeneity in these variables than in the productivity factors underlying wage rates. Overall, the results suggest, in common with other evidence regarding work hours mentioned in the introductory paragraphs, that vacation time as well as work hours are

governed by broad policies of the employer. They are not heavily influenced by the preferences or alternative opportunities of a particular worker.

2.7 The Effects of Union Membership, Government Employment, Industry and Occupation, and Gender on Vacation Time

The above analysis suggests that vacation time reflects employer policy. We now examine variation in vacation time across job types. Conditional on demographic characteristics and experience and tenure, union membership boosted *VT* by .487 (.075) weeks and *VP* by only .184 (.043) weeks. Compared to private sector employees, government workers took 1.21 (.096) more weeks of vacation per year and received .673 (.054) more paid weeks (Table 4, columns 1 and 2). Perhaps unions and civil service structures suppress “rat races” and so reduce employees’ incentive to forgo paid vacation. Another potential explanation for the results for government workers is that “comp” time is more prevalent in the public sector than the private sector and is taken as additional vacation but is not reported as paid vacation. We do not have any evidence on this.

Table 8 presents estimates of the effects of occupation on *VT* and *VP* when demographic characteristics, seniority, union membership, and government membership are controlled for. The reference occupation is “Operatives, Except Transport.” For *VT* we report estimates using the sample for 1975–91. The largest coefficient in the *VP* equation is 2.42 (.205), which is for the armed forces. Interestingly, for that group the coefficient on *VT* is only .437 (.130). In general, there are positive coefficients for *VP* in professional occupations. The two largest coefficients on *VT* are, not surprisingly, 7.44 (.195) for K12 teachers and 2.63 (.413) for college teachers and librarians.²¹

²⁰For a sample of job changers, a tabulation of weeks taken (*VT*) on the new job by experience and tenure on the previous job shows little systematic variation with either experience or prior tenure (not shown). This is true for both quits and layoffs considered separately. These results indicate that seniority-based vacation was usually lost when a person changed employers. They reinforce our finding of a relatively weak link between vacation on the previous job and the current job controlling for seniority on the current job. They suggest that employees were unable or unwilling to negotiate vacation in the new job on the basis of vacation in the previous one.

²¹We also regressed *VP* on characteristics drawn from the *Dictionary of Occupational Titles*, entering characteristics one at a time in regressions with our full set of control variables (not shown). Measures of general education development (math, language, and reasoning) and specific vocational preparation (*SVP*)

Table 8. The Effects of Occupation on Vacation Weeks Taken and Vacation Weeks Paid.

Explanatory Variable	Dependent Variable			
	Vacation Taken (VT)		Paid Vacation (VP)	
	Coefficient	Std. Error	Coefficient	Std. Error
Physician, Dentist	0.214	0.241	0.783	0.500
Other Medical & Paramedical	0.436	0.227	0.993	0.277
Accountant, Auditor	-0.055	0.127	0.261	0.096
K-12 Teacher	7.435	0.195	0.550	0.321
College Teacher, Librarian	2.628	0.413	0.256	0.322
Architect, Physical & Biological Scientist	0.021	0.106	0.242	0.082
Technician	0.136	0.088	0.466	0.108
Public Advisor	-0.223	0.127	0.371	0.131
Judge, Lawyer	-0.485	0.149	0.565	0.186
Other Professional	1.544	0.477	0.182	0.326
Manager, Official, Proprietor (not self-empl.)	-0.058	0.077	0.273	0.071
Manager, Official, Proprietor (self-empl.)	0.639	1.101	-0.954	2.364
Secretary, Typist	-0.052	0.106	0.209	0.089
Other Clerical Worker	0.146	0.078	0.316	0.061
Retail Store Salesman, Sales Clerk	-0.145	0.081	-0.152	0.087
Craftsman, Foreman	0.093	0.090	0.356	0.084
Other Craftsman	-0.153	0.071	-0.226	0.054
Government Protective Service Worker	0.087	0.174	0.322	0.166
Armed Forces	0.437	0.130	2.416	0.205
Transport Equipment Operative	-0.041	0.091	0.042	0.066
Unskilled Laborer	-0.377	0.078	-0.301	0.075
Farm Laborer, Farm Foreman	-0.417	0.185	-1.067	0.149
Private Household Worker	-0.773	0.253	-1.132	0.210
Other Service Worker	-0.011	0.086	-0.077	0.067
Farmer & Farm Manager	0.146	0.484	-0.883	0.371
R ²	0.354		0.275	
N	55,056		10,368	

Notes: The reference category for the occupational dummies is operatives, except transport. All models control for education, a cubic in experience, education * experience, a cubic in seniority, dummies for sex, marital status, union membership, government employment, residence in an SMSA, residence in a city with more than 500,000 people, and disability status, two race dummies, three regional dummies, and calendar year dummies. The sample selection criteria are described in the note to Table 1. Robust panel standard errors are in parentheses.

Vacation policy and hours preferences of the median worker: the effect of percent female in an occupation on vacation time. Rosen (1969) and Deardorff and Stafford's (1976) analyses suggest that job characteristics will be determined in part by the preferences of the typical worker in a job. Women work fewer

hours than men even among full-time workers. Usui (2004) showed that for both men and women, average annual hours worked is negatively related to the proportion female in an occupation. In the PSID vacation time is positively related to the proportion female in an occupation. Did the large changes over the past three decades in the gender composition of the work force and the sharp increase in women's work hours weaken the relationship? The coefficient on percent female in an occupation is .488 (.210) for men and 1.28 (.363) for women for the years 1975-83 in regressions that control for demographic characteristics, seniority, union membership, government employment, a detailed list of occupational characteristics based on the

all enter positively and are highly statistically significant. Measures of strength, climbing, stooping, balancing, kneeling, crouching, crawling, reaching, handling, fingering, feeling, talking, hearing, tasting/smelling, near acuity, far acuity, depth perception, accommodation, color vision, and field of vision are negative in most cases. Proxies for bad environmental conditions typically enter negatively and are statistically significant in some cases.

Dictionary of Occupational Titles, and a dummy for whether the person is a teacher. For the period 1983–91, the coefficient is .237 (.200) for men and .597 (.298) for women. One hypothesis is that the decline in coefficients, although not statistically significant, is the result of a decrease in the desired number of weeks of vacation among women between the two periods, as the labor force attachment of women increased. Unfortunately, we cannot examine changes in the link between *VP* and percent female over the same period.

2.8 Implicit Contracts, Intertemporal Substitution over the Business Cycle, and Vacation Time

To the extent that leisure is substitutable over time at annual frequencies, one might expect $VT - VP$ to be countercyclical. It is efficient for workers to shift *VT* from booms to periods when business is slow. Research on intertemporal substitution over the business cycle has generally failed to explain movements in hours as a response on the labor supply curve to procyclical movements in wage rates. However, Barro (1977) and others have argued that hours per week and annual weeks worked are governed by implicit contracts in which hours decisions respond to an unobservable shadow price of labor that equates marginal revenue production with the marginal utility of leisure rather than to the contractual wage, which reflects marginal revenue product over a longer horizon. Such models are difficult to assess, however, because the shadow price is not observed. An examination of *VT* relative to *VP* provides a window on this possibility. Under such an implicit contract, the timing of vacations would respond to the needs of the firm as well as the needs of the worker. Under the reasonable assumption that firms do not change paid vacation policy in response to short-term business conditions, cyclical variation in $VT - VP$ would be similar to variation in *VT*, ignoring compositional changes in the job mix and work force over the business cycle.

We examine this issue by regressing *VT* on state-level business cycle indicators for 1975–91. The indicators consist of the state

unemployment rate and the change in the state unemployment rate. We control for individual fixed effects to guard against spurious correlation between the labor market indicators and unobserved compositional changes in the work force that influence vacation time, as well as for education, experience, job seniority, union membership, government employment, marital status, disability status, city size, region, and a quadratic time trend. Standard errors account for clustering at the state-year level. In separate regressions we obtain a coefficient of .012 (.007) when we use the state unemployment rate as our business cycle indicator and a coefficient of .025 (.008) when we use the change in the state unemployment rate. The results suggest that vacation time was in fact weakly countercyclical, as predicted by models of intertemporal substitution. In summary, we have a little evidence that firms and workers adjusted weeks worked through the timing of vacations in response to changes in demand, but the magnitudes are very small.²²

3. Conclusion

Once one steps beyond the standard labor supply model of hours determination in which workers are free to choose how much to work at a parametric wage, the study of work hours becomes very complicated. Vacation policy is a key component of the regulation of work hours and is an important job attribute, but has been the subject of very little research. Using the PSID and other sources, we have provided the first detailed analysis of paid vacation time and vacation time actually taken. Our main findings are as follows.

There was substantial variation in both *VP* and *VT*. An increase in *VP* led to an increase of one week in *VT*, but there was a significant amount of variation in *VT* around *VP*. There is little evidence that an extra week of *VP* was offset by increases in other dimensions of work hours, such as hours per week or

²²If consumers are credit-constrained, then complementarity between market goods (travel fares, lodging, and so on) and time in the production of vacations is an offsetting force that could lead to procyclical variation in vacation time taken.

annual hours on other jobs. An extra week of *VP* reduced annual hours worked by approximately one week.

Women took about one more week of vacation than men, but received only slightly more paid vacation. Part of the gender difference in *VT* – *VP* is related to the high concentration of women in education and related fields. *VP* and *VT* were both a bit higher for married people than for single people and about .26 weeks lower for blacks than for whites.

Hourly wage rates as well as our broad array of fringe benefits were positively related to *VP* both in the cross-section and across jobs.

Both *VP* and *VT* increased with seniority but were largely unrelated to labor market experience (conditional on seniority). For job changers, vacation time on the previous job had little relationship with vacation time on the new job. Our results suggest that vacation time is determined by firm-wide policy and tends not to reflect the preferences and bargaining power of individual employees. Coordination costs do not provide a full explanation for the lack of heterogeneity, because within a firm vacation time varies with

seniority. As noted in the introduction, a possible explanation is that correlation between hours preferences and unobserved factors that influence productivity and turnover may make workers reluctant to bargain.

Both *VT* and *VP* were higher for union members and government workers. *VT* and *VP* varied substantially across occupations and industries. *VT* was positively associated with percent female in an occupation when the analysis controlled for the gender of the worker and other characteristics. The relationship between percent female and *VT* declined over time, which is consistent with models in which the hours policy of the firm reflects the typical worker, and the work preferences of women and men have converged to some extent.

Vacation time taken was countercyclical, as predicted by some equilibrium business cycle models, but the relationship was very weak.

A natural program for future research is the development and empirical testing of alternative models of the role of firms in determining work hours mentioned in the introduction, with particular attention to leave policy.

Appendix

Description of Variables Used (All Variables from the Panel Study of Income Dynamics)

Employment Variables

Paid vacation (VP). In 1975–77 and 1984, heads of household were asked how much paid vacation they were allotted, and in 1976 and 1984 spouses were asked the same question. In 1975–77, respondents were asked, “How many weeks of paid vacation do you get each year?” In 1984, respondents who answered “yes” to “Not counting holidays like Christmas and Labor Day, do you get paid vacation or personal days?” were asked, “How much paid vacation or personal time do you get each year?” In 1984, respondents reported *VP* either in days per year, weeks per year, hours per year, or other (combination). We converted days per year and hours per year to 5-day weeks, assuming 8 hours per day, and rounded to the nearest integer.

Vacation taken (VT). Respondents who answered “yes” to “Did you take any vacation or time off during 19XX?” were asked, “How much vacation or time off did you take?”

Indicators for quits and layoffs, job seniority, and labor market experience are taken from Altonji and Williams (2005).

Hourly rate of pay. To reduce the influence of measurement error and outliers, reported wage rates less than \$1.5 were set to missing.

Industry and occupation. Coded based on three-digit 1970 Census codes.

0-1 indicators for union membership and government employment.

Demographic Variables

Marital status. 0–1 indicator for married with spouse present and never married, divorced, separated, or deceased.

Race. Separate 0–1 indicators for black and nonwhite/nonblack. The excluded category in the regressions is white.

Education. 1–16 (16 = fourth year college), 17 (at least some graduate work).

Health limitation. 0–1 indicator for whether the respondent has a physical or nervous condition that limits the type of work or the amount of work.

Region and urbanicity of current residence. We include separate 0-1 indicators for Northeast, North Central, and West. The excluded category is South. Our urbanicity measures are a 0-1 indicator for whether the residence is in an SMSA and a 0-1 indicator for whether the residence is in a city of more than 500,000 people.

REFERENCES

- Aaronson, Daniel, and Eric French. 2004. "The Effect of Part-Time Work on Wages: Evidence from the Social Security Rules." *Journal of Labor Economics*, Vol. 22, No. 2 (April), pp. 329–52.
- Abowd, John M., and Orley C. Ashenfelter. 1981. "Anticipated Unemployment, Temporary Layoffs, and Compensating Wage Differentials." In Sherwin Rosen, ed., *Studies in Labor Markets*, pp. 141–70. Chicago: University of Chicago Press.
- Altonji, Joseph G., and Jennifer Oldham. 2003. "Vacation Laws and Annual Work Hours." Federal Reserve Bank of Chicago *Economic Perspectives*, Vol. 27, Third Quarter, pp. 19–29.
- Altonji, Joseph G., and Christina H. Paxson. 1986. "Job Characteristics and Hours of Work." In Ronald G. Ehrenberg, ed., *Research in Labor Economics*, Vol. 8, Part A, pp. 1–55. Greenwich, Conn.: Westview.
- _____. 1988. "Labor Supply Preferences, Hours Constraints, and Hours-Wage Tradeoffs." *Journal of Labor Economics*, Vol. 6, No. 2 (April), pp. 254–76.
- Altonji, Joseph G., and Robert A. Shakotko. 1987. "Do Wages Rise with Job Seniority?" *Review of Economic Studies*, Vol. 54, No. 3 (July), pp. 437–59.
- Altonji, Joseph G., and Emiko Usui. 2005. "Work Hours, Wages, and Vacation Leave." NBER Working Paper No. 11694 (October).
- Altonji, Joseph G., and Nicolas Williams. 2005. "Do Wages Rise with Job Seniority? A Reassessment." *Industrial and Labor Relations Review*, Vol. 58, No. 3 (April), pp. 370–97.
- Barro, Robert J. 1977. "Long-Term Contracting, Sticky Prices, and Monetary Policy." *Journal of Monetary Economics*, Vol. 3, No. 3 (July), pp. 305–16.
- Beam, Burton T., Jr., and John J. McFadden. 1998. *Employee Benefits*, 5th ed. Chicago: Dearborn Financial Publication.
- Blank, Rebecca M. 1990. "Understanding Part-Time Work." In Laurie J. Bassi and David L. Crawford, eds., *Research in Labor Economics*, Vol. 11, pp. 137–58. Greenwich, Conn.: JAI Press.
- Biddle, Jeff E., and Gary Zarkin. 1989. "Choice among Wage-Hours Packages: An Empirical Investigation of Male Labor Supply." *Journal of Labor Economics*, Vol. 7, No. 4 (October), pp. 415–37.
- Blundell, Richard, and Thomas MaCurdy. 1999. "Labor Supply: A Review of Alternative Approaches." In Orley C. Ashenfelter and David Card, eds., *Handbook of Labor Economics*, Vol. 3A, Chap. 27, pp. 1559–1695. Amsterdam: Elsevier Science.
- Brown, Charles. 1980. "Equalizing Differences in the Labor Market." *Quarterly Journal of Economics*, Vol. 94, No. 1 (February), pp. 113–34.
- Buckley, John E. 1989. "Variations in Holidays, Vacations, and Area Pay Levels." *Monthly Labor Review*, Vol. 112, No. 2 (February), pp. 24–31.
- Deardorff, Alan V., and Frank P. Stafford. 1976. "Compensation and Cooperating Factors." *Econometrica*, Vol. 44, No. 4 (July), pp. 671–84.
- Dey, Matthew S., and Christopher J. Flinn. 2005. "An Equilibrium Model of Health Insurance Provision and Wage Determination." *Econometrica*, Vol. 73, No. 2 (March), pp. 571–627.
- Duncan, Greg J., and Bertil Holmlund. 1983. "Was Adam Smith Right after All? Another Test of the Theory of Compensating Wage Differentials." *Journal of Labor Economics*, Vol. 1, No. 4 (October), pp. 366–79.
- Ehrenberg, Ronald G. 1971. *Fringe Benefits and Overtime Behavior: Theoretical and Econometric Analysis*. Lexington, Mass.: Lexington Books.
- Elder, Todd E. 2004. "Reemployment Patterns of Displaced Older Workers." Unpublished paper, University of Illinois at Urbana-Champaign.
- Gustman, Alan L., and Thomas L. Steinmeier. 1984. "Partial Retirement and the Analysis of Retirement Behavior." *Industrial and Labor Relations Review*, Vol. 37, No. 3 (April), pp. 403–15.
- Ham, John C. 1986. "Testing Whether Unemployment Represents Intertemporal Labour Supply." *Review of Economic Studies*, Vol. 53, No. 4 (August), pp. 559–78.
- Hamermesh, Daniel S. 1996. *Workdays, Workhours, and Work Schedules: Evidence for the United States and Germany*. Kalamazoo, Mich.: W. E. Upjohn Institute for Employment Research.
- _____. 1998. "When We Work." *American Economics Review*, Vol. 88, No. 2 (May), pp. 321–25.
- _____. 1999. "The Timing of Work over Time." *Economic Journal*, Vol. 109, No. 452 (January), pp. 37–66.
- Hanoch, Giora. 1980. "Hours and Weeks in the Theory of Labor Supply." In James Smith, ed., *Female Labor Supply: Theory and Estimation*, pp. 119–65. Princeton, N.J.: Princeton University Press.
- Hurd, Michael D. 1996. "The Effect of Labor Market Rigidities on the Labor Force Behavior of Older Workers." In David A. Wise, ed., *Advances in the Economics of Aging*, pp. 11–58. Chicago: University of Chicago Press.
- Hwang, Hae-shin, Dale T. Mortensen, and W. Robert Reed. 1998. "Hedonic Wages and Labor Market Search." *Journal of Labor Economics*, Vol. 16, No. 4 (October), pp. 815–47.
- Kahn, Shulamit B., and Kevin Lang. 1995. "The Causes of Hours Constraints: Evidence from Canada." *Canadian Journal of Economics*, Vol. 28, No. 4a (November), pp. 914–28.
- Killingsworth, Mark R. 1983. *Labor Supply*. Cambridge: Cambridge University Press.
- Kniesner, Thomas J. 1993. "Review Essay: The Overworked American?" *Journal of Human Resources*, Vol. 28, No. 3 (Summer), pp. 681–88.
- Lang, Kevin, and Sumon Majumdar. 2004. "The Pricing of Job Characteristics When Markets Do Not Clear: Theory and Policy Implications." *International Economic Review*, Vol. 45, No. 4 (November), pp. 1111–28.
- Landers, Renee M., James B. Rebitzer, and Lowell J. Taylor. 1996. "Rat Race Redux: Adverse Selection in the Determination of Work Hours in Law Firms." *American Economic Review*, Vol. 86, No. 3 (June), pp. 329–48.
- Maniaci, Serafina. 2001. "Time-Off Benefits and Family and Medical Leave Program." In Jerry S. Rosenbloom, ed., *The Handbook of Employee Benefits: Design, Funding, and Administration*, 5th ed., Chap. 18, pp. 423–36. New

- York: McGraw-Hill.
- Martinez-Granado, Maite. 2005. "Testing Labour Supply and Hours Constraints." *Labour Economics*, Vol. 12, No. 3 (June), pp. 321–43.
- Moffitt, Robert. 1984. "The Estimation of a Joint Wage-Hours Labor Supply Model." *Journal of Labor Economics*, Vol. 2, No. 4 (October), pp. 550–66.
- Paxson, Christina H., and Nachum Sicherman. 1996. "The Dynamics of Dual Job Holding and Job Mobility." *Journal of Labor Economics*, Vol. 14, No. 3 (July), pp. 357–93.
- Pencavel, John. 1986. "Labor Supply of Men." In Orley C. Ashenfelter and Richard Layard, eds., *Handbook of Labor Economics*, Vol. 1, Chap. 1, pp. 3–102. Amsterdam: Elsevier Science.
- Rebitzer, James B., and Lowell J. Taylor. 1995. "Do Labor Markets Provide Enough Short-Hour Jobs? An Analysis of Work Hours and Work Incentives." *Economic Inquiry*, Vol. 33, No. 2 (April), pp. 257–73.
- Rosen, Harvey S. 1976. "Taxes in a Labor Supply Model with Joint Wage-Hours Determination." *Econometrica*, Vol. 44, No. 3 (May), pp. 485–507.
- Rosen, Sherwin. 1968. "Short-Run Employment Variation on Class-I Railroads in the U.S., 1947–1963." *Econometrica*, Vol. 36, No. 3/4 (July/October), pp. 511–29.
- Schor, Juliet B. 1991. *The Overworked American: The Unexpected Decline of Leisure*. New York: Basic Books.
- Senesky, Sarah. 2005. "Testing the Intertemporal Labor Supply Model: Are Jobs Important?" *Labour Economics*, Vol. 12, No. 6 (December), pp. 749–72.
- Sousa-Poza, Alfonso, and Alexandre Ziegler. 2003. "Asymmetric Information about Workers' Productivity as a Cause for Inefficient Long Working Hours." *Labour Economics*, Vol. 10, No. 6 (December), pp. 727–47.
- Stafford, Frank P. 1992. Review of *The Overworked American: The Unexpected Decline of Leisure*, by Juliet B. Schor. *Journal of Economic Literature*, Vol. 30, No. 3 (September), pp. 1528–29.
- U.S. Department of Labor. 1983. *Employee Benefits in Medium and Large Private Firms, 1982*. Bulletin 2176. Washington, D.C.: Bureau of Labor Statistics, August.
- _____. 1989. *Employee Benefits in Medium and Large Private Firms, 1988*. Bulletin 2336. Washington, D.C.: Bureau of Labor Statistics, August.
- _____. 1994. *Employee Benefits in Medium and Large Private Establishments, 1993*. Bulletin 2456. Washington, D.C.: Bureau of Labor Statistics, November.
- _____. 1999. *Employee Benefits in Medium and Large Private Establishments, 1997*. Bulletin 2517. Washington, D.C.: Bureau of Labor Statistics, September.
- Usui, Emiko. 2004. "Wages, Non-Wage Characteristics, and Predominantly Female Jobs." Unpublished paper, Wayne State University.
- Villanueva, Ernesto. 2004. "Compensating Wage Differentials and Voluntary Job Changes: Evidence from Germany." Unpublished paper, Universitat Pompeu Fabra.