Mayer, S., & Knutson, D. (1996). *Early Education Versus More Education: Does the Timing of Education Matter?*. Harris School, University of Chicago, unpublished draft.

Mortimore, P., Sammons, P., Stoll, L., Lewis, D., & Ecob, R. (1988). *School Matters: The Junior Years*. Somerset, U.K.: Open Books.

Moretti, E. (1998). *Social Returns to Education and Human Capital Externalities: Evidence from Cities*. Berkeley, CA: Institute of Industrial Relations, Center for Labor Economics Working Paper No. 9.

O'Callaghan, E., Gibson, T., Colohan, H. A., Walshe, D., Buckley, P., Larkin, C., & Waddington, J. L. (1991). Season of Birth in Schizophrenia: Evidence for Confinement of an Excess of Winter Births to Patients Without a Family History of Mental Disorder. *British Journal of Psychiatry, 158*, 764–769.

Rauch, J. E. (1993). Productivity Gains from Geographic Concentration of Human Capital: Evidence from the Cities. *Journal of Urban Economics, 34*, 380–400.

Rumberger, R. W. (1987). High School Dropouts: A Review of Issues and Evidence. *Review of Educational Research, 57*, 101–121.

Seiver, D. A. (1985). Trend and Variation in the Seasonality of United States Fertility, 1947–1976. *Demography, 22*, 89–100.

Sham, P. C., O'Callaghan, E., Takei, N., Murray, G. K., Hare, E. H., & Murray, R. M. (1992). Schizophrenia Following Prenatal Exposure to Influenza Epidemics Between 1930 and 1960. *British Journal of Psychiatry, 160*, 461–466.

Solon, G. (1992). Intergenerational Income Mobility in the United States. *American Economic Review, 82*, 393–408.

Staiger, D., & Stock, J. H. (1997). Instrumental Variables Regression with Weak Instruments. *Econometrica, 65*, 557–586.

Steckel, R. H. (1983). The Economic Foundations of East–West Migration during the 19th Century. *Explorations in Economic History, 20*, 14–36.

Steckel, R. H. (1989). Household Migrations and Rural Settlement in the United States, 1850–1860. *Explorations in Economic History, 26*, 190–218.

Tarnowski, K. J., Anderson, D. F., Drabman, R. S., & Kelly, P. A. (1990). Disproportionate Referrals for Child Academic/Behavior Problems: Replication and Extension. *Journal of Consulting and Clinical Psychology, 58*, 240–243.

Templer, D. I., Trent, N. H., Spencer, D. A., Trent, A., Corgiat, M. D., Mortensen, P. B., & Gorton, M. (1991). Season of Birth in Multiple Sclerosis. *Acta Neurologica Scandinavica, 85*, 107–109.

Watson, C. G., Kucala, T., Tilleskjor, C., & Jacobs, L. (1984). Schizophrenic Birth Seasonality in Relation to the Incidence of Infectious Diseases and Temperature Extremes. *Archives of General Psychiatry, 41*, 85–90.

White, H. (1980). Heteroskedasticity-Consistent Covariance Matrix Estimation and a Direct Test for Heteroskedasticity. *Econometrica, 48*, 817–838.

Whorton, J. E., & Karnes, F. A. (1981). Season of Birth and Intelligence in Samples of Exceptional Children. *Psychological Reports, 49*, 649–650.

Williams, P., Davies, P., Evans, R., & Ferguson, N. (1970). Season of Birth and Cognitive Development. *Nature, 228*, 1033–1036.

Willis, R. J. (1986). Wage Determinants: A Survey and Reinterpretation of Human Capital Earnings Functions. In: O. Ashenfelter & R. Layard (Eds), *Handbook of Labor Economics* (pp. 525–602). Amsterdam: North-Holland.

MOTIVATION AND LABOR MARKET OUTCOMES

Arthur H. Goldsmith, Jonathan R. Veum and William Darity, Jr.

I. INTRODUCTION

This chapter proposes and tests a theory of the relationship between human capital and wages that explicitly accounts for the influence of motivation on the utilization of skills. In addition, we present estimates of the short-run impact of motivation, a so-called '*soft skill*', on wages and a host of labor market outcomes including labor force participation, job separation, formal on-the-job training, and job satisfaction.

Economists ordinarily treat motivation as part of unobserved individual-specific heterogeneity. However, a handful of economists and social psychologists have examined the influence of motivation on subsequent labor market outcomes. These studies have explored the effect of motivation on labor market developments either in the intermediate-run (e.g. a few years later) or the long-run (e.g. many years later). This study adds to the literature by offering evidence on the contribution of motivation in the short-run to wages and other labor market outcomes.

The theory advanced of the relationship between motivation and wages predicts that the influence of human capital on wages is contingent upon motivation. If this is the case, then existing estimates of the wage returns to human capital investment are biased, even if they have been derived using a fixed-effects model.

Worker Well-Being, Volume 19, pages 109–146.

ISBN: 0–7623–0693–9

Psychologists believe that a primary determinant of personal motivation is expectancy, such as an individual's assessment that their actions will lead to the accomplishment of a desired outcome. In their view, a person's locus of control reflects their expectancy attitude. Moreover, locus of control *can* be detected by employers and can be measured by investigators. Many employers administer the Myers-Briggs personality inventory to job candidates and employees, so there is evidence that employee psychological health is important enough to firms and that they devote resources towards its measurement. Measures of locus of control are available in the National Longitudinal Survey of Youth (NLSY). Using data drawn from the NLSY we examine four questions regarding the influence of motivation on labor market outcomes.

First, is the contribution of human capital to wages mediated by a person's level of motivation? Second, how inaccurate are estimates of the wage return to human capital if the contribution of motivation to productivity, and hence wages, is ignored? Third, do more motivated workers receive higher wages in the short-run? Finally, is motivation both a rapid and significant determinant of labor market outcomes; within a year following measurement of motivation, do more motivated individuals have a greater likelihood of participating in the labor force, taking part in formal on-the-job training, attachment to their job and being satisfied with their job?

This work is organized as follows: In Section II we specify a model of real wage determination that explicitly accounts for the contribution motivation to productivity. In Section III we discuss the role of expectancy, a central component of the theory of individual motivation. In addition, we discuss why an operational feature of personality, locus of control, can be used to measure an individual's motivation. Section IV contains a description of our empirical procedures, including our data set, our approach to measurement of motivation, our model specification, and our estimation techniques. We present estimates of the wage return to an increase in a person's stock of human capital when motivation is taken into account in Section V. In Section VI we present our findings on the contribution of motivation to four other labor market outcomes in the short-run. Finally, concluding remarks appear in Section VII.

We find that both motivation and human capital, measured by schooling, work place experience, and academic achievement, are important determinants of the wage. The evidence suggests that the impact of human capital accumulation on wages depends on motivation. Specifically, we find that for the data set as a whole, for males, females, blacks, and Hispanics, the influence of human capital accumulation on a person's wage is contingent upon their motivation. This evidence is consistent with the view that motivation influences the portion of a person's human capital they access. Thus, more motivated persons are able to make use of a larger amount of their additional human capital raising the monetary benefit of human capital accumulation. Therefore, we find that the wage return to human capital investment is underestimated when motivation is omitted from the model of wage determination. Finally, our findings reveal that in the short-run more motivated persons are more likely to participate in the labor force, partake in on-the-job training, exhibit greater attachment to their job, and are more satisfied with their job.

II. MOTIVATION, HUMAN CAPITAL, AND PRODUCTIVITY

A Theory of Human Efficiency

Motivation is the willingness to exert high levels of effort to reach a goal. Economists Kim and Polachek (1994) recognize that motivation differs among people and is likely to influence their productivity. How else can we explain the hardworking individual with modest skills who consistently outperforms other more gifted persons? Motivation entails an abnormal physical effort or a greater mental commitment to work, or both. With respect to mental commitment, Seligman (1975) and Seligman and Maier (1967) found that more motivated persons tend to memory scan (i.e. search their memory banks for appropriate information) more rapidly and accurately. More motivated persons also engage in more thoughtful, higher order cognitive behavior.

Conventional economic theory says the stock of human capital that a person possesses determines their capacity to initiate and complete tasks. However, the extent to which a person mobilizes their skills – the person's 'effective' human capital – is governed by their mental proficiency, which in turn depends on their motivation. Thus, more motivated individuals—those with greater mental proficiency—are able to access a larger portion of their human capital stock lifting their effective human capital and in turn their human efficiency.

Suppose a profit-maximizing firm will pay the ith worker a real wage, MP_i.[2] In addition, suppose a person's marginal product depends on their 'human efficiency', HE_i, and the capital, K_j, made available to them by the jth firm that employs them. In our framework, an individual's level of motivation, M_i, influences human efficiency both directly – by altering an individual's physical effort level – and indirectly – by effecting a person's rate of mental proficiency, e_i, and thus their 'effective' human capital, $e_i * HC_i$. Thus, the ith worker's wage function can be written as follows: The functions describing the marginal product of labor, human efficiency, and mental proficiency are well behaved, having positive first and negative second derivatives.[3]

$$w_i = MP_i(K_j, HE_i) \tag{2.1}$$

$$HE_i = HE_i(M_i, e_i * HC_i) \tag{2.2}$$

$$e_i = e_i(M_i) \tag{2.3}$$

where

$$0 \le e_i \le 1$$

For simplicity and expository purposes, equation (2.2) can be specified as an additive and linear function.[4] Thus, equation (2.2) becomes

$$HE_i = M_i + e_i * HC_i \tag{2.2'}$$

Human capital accumulation enlarges an individual's 'human efficiency', $\frac{\partial(HE_i)}{\partial(HC_i)} = e_i(M_i) > 0$, which in turn improves their productivity. The contribution of human capital formation to productivity is therefore larger for more motivated individuals since they mobilize a larger portion of their human capacity, $\frac{\partial(e_i)}{\partial(M_i)} > 0$. Thus, the influence of human capital on real wages is contingent upon motivation, $\frac{\partial\left\{\left(\frac{\partial(HE_i)}{\partial(HC_i)} = e_i(M_i)\right)\right\}}{\partial(e_i)}\left[\frac{\partial(e_i)}{\partial(M_i)}\right] = \frac{\partial(e_i)}{\partial(M_i)} > 0.$

Improved motivation enhances productivity, $\frac{\partial(HE_i)}{\partial(M_i)} = 1 + \left\{HC_i \frac{\partial(e_i)}{\partial(M_i)}\right\} > 0$ for two reasons: (i) greater physical effort for a given stock of human capital enlarges hourly output, and (ii) greater motivation increases access to a person's skills, enlarging their 'effective' human capital for a given stock of human capital. This latter indirect effect, $\left\{HC_i \frac{\partial(HE_i)}{\partial(M_i)}\right\}$, is larger for those with more human capital. Thus, the effect of motivation on productivity is dependent upon one's level of human capital, $\frac{\partial\left[\frac{\partial(HE_i)}{\partial(M_i)} = 1 + \left\{HC_i \frac{\partial(e_i)}{\partial(M_i)}\right\}\right]}{\partial(HC_i)} = \frac{\partial(e_i)}{\partial(M_i)} > 0.$

III. MOTIVATION: THEORY, MEASUREMENT, AND EFFECT ON WAGES

Measuring Motivation: Theory and Evidence

Psychologists have advanced many different theories to explain the nature and consequences of motivation.[5] Among psychologists, expectancy theory is the most widely accepted and empirically verified theory of motivation (Robbins, 1993; Muchinsky, 1977). According to expectancy theory, the strength of a person's motivation depends on the extent to which they believe that 'exertion, performance, and reward' are linked tightly. Attribution theorists (Heider, 1958; Rotter, 1966) have proposed that an aspect of personality – locus of control – governs a person's perception of the relation between exertion, performance, and reward.

Rotter (1966) classified individuals who believe they are masters of their own fates, and hence bear personal responsibility for what happens to them, as 'internalizers'. Internalizers see control of their lives as coming from within themselves. On the other hand, many people believe that they are pawns of fate, that they are controlled by outside forces over which they have little, if any, influence. Such people feel that their locus of personal control is external rather than internal, and they bear little or no responsibility for what happens to them. Rotter referred to the latter group as 'externalizers'.

Expectancy theory predicts that a person with a more internal locus of control will be more motivated than a comparable individual whose locus of control is external because internalizers see themselves as able to produce desired outcomes (Skinner et al., 1988). Skinner (1995) asserts that the primary route that enables perceived control to influence outcomes is via its effects on motivation. According to Bandura (1989, p. 1176) a person's beliefs about their capabilities to exercise control over events – locus of control – "determines their level of motivation, as reflected in how much effort they will exert in an endeavor and how long they will persevere in the face of obstacles."

Direct evidence that locus of control influences motivation comes from a number of sources. Studies by Harter (1978) and Kuhl (1981) reveal that when perceived control is high, a person tends to embrace challenges, construct more effective action plans and exert more sustained effort in their enactment. Bandura and Cervone (1983) found individuals with a stronger belief that they are in control exert greater effort to master a challenge and are more persistent in their efforts. In addition, when actions do not initially succeed, people with high control are more likely to increase their effort exertion and continue to try

to achieve their goal (Bandura, 1989; Dweck, 1991; Jacobs et al., 1984; Baum et al., 1986).

These findings corroborate the earlier findings of Seligman (1975) that repeated exposure to uncontrollable events, leading to feelings of helplessness and an external outlook, reduces motivation to engage in goal directed behavior. In summarizing her review of the literature on the relationship between locus of control and action, Skinner (1996, 556) stated 'when people perceive that they have a high degree of control, they exert effort, try hard, initiate action, and persist in the face of failures and setbacks; they evince interest, optimism, sustained attention, problem solving, and an action orientation'. In short, persons with a more internal locus of control are both more motivated and productive.

Motivation and Wages: Existing Evidence

The designers of the National Longitudinal Surveys (NLS) and the Panel Study of Income Dynamics (PSID) believed that motivation is likely to influence subsequent developments in a person's life. Therefore, according to Dunifon and Duncan (1998), they decided to include measures of motivation in these panel data sets. Their premonition that expectancies would be empirically linked to motivation, as suggested by Atkinson (1964) and later motivation motivational theorists (Bandura, 1986) led to the inclusion of questions to gauge a person's locus of control.

More motivated individuals are expected to be rewarded with a higher wage by their employer because of the direct relation between motivation and productivity. Motivation is likely also to indirectly influence productivity, by enhancing the likelihood of acquiring additional formal education and on-the-job training, which in turn enlarge productivity. Thus, as Dunifon and Duncan (1998, 34) point out, "it may take time for the effects of motivational measures to manifest themselves in an individual's wages." In order to capture the indirect effects of motivation on productivity existing empirical studies examine the link between motivation at some point and wages either a few years later – the intermediate-run – or many years later – the long-run.

Evidence offered by Duncan and Dunifon (1998), Dunifon and Duncan (1998), Szekel and Tardos (1993), and Koppel (1981) suggests that in the long run individuals with a more internal locus of control, ceteris paribus, receive higher wages.[6] Using data drawn from the PSID, Dunifon and Duncan (1998) examine the impact of greater motivational traits, represented by a person's level of personal control measured between 1968 and 1972, on average hourly earnings between 1988 and 1992 for a sample of men age 21–29 in 1972.

Controlling for a standard set of demographic and background characteristics as well as cognitive skills, they report that 15–25 years after measurement of a person's level of motivation, individuals with a greater level of personal control earn significantly higher wages. These findings confirm those of Szekelyi and Tardos (1993) who, using PSID data, find that an index of "*personal control and orientation toward the future*" is a positive predictor of wages 21 years later. A positive relation between a person's level of motivation and wages at a much later date in their life-cycle, five to ten years later, is reported by Koppel (1981) using data drawn from the National Longitudinal Survey of Young Men. Although a consensus is emerging that motivation yields significant wage returns over the long run, the evidence is mixed regarding the influence of greater motivation on wages over a substantial, but shorter, time horizon we refer to as the intermediate-run.

Andrisani (1978) analyzed data from the NLS panels of Young and Older Men and found that persons with a more internal locus of control earn significantly higher wages two years later than otherwise comparable persons. Duncan and Morgan (1981) replicated the Andrisani study using PSID data from the two younger age cohorts. They report no evidence of a direct relation between locus of control and subsequent wages. Duncan and Morgan then extended the time interval and examined wages four years after the measurement of personal locus of control. The expanded time horizon offers a better opportunity for the impact of motivation on wages to be observed. Over the four-year period, a significant positive association between wages and motivation is found. However, using essentially the same data, Hill et al. (1985) find a direct but insignificant relation. Hill adopts a different model specification, which may account for the weaker finding.

The theory we advance suggests that at any moment in time a person with greater motivation is more productive than an otherwise identical person who is less motivated because they have more effective human capital. Thus, even in the short-run, we expect the more motivated, ceteris paribus, to earn more. Heretofore, there is no direct evidence on the short run contribution of motivation to wages. In an earlier paper (Goldsmith, Veum & Darity, 1997), we provide indirect evidence using a cross section of data drawn from the NLSY in 1980. The measure of motivation we adopt is a person's score in 1979 on an 'abbreviated' version of Rotter's (1966) locus of control scale.[7] We estimated a model in which a person's 1980 level of wages and self-esteem are simultaneously determined. A person's Rotter score is specified to influence their self-esteem directly, and contribute to wages indirectly through the impact of self-esteem on wages. Our findings reveal that persons with a more internal locus of control hold a significantly more favorable view of self. In addition,

wages are significantly higher for individuals characterized by greater self-esteem. Thus, we find indirect evidence of a positive relation between motivation and wages in the short-run. However, a shortcoming in the literature is the lack of evidence on whether motivation directly contributes to wages in the short-run.

IV. EMPIRICAL PROCEDURES: WAGES, MOTIVATION, AND HUMAN CAPITAL

Data

The data used in this study are from the National Longitudinal Survey of Youth (NLSY). The NLSY is a sample of 12,686 males and females who were between the ages of 14 and 21 in 1978 and who have been interviewed regularly annually since 1979. The NLSY conducted interviews annually from 1979–1994. After 1994, the survey moved to a biennial interview cycle. The NLSY is a data set rich in economic and demographic information, including data on wages and multiple aspects of human capital.

Psychologists have designed and validated survey instruments that measure locus of control. Rotter (1966) and Pearlin et al. (1981) each developed an inventory of questions to gauge an individual's locus of control. These scales are constructed from self-reported evaluations collected in the form of responses to survey questions. In 1992 the NLSY included the set of questions that constitute The Mastery Scale developed by Pearlin et al. (1981) to measure a person's locus of control.[8] Mastery Scale scores range in value from 0 (external response to each question) to 7 (internal response to each question). Individuals with higher Mastery Scale scores – those with a more internal locus of control – are expected to be more motivated than comparable persons with a lower score on the Mastery Scale.

Model Specification and Hypotheses

Following the convention initiated by Mincer, a person's wage function, equation (4.1) below, is depicted by a linear representation of their productivity function, described in equation (2.1) above:

$$w_i = \phi(M_i) + (HC_i)\gamma + (HC_i * M_i)\varphi + (X_i)\beta + \varepsilon_i \qquad (4.1)$$

Note that we advance a theory where effective human capital – the portion of human capacity accessed, $e_i * HC_i$ – affects human efficiency, which in turn influences productivity and wages. This theory predicts that the contribution of human capital to wages is contingent upon motivation, and the influence of motivation on wages is mediated by human capital. One way to account for this feature of the productivity function is to specify a wage equation that includes the product of human capital and motivation, $M_i * HC_i$.

Given this specification: (i) the 'total effect' of an increase in human capital on the wage is $\frac{\partial(w_i)}{\partial(HC_i)} = \gamma + (M_i)\varphi$; (ii) if a more motivated person accesses a greater portion of their human capital, then the influence of greater human capital on wages is contingent upon motivation; $\frac{\partial\left\{\frac{\partial(w_i)}{\partial(HC_i)}\right\}}{\partial(M_i)} = \varphi > 0$. Thus, if φ is positive and statistically significant then we have evidence that the contribution of human capital to wages is mediated by motivation; (iii) improved motivation leads to a wage increase of $\frac{\partial(w_i)}{\partial(M_i)} = \phi + (HC_i)\varphi$, part of which – $(HC_i)\varphi$ – is due to the contribution of improved motivation on greater effective human capital, and (iv) if φ is positive and significant then as human capital increases the impact of motivation on the wage becomes larger, $\frac{\partial\left\{\frac{\partial(w_i)}{\partial(M_i)}\right\}}{\partial(HC_i)} = \varphi > 0$.

Equation (4.1) is estimated by ordinary least squares using a cross section of data from the NLSY in 1993. The dependent variable in equation (4.1), w_i, is measured by the natural log of a person's wage rate in 1993, and ε_i is the disturbance term. Motivation is treated as a predetermined variable in our analysis for two reasons. First, social psychologists (Rotter, 1966; Seligman, 1975; Bandura, 1986; Lefcourt, 1991) argue that a person's locus of control is largely time invariant or 'trait like'. In their view, locus of control is determined primarily by early childhood socialization. Consequently, locus of control is treated as an exogenous variable in our previous work (Goldsmith, Veum & Darity, 1997) that examines the hypothesis that self-esteem and wages are jointly determined.

The primary focus of this chapter is to examine whether there is evidence of an interactive relationship between motivation and human capital. This goal provides a second rationale for treating motivation as an exogenous determinant of wages. The findings from this empirical exercise will shed light on the viability of a new theory of how motivation effects productivity. The theory we offer posits that a person's level of motivation governs access to their

stock of human capital. An implication of this theory is that the relation between human capital and wages is mediated by motivation. We examine this inference by specifying a model of wage determination that includes an interaction term between human capital and motivation. Probing the validity of this new theory while treating motivation as an endogenous variable – a variable jointly determined with a person's wage rate – is beyond the scope of this paper.[9] In addition, using a lagged value of locus of control when estimating equation (4.1) is consistent with the treatment of motivation as a predetermined or exogenous determinant of a person's wage in 1993. Thus, motivation (M), is measured by a person's Mastery Scale score – personal locus of control – in 1992.

Before continuing with the discussion of empirical procedures associated with this work, it is useful to identify differences between this study and our earlier work (Goldsmith, Veum & Darity, 1997) that explores the relation among self-esteem and wages, where locus of control is treated as a predetermined variable. Even though locus of control is an important determinant of self-esteem, we did not offer a theory in which the effect of human capital on wages depends on self-esteem. Thus, the wage equation we estimated did not contain an interaction term between human capital and self-esteem. Therefore, even if self-esteem were considered to be a proxy for motivation, our prior work examining the relationship between self-esteem and wages does not offer a complete test of the theory offered and examined in this paper – that motivation mediates the impact of human capital on wages.

Variable names, descriptions of each variable used in the estimation of equation (4.1), and sample summary statistics are provided in Table 1.

Inspection of Table 1 reveals that the typical person in the sample has completed 13 years of formal education. Among the individuals working in 1993, the average person has been with their current employer for about four years. Half of the people in the sample are females and black persons comprise 30% of the individuals in the sample.

The typical person self-reports a Mastery Scale score of 5.98 – a high level of motivation. The frequency distribution for Mastery Scale scores in 1992 is presented in Table 2.

Fifty two percent of the persons in the sample scored a seven, the most internal score possible, on the Mastery Scale. Another 25% offered responses leading them to receive a score of six on the Mastery Scale Index. Only 6% of the individuals in the sample hold a highly external perception of personal locus of control.

The vector HC_i is composed of elements representing four different aspects of human productive capacity. Broad-based formal skills are captured by

Table 1. Variable Names, Definitions, Means, and Standard Deviations

Variable name	Variable definition	Mean	Standard deviation
w	= Natural log of hourly wage received from most recent employer in 1993	2.27	0.56
M	= Sum of the response to the seven Pearlin questions, administered in 1992, used to measure locus of control	5.98	1.35
EDUC	= Years of education completed at time of 1993 interview	12.95	2.40
TENURE	= Total weeks of work experience with employer at time of the 1993 interview divided by 1000	0.21	0.19
EXP	= Total weeks of work experience with all employers other than employer at time of the 1993 interview divided by 1000	0.35	0.20
AFQT	= Percentile score on the Armed Forces Qualifying Test	39.21	28.67
EST SIZE	= Number of employees at employer's establishment at time of 1993 interview	0.47	2.01
MUL LOC	= 1 if employer at time of the 1993 interview employees at another location, 0 otherwise	0.64	0.48
LG MUL LOC	= 1 if employer at time of the 1993 interview has 1,000 or more employees at other locations	0.38	0.48
UNION	= 1 if member of a union at time of the 1993 interview, 0 otherwise	0.18	0.38
SMSA	= 1 if live in an SMSA at time of the 1993 interview, 0 otherwise	0.82	0.39
MARRIED	= 1 if married at time of the 1993 interview, 0 otherwise	0.54	0.50
KIDS	= Number of children in household at time of the 1993 interview	1.40	1.31
MALE	= 1 if female, 0 otherwise	0.48	0.50
BLACK	= 1 if black, 0 otherwise	0.30	0.46
HISPANIC	= 1 if Hispanic, 0 otherwise	0.19	0.39
LFORCE	= 1 if employed at time of the 1993 interview, 0 otherwise	0.84	0.37
TRAIN	= 1 if received company training on the job held at the time of the 1993 interview, 0 otherwise	0.11	0.32
JOBSAT	= score on job satisfaction question ranging from 0 (low job satisfaction) to 4 (large job satisfaction)	3.31	0.72

Table 1. Continued

Variable name	Variable Definition	Mean	Standard deviation
JOBCHG	= 1 if separated by the 1994 interview from employer at time of the 1993 interview, 0 otherwise	0.31	0.46
SELECTION	= Selection correction term	0.24	0.19
PROFESSION	= 1 if occupation of 1993 job is professional, 0 otherwise	0.17	0.38
MANAGER	= 1 if occupation of 1993 job is manager, 0 otherwise	0.12	0.33
SALES	= 1 if occupation of 1993 job is sales, 0 otherwise	0.04	0.20
LABORER	= 1 if occupation of 1993 job is laborer, 0 otherwise	0.08	0.27
CLERICAL	= 1 if occupation of 1993 job is clerical, 0 otherwise	0.19	0.39
OPERATIVE	= 1 if occupation of 1993 job is operative, 0 otherwise	0.12	0.33
CRAFT	= 1 if occupation of 1993 job is craft, 0 otherwise	0.11	0.32
SERVICE	= 1 if occupation of 1993 job is service or private household, 0 otherwise	0.16	0.37
AGRINMIN	= 1 if industry of 1993 job is agriculture or mining, 0 otherwise	0.03	0.17
CONSTRUC	= 1 if industry of 1993 job is construction, 0 otherwise	0.07	0.26
MANUFACT	= 1 if industry of 1993 job is manufacturing, 0 otherwise	0.18	0.39
TRANSPORT	= 1 if industry of 1993 job is transportation, 0 otherwise	0.07	0.25
WHOLESALE	= 1 if industry of 1993 job is wholesale trade, 0 otherwise	0.17	0.38
FINANCE	= 1 if industry of 1993 job is finance, 0 otherwise	0.06	0.24
BUSINESS	= 1 if industry of 1993 job is business, 0 otherwise	0.07	0.26
PERSERV	= 1 if industry of 1993 job is personal services and entertainment, 0 otherwise	0.06	0.23
PROFSERV	= 1 if industry of 1993 job is professional services, 0 otherwise	0.22	0.41
PUBADMIN	= 1 if industry of 1993 job is public administrative, 0 otherwise	0.06	0.24
AGCONTR	= 1 if industry of 1993 job is public administrative, or construction, or transportation, 0 otherwise	0.17	0.38

Table 2. Frequency Distribution of Scores on the Pearlin Mastery Scale Used to Measure Motivation*

Score range	Mastery Scale Frequency	Percent
0	5	0
1	26	0
2	96	2
3	178	3
4	371	6
5	728	12
6	1574	25
7	3257	52
n	6235	100

* Motivation is measured by a person's score on Pearlin et al.'s Mastery Scale administered in 1992. The distribution presented is for the sample used to estimate the wage equation for 1993.

educational attainment (EDUC). An individual's accumulated verbal and mathematical skills are measured by scores on the Armed Forces Qualifying Exam (AFQT). General and specific workplace skills are operationalized by experience (EXP) and tenure (TEN), respectively. Individuals who possess more human capital are expected to be more productive and thus command a higher real wage, w_i, ceteris paribus.

Having a measure of accumulated academic skills, AFQT, is both a striking and scientifically important feature of the NLSY. June O'Neill (1990, pp. 32) describes the AFQT as "an achievement test of verbal and mathematical skills that reflects the quality of schooling received as well as the effects of parental background." Thus, if O'Neill is correct, including the AFQT in the wage equation controls for parental inputs and personal ability, both of which are likely to be positively correlated with motivation.

Estimating equation (4.1) without a measure of ability included in the human capital vector presents two problems. First, if ability is treated as an omitted variable, ability is included in the error term of equation (4.1). If ability is correlated with wage determinants such as education and motivation, which is likely, than the estimated coefficients are inconsistent. In addition, a positive relation between motivation and wages could be interpreted as evidence that the more able receive higher wages.

A number of different variables have been used to serve as a proxy for ability or academic skills accumulated in the literature.[10] Altonji and Spletzer (1991)

use high school class rank and a person's score on the Scholastic Aptitude Test, while Card and Krueger (1990) use secondary school quality to measure cognitive ability. Murnane, Willett and Levy (1995) use an individual's score on a test designed to assess mastery of elementary mathematical concepts to represent a person's ability level. A person's score on a 10-item sentence completion test contained in the PSID is used by Mason (1998) to gauge cognitive ability. Blackburn and Neumark (1993) use scores on the academic tests, the technical tests, and the computational test of the Armed Services Vocational Aptitude Battery (ASVAB) to account for cognitive talents. Herrnstein and Murray (1994), O'Neill (1994), and Neal and Johnson (1996) use AFQT as a control for ability. The AFQT score is constructed from a subset of scores on the ASVAB. In particular, AFQT consists of the numerical operations, arithmetic reasoning, word knowledge, and paragraph comprehension components of the ASVAB. Goldsmith, Darity and Veum (1999b) estimate a wage equation that includes a person's AFQT score, but they do not refer to the AFQT as a measure of ability. All of these studies find a positive relation between ability or formal skills amassed and wages.

Because it is becoming common for a person's AFQT score to be included in empirical models of wage determination, it is important to note that differences of opinion exist over what AFQT scores reflect. Herrnstein and Murray (1994) believe that the AFQT score is a valid measure of innate intelligence.[11] Neal and Johnson (1996) argue that pre-market factors are the primary determinants of an individual's AFQT score. Alternatively, O'Neill (1994), Rodgers and Spriggs (1995), and Goldsmith, Darity and Veum (1999) assert that AFQT scores depend on a host of factors including school resources. Thus, they view the AFQT as a measure of academic skills accumulated, controlling for the amount of formal education completed.

Card (1995) presents a review of recent studies that estimate the impact of schooling on wages after attempting to purge the estimates of omitted variable bias. The distinguishing feature of the studies selected by Card is they use an instrumental variable approach to control for ability, a component of individual specific heterogeneity.[12] In these studies, an additional year of formal schooling typically expands a person's wage by six to eight percent if ability is treated as an omitted variable. The 'corrected' or instrumental variable estimates are noticeably larger. According to Card (1995, 43) "all of the IV estimates are at least 10% above the corresponding OLS estimates . . ." However, these studies also suffer from the problem of omitted variable bias, since the influence of motivation on wages is neglected. The omission of motivation from the empirical wage equation cast doubt on the accuracy of the coefficient estimates of the impact of schooling on wages. In our study, equation (4.1) includes

measures of motivation, cognitive ability, and parental characteristics. Thus, we attempt to directly avoid the statistical and interpretive problems created by treating motivation and ability as omitted variables.

The vector X_i contains a standard set of wage equation regressors, including individual characteristics such as gender, race, marital status, number of dependents, and union status. In addition, job characteristics such as establishment or work site and firm size as well as industry and occupation of employment are contained in X_i. Finally, a selection-correction variable is included in equation (4.1) since wages are observed only for those individuals working for pay.[13]

V. RESULTS

Motivation, Human Capital, and Wages

The original group of NLSY participants numbered 12,686 and included an over sample of military and poor persons. These over samples of military employees and indigent whites were discontinued after the 1984 and 1990 survey's, respectively. In 1993, 9,964 of the initial 12,686 were eligible to be interviewed. Our data set is composed of the 7,424 individual respondents in 1993 for whom information is available on all variables used in the analysis.[14] Eighty-four percent of these persons were employed in 1993. The model of wage determination was estimated using the entire data set and separately by gender and race/ethnicity (e.g. white, black, Hispanic). Table 3 presents the results for the entire regression for each data set used.

Because the human capital variables are interacted with motivation, it is difficult to discern the total effect of an increase in a form of human capital on the wage rate for a typical person in the sample by examining Table 3. The estimated total effect on the wage rate of an additional year of education, the first component of the vector *HC*, for the average person in the data set is

$$\frac{\partial(w)}{\partial(EDUC)} = \gamma_1 + (\bar{M})\varphi_1 \tag{5.1}$$

where $(\bar{M})$ is mean motivation for individuals in the data set. For each of these data sets, the *total impact* of each form of human capital, and motivation, on the wage is reported in Table 4.

Examination of Table 4 reveals that each form of human capital contributes positively and significantly to the typical person's wage level in each data set.

The estimated coefficients on the human capital-motivation interaction terms reveal if the influence of human capital on the wage depends on a person's level

Table 3. OLS Wage Estimates (*t*-statistics in parentheses)

Variable name	All data	Males	Females	Whites	Blacks	Hispanics
M	–0.43e–01	–0.14e–01	0.78e–01	0.14e–02	–0.59e–01	–0.12e–01
	(1.25)	(0.24)	(1.43)	(0.03)	(0.91)	(1.75)*
EDUC	0.15e–01	0.40e–01	0.24e–01	0.30e–01	0.17e–01	0.22e–01
	(0.98)	(1.71)*	(1.04)	(1.27)	(0.56)	(0.67)
TENURE	0.71	0.44	0.96	1.08	0.27	0.58
	(4.05)***	(1.74)*	(3.83)**	(3.96)**	(0.97)	(1.41)
EXP	0.26	–0.71e–01	1.39	0.60	0.59	–0.34
	(1.28)	(0.28)	(4.31)***	(1.93)*	(0.18)	(0.68)
AFQT	0.27e–02	0.28e–02	0.76e–02	0.97e–03	0.39e–02	0.45e–02
	(1.98)**	(1.39)	(3.41)***	(3.41)***	(1.12)	(1.13)
M * EDUC	0.47e–02	0.13e–02	0.49e–02	0.27e–02	0.43e–02	0.85e–02
	(1.91)*	(0.36)	(1.40)	(0.72)	(0.87)	(1.66)*
M * TENURE	0.29e–01	0.56e–01	–0.81e–02	–0.26e–01	0.10	0.43e–01
	(1.02)	(1.37)	(0.20)	(0.59)	(2.17)**	(0.65)
M * EXP	0.51e–01	0.91e–01	–0.70e–01	0.65e–02	0.85e–02	0.10
	(1.71)*	(2.07)**	(1.61)	(0.14)	(1.79)*	(1.41)
M * AFQT	–0.40e–04	–0.43e–04	–0.43e–03	0.22e–03	–0.33e–04	–0.47e–03
	(0.19)	(0.14)	(1.35)	(0.71)	(0.06)	(0.77)
EST SIZE	0.12e–01	0.70e–02	0.19e–01	0.11e–01	0.83e–02	0.26e–01
	(4.34)***	(1.93)*	(4.43)***	(3.16)***	(1.72)*	(2.77)***
MUL LOC	0.27e–01	0.28e–01	0.13e–01	0.35e–01	0.22e–01	0.14e–01
	(1.92)*	(1.47)	(0.61)	(1.77)*	(0.86)	(0.40)
LG MUL LOC	0.35e–01	0.42e–01	0.37e–01	0.23e–01	0.54e–01	0.29e–01
	(2.48)***	(2.28)**	(1.80)*	(1.13)	(2.16)**	(0.85)
UNION	0.13	0.18	0.65	0.14	0.13	0.13
	(8.79)***	(8.79)***	(2.91)***	(6.19)***	(5.38)***	(3.63)***
SMSA	0.16	0.17	0.10	0.16	0.11	0.24
	(10.62)***	(8.30)***	(4.45)***	(8.46)***	(3.95)***	(4.75)***
MARRIED	0.44e–01	0.99e–01	0.81e–01	0.47e–01	0.64e–01	–0.11e–01
	(3.13)***	(4.51)***	(2.97)***	2.36)***	(2.44)***	(0.33)
KIDS	–0.20e–01	–0.91e–02	–0.91e–01	–0.26e–01	–0.19e–01	0.89e–02
	(2.92)***	(0.79)	(6.13)***	(2.54)***	(1.42)	(0.53)
MALE	0.18			0.20	0.19	0.38e–01
	(7.85)***			(6.30)***	(3.82)***	(0.64)
BLACK	–0.67e–01	–0.93e–01	–0.57e–01			
	(4.39)***	(4.51)***	(2.55)***			
HISPANIC	0.16e–01	0.16e–01	0.63e–01			
	(1.01)	(0.75)	(2.70)***			
SELECTION	0.22	0.45	1.19	0.35	0.32	–0.49
	(1.91)*	(1.53)	(4.77)***	(1.83)**	(1.45)	(1.77)*
PROFESSION	0.27	0.27	0.28	0.26	0.26	0.30
	(9.38)***	(7.69)***	(4.59)***	(6.27)***	(5.10)***	(4.42)***

Table 3. Continued

Variable name	All data	Males	Females	Whites	Blacks	Hispanics
MANAGER	0.28	0.29	0.28	0.27	0.31	0.28
	(10.15)***	(8.90)***	(4.45)***	(6.84)***	(5.85)***	(4.17)***
SALES	0.22	0.29	0.14	0.23	0.21	0.10
	(6.00)***	(6.48)***	(1.93)**	(4.72)***	(2.96)***	(1.18)
CLERICAL	0.93e–01	0.32e–01	0.12	0.33e–01	0.16	0.15
	(3.47)***	(0.89)	(2.10)**	(0.83)	(3.57)***	(2.39)***
OPERATIVE	0.10e–01	0.12	0.77e–01	0.69e–01	0.13	0.16
	(3.81)***	(4.02)***	(1.18)	(1.72)*	(3.12)***	(2.43)***
CRAFT	0.20	0.19	0.29	0.18	0.23	0.25
	(7.74)***	(6.97)***	(3.75)***	(4.66)***	(5.01)***	(3.98)***
SERVICE	0.40e–01	0.47e–01	0.53e–01	0.56e–02	0.63e–12	0.14
	(1.49)	(1.41)	(0.87)	(0.13)	(1.48)	(2.15)**
AGRINMIN	–0.96e–01	–0.89e–01	–0.11	–0.15	0.14	–0.12
	(2.64)***	(2.20)**	(1.32)	(2.92)***	(1.88)*	(1.53)
CONSTRUC	0.10	0.10	0.11e–01	0.85e–01	0.14	0.11
	(3.86)***	(3.56)***	(0.13)	(2.43)***	(2.98)***	(1.64)
TRANSPORT	0.32e–01	0.78e–02	0.85e–01	0.47e–02	0.90e–01	0.23e–01
	(1.30)	(0.27)	(1.91)*	(0.13)	(2.14)**	(0.39)
WHOLESALE	–0.20	–0.19	–0.19	–0.21	–0.20	–0.17
	(10.14)***	(7.46)***	(5.79)***	(7.61)***	(5.24)***	(3.46)***
FINANCE	0.42e–01	0.61e–01	0.35e–01	0.58e–01	0.36e–01	0.23e–02
	(1.54)	(1.52)	(0.90)	(1.57)	(0.70)	(0.04)
BUSINESS	–0.33e–01	–0.79e–01	0.49e–01	–0.17e–01	0.50e–01	–0.25e–01
	(1.35)	(2.61)**	(1.17)	(0.50)	(1.20)	(0.40)
PERSERV	–0.29	–0.22	–0.31	–0.35	–0.22	–0.21
	(9.99)***	(4.88)***	(7.50)***	(8.52)***	(4.52)***	(2.83)***
PROFSERV	–0.78e–01	–0.13e–01	–0.42e–01	–0.79e–01	–0.75e–01	–0.73e–01
	(3.83)***	(4.25)***	(1.32)	(2.82)***	(1.99)**	(1.43)
PUBADMIN	0.40e–01	–0.13e–01	–0.10	0.20	0.85e–01	–0.15e–01
	(1.49)	(0.36)	(2.48)***	(0.51)	(1.94)*	(0.23)
INTERCEPT	1.04	0.97	–0.31	0.71	0.99	2.01
	(4.06)***	(2.27)**	(0.64)	(1.78)*	(2.02)**	(3.56)***
Number of Observations	6235	3275	2960	3353	1726	1156
F	F[36, 6198]	F[35, 3239]	F[35, 2924]	F[34, 3318]	F[34, 1691]	F[34, 1121]
	129.05***	62.80***	64.86***	71.70***	68.93***	19.65***
R^2	0.43	0.40	0.43	0.42	0.44	0.37

* Statistically significantly different from zero at the .1 confidence level.
**Statistically significantly different from zero at the .05 confidence level.
***Statistically significantly different from zero at the .01 confidence level.

Table 4. Summary Table: Motivation, Human Capital, and Wages (*t*-statistics in parentheses) and [F-statistics in brackets]

Variable name	All data	Males	Females	Whites	Blacks	Hispanics
M	–0.43e–01	–0.14e–01	0.78e–01	0.14e–02	–0.59e–01	–0.12e–01
	(1.25)	(0.24)	(1.43)	(0.03)	(0.91)	(1.75)*
EDUC	0.15e–01	0.40e–01	0.24e–01	0.30e–01	0.17e–01	0.22e–01
	(0.98)	(1.71)*	(1.04)	(1.27)	(0.56)	(0.67)
TENURE	0.71	0.44	0.96	1.08	0.27	0.58
	(4.05)***	(1.74)*	(3.83)**	(3.96)***	(0.97)	(1.41)
EXP	0.26	–0.71e–01	1.39	0.60	0.59	–0.34
	(1.28)	(0.28)	(4.31)***	(1.93)**	(0.18)	(0.68)
AFQT	0.27e–02	0.28e–02	0.76e–02	0.97e–03	0.39e–02	0.45e–02
	(1.98)**	(1.39)	(3.41)***	(3.41)***	(1.12)	(1.13)
M * EDUC	0.47e–02	0.13e–02	0.49e–02	0.27e–02	0.43e–02	0.85e–02
	(1.91)*	(0.36)	(1.40)	(0.72)	(0.87)	(1.66)*
M * TENURE	0.29e–01	0.56e–01	–0.81e–02	–0.26e–01	0.10	0.43e–01
	(1.02)	(1.37)	(0.20)	(0.59)	(2.17)**	(0.65)
M * EXP	0.51e–01	0.91e–01	–0.70e–01	0.65e–02	0.85e–02	0.10
	(1.71)*	(2.07)**	(1.61)	(0.14)	(1.79)*	(1.41)
M * AFQT	–0.40e–04	–0.43e–04	–0.43e–03	0.22e–03	–0.33e–04	–0.47e–03
	(0.19)	(0.14)	(1.35)	(0.71)	(0.06)	(0.77)
$\frac{\partial(w)}{\partial(EDUC)} = \gamma_1 + (\bar{M})\varphi_1$	0.44e–01	0.48e–01	0.55e–01	0.47e–01	0.41e–01	0.30e–01
	F[1,6198]	F[1,3239]	F[1,2924]	F[1,3318]	F[1,1691]	F[1,1121]
	152***	91***	76***	87***	36***	13***
$\frac{\partial(w)}{\partial(EXP)} = \gamma_2 + (\bar{M})\varphi_2$	0.57	0.49	0.96	0.63	0.57	0.28
	F[1,6198]	F[1,3239]	F[1,2924]	F[1,3318]	F[1,3318]	F[1,1121]
	102***	33***	70***	64***	27***	4***
$\frac{\partial(w)}{\partial(TEN)} = \gamma_3 + (\bar{M})\varphi_3$	0.89	0.79	0.91	0.92	0.88	0.84
	F[1,6198]	F[1,3239]	F[1,2924]	F[1,3318]	F[1,3318]1	F[1,1121]
	510***	198***	255***	265***	71***	76***
$\frac{\partial(w)}{\partial(AFQT)} = \gamma_4 + (\bar{M})\varphi_4$	0.25e–02	0.28e–02	0.51e–02	0.22e–02	0.38e–02	0.16e–02
	F[1,6198]	F[1,3239]	F[1,2924]	F[1,3318]	F[1,1691]	F[1,1121]
	55***	24***	53***	24***	28***	4***
$\frac{\partial(w)}{\partial(\bar{M})} = \phi_1 + \varphi_1(\overline{EDUC}) + \varphi_2(\overline{TEN}) + \varphi_3(\overline{EXP}) + \varphi_4(\overline{AFQT})$	0.06	0.48e–01	0.10	0.45e–01	0.39e–01	0.12e–01
	F[1,6198]	F[1,3239]	F[1,2924]	F[1,3318]	F[1,1691]	F[1,1121]
	32***	14***	37***	19***	8***	0.4*
Number of Observations	6235	3275	2960	3353	1726	1156

* Statistically significantly different from zero at the 0.1 confidence level; ** at the 0.05 confidence level; *** at the 0.01 confidence level.

of motivation. Twenty-four interaction term coefficients were estimated (four types of human capital for six data sets). Six of the twenty-four estimated coefficients are positive and significant and the remaining eighteen are insignificant. Thus, we offer weak evidence consistent with the hypothesis that the contribution of human capital to a person's wage is contingent upon their motivation level.

The estimated coefficient on the education-motivation (EDUC*M) interaction term is positive and significant for the entire sample and for Hispanics. Thus, in these samples the influence of additional education on the wage rate is greater for more motivated individuals. The impact of additional experience on wages is significantly larger for the typical person in the data set, as well as for males and blacks. More motivated males and blacks reap a larger wage return from additional tenure than do comparable, but less motivated, persons.

Motivation and the Human Capital-Wage Relation: Evidence of Omitted Variable Bias?

In existing studies of wage determination, where motivation is an omitted variable, the wage equation estimated typically takes the form

$$w_i = (HC_i)\lambda + (X_i)\pi + \varsigma_i \tag{5.2}$$

where HC_i and X_i are defined as previously. Given this specification, motivation is a component of the disturbance term, ς_i, and the effect of additional educational accumulation on the wage rate is

$$\frac{\partial(w)}{\partial(EDUC)} = \lambda_1 \tag{5.3}$$

If educational accumulation and current motivation are correlated, some of the effect of motivation on the wage rate is attributed to education. Thus, given the model of wages we specify,

$$w_i = \phi(M_i) + (HC_i)\gamma + (HC_i * M_i)\varphi + (X_i)\beta + \varepsilon_i \tag{4.1}$$

Estimates of γ_1 (i.e. the direct coefficient on EDUC, when EDUC*M also appears in the wage equation) may be *smaller* than existing estimates of λ_1 generated by estimating equation (5.2), since motivation is directly controlled for in equation (4.1) but not in equation (5.2).

On the other hand, according to equation (5.1), which is derived from equation (4.1), the impact of education on the wage is greater for more motivated individuals. When motivation is an omitted variable, a portion of the total contribution of education on the wage – $(\bar{M})\varphi_1$ – is neglected. Therefore, estimates of the total effect of education on the wage generated by estimation

of equation (4.1), $\hat{\gamma}_1 + (\bar{M})\hat{\varphi}_1$, may exceed or fall short of existing estimates of the influence of education on the real wage, $\hat{\lambda}_1$, produced by estimating equation (5.2), since we expect $\hat{\gamma}_1 < \hat{\lambda}_1$, and $(\bar{M})\hat{\varphi}_1 > 0$.

To assess how the inclusion of a direct measure of motivation affects the estimated influence of greater human capital on a person's real wage, we estimated a 'garden variety' wage equation such as (5.2) by re-estimating (4.1) without a measure of motivation, but including a measure of ability. This produces baseline estimates of the relationship between each of the four forms of human capital and the wage rate (i.e. $\hat{\lambda}_1$, $\hat{\lambda}_2$, $\hat{\lambda}_3$, $\hat{\lambda}_4$). The estimated return to an additional year of formal schooling once ability is accounted for ($\hat{\lambda}_1$), the focus of the studies reviewed by Card (1995), is 4% for the typical person in our sample. NLSY respondents were only 28 to 36 years of age in 1993 which accounts for the relatively low return to schooling we report. A similar return to schooling is reported by Lynch (1992) and Veum (1995) using cross sectional data drawn from the NLSY.

Table 5 presents a comparison of our estimates of $\hat{\lambda}_1$ and the total coefficient (i.e. $\hat{\gamma}_1 + (\bar{M})\hat{\varphi}_1$, $\hat{\gamma}_2 + (\bar{M})\hat{\varphi}_2$) generated by estimation of equation (4.1) when data on a person's motivation level are available.

The results are quite striking. In virtually every case, the estimated impact of greater human capital on the real wage rises when a measure of motivation is included in the wage equation estimated. For the typical person in the sample, the effect of greater education on the real wage is 10% greater if the contribution of motivation to wages is accounted for ($\hat{\gamma}_1 + (\bar{M})\hat{\varphi}_1 > \hat{\lambda}_1$). Therefore, existing estimates understate the contribution of human capital to wages.[15] We interpret this as evidence suggesting that empirical studies probing the influence of schooling on a person's wage that account for ability continue to suffer from omitted variable bias.

Inspection of Table 4 reveals that improved motivation significantly enhances the wage rate for the average individual in every data set. Thus, we offer evidence consistent with what economists have long suspected – that the more motivated, ceteris paribus, are more productive.[16] Moreover, we offer some evidence that the significant contribution of motivation to the real wage is greater for persons who have accumulated more of various forms of human capital.

Because the data is stratified by gender we can offer evidence on whether the wage return to greater motivation is sensitive to male or female status. Before examining these findings it is useful to extend our theoretical model of wage determination, equation (1), to account for factors associated with gender. The extended model of wage determination then can be used to generate a

hypothesis on whether men and women are likely to experience a comparable wage increase when their motivation advances an equivalent amount.

Consider a firm that pays its workers a real wage, w, equal to their net expected marginal product, NMP^{ε}. The subscript M refers to male workers while the subscript F denotes female employees. An un-subscripted M continues to represent motivation.

$$w_M = NMP^{\varepsilon}_M, \tag{5.3}$$

and

$$w_F = NMP^{\varepsilon}_F, \tag{5.4}$$

A person's NMP^{ε} equals their expected marginal product independent of distractions due to family responsibilities, MP^{ε}, net of the employer's

Table 5. Summary Table: The Impact of Human Capital on Wages with Motivation Treated as an Omitted Variable in the Estimated Wage Equation and with Motivation Included in the Estimated Wage Equation

Variable name	Estimating equation	All data	Males	Females	Whites	Blacks	Hispanics
EDUC	MOTIVATION OMITTED	0.040	0.043	0.035	0.043	0.039	0.029
	MOTIVATION INCLUDED	0.044	0.048	0.055	0.047	0.041	0.030
	% DIFFERENCE	10%	11.6%	57.1%	9.3%	5.1%	3.4%
TENURE	MOTIVATION OMITTED	0.86	0.77	0.85	0.89	0.85	0.82
	MOTIVATION INCLUDED	0.89	0.79	0.91	0.92	0.88	0.84
	% DIFFERENCE	3.5%	2.5%	7.1%	3.4%	3.5%	2.4%
EXP	MOTIVATION OMITTED	0.43	0.32	0.45	0.49	0.39	0.27
	MOTIVATION INCLUDED	0.57	0.49	0.99	0.63	0.57	0.28
	% DIFFERENCE	32.5%	53.1%	113.3%	28.6%	46.1%	3.7%
AFQT	MOTIVATION OMITTED	0.0021	0.0018	0.0023	0.0016	0.0032	0.0017
	MOTIVATION INCLUDED	0.0025	0.0028	0.0051	0.0022	0.0038	0.0016
	% DIFFERENCE	19%	55.5%	121.7%	37.5%	18.7%	–0.6%

$$\%\ \text{Difference} = \frac{(\text{total coefficient motivation included}) - (\text{coefficient motivation not included})}{(\text{coefficient motivation not included})}\ (100)$$

perception of the decline in productivity due to restraints caused by family commitments, R^{ε} Thus, for the ith individual

$$NMP_i^{\varepsilon} = MP_i^{\varepsilon} - R_i^{\varepsilon} \tag{5.5}$$

Suppose the '*unrestrained*' expected marginal productivity of labor is equivalent for workers who differ only in terms of gender – $MP_M^{\varepsilon} = MP_F^{\varepsilon}$. Moreover, suppose employers believe that only female employees face family related restrictions on productivity – $R_M^{\varepsilon} = 0$ and $R_F^{\varepsilon} > 0$. Their presumption is that women take on the task of running errands, caring for ill children, and managing household affairs whenever these and related needs arise during the work period. Therefore,

$$w_M = (NMP_M^{\varepsilon} = MP_M^{\varepsilon} = MP_F^{\varepsilon}) \tag{5.6}$$

while

$$w_F = (NMP_F^{\varepsilon} = MP_F^{\varepsilon} - R_F^{\varepsilon}) \tag{5.7}$$

Given this framework for wage determination, and the societal constraints imposed, female workers of comparable talent would be paid less than their male peers – $w_M > w_F$ due to $R_F^{\varepsilon} > 0$.

Greater motivation is expected to improve the ith worker's productivity to $MP_i^{\varepsilon'} > MP_i^{\varepsilon}$ and the increase is expected to be equivalent for male and female workers, resulting in $MP_M^{\varepsilon'} > MP_F^{\varepsilon'}$. However, our conjecture is that there is an additional impact of greater motivation for female workers. Employers may interpret greater motivation for a female worker as sending a signal with respect to household constraints upon their productivity.[17] In the employer's view, more highly motivated female employees either ignore household responsibilities or transfer them to their spouse, another family member or a person they hire – $\dfrac{\partial(R_F^{\varepsilon})}{\partial(M_F)} < 0$. For simplicity, suppose that enhanced motivation completely eliminates the perceived deduction on productivity imposed by household responsibilities – $R_F^{\varepsilon} = 0$.

Thus, following an equivalent expansion of motivation, comparable male and female workers earn identical wages

$$w'_M = (NMP_M^{\varepsilon'} = MP_M^{\varepsilon'} = MP_F^{\varepsilon'}) \tag{5.8}$$

and

$$w'_F = (NMP_F^{\varepsilon'} = MP_F^{\varepsilon'}) \tag{5.9}$$

The rise in hourly compensations for male and female workers fostered by improved motivation is

$$(w'_M - w_M) = (MP_M^{\varepsilon'} - MP_M^{\varepsilon}) \tag{5.10}$$

$$(w'_F - w_F) = (MP_F^{\varepsilon'} - MP_F^{\varepsilon}) + R_F^{\varepsilon} \tag{5.11}$$

Therefore, an equivalent rise in motivation is expected to increase wages more for female employees than for male employees, since their wage no longer is reduced by the expected decline in productivity associated with household responsibilities.

$$(w'_F - w_F) - (w'_M - w_M) = R_F^{\varepsilon} > 0 \tag{5.12}$$

The wage return to greater motivation is virtually twice as large for women as for otherwise comparable men (see Table 4). A 10% increase in motivation increases the wage by 1% for the average female worker in the sample, but by only one-half of a percent for the typical male employee. Thus, we offer evidence consistent with our hypothesis that the monetary return to motivation is greater for women than for men, because motivation both increases productivity and sends a signal to employers that reduces the employer's belief that women are less productive due to household responsibilities.

If everyone employed exhibited greater motivation, wages would rise more for the average woman than the average man. However, the male-female wage gap would persist since, controlling for motivation, the typical woman in the sample earns 18% less per hour than a comparable male.

VI. MOTIVATION AND OTHER LABOR MARKET OUTCOMES

Participation, Satisfaction, Training, Job Separation, and Motivation

Motivation is likely to influence a myriad of labor market outcomes aside from wages. Persons with greater motivation are less likely to join the labor force, and when employed, participate in on-the-job training programs. A person's effectiveness in locating a desirable job is liable to depend on their level of motivation. Thus, more motivated individuals are likely to report greater satisfaction with their job.

People with heightened levels of motivation may 'job shop' or switch employers more often in an effort to advance, leading to a high rate of job separation. On the other hand, if the more motivated are inclined to be more content with their job, they have an incentive to stay with their current employer. Also, employers are likely to attempt to retain more motivated workers. Thus, it is unclear if enhanced motivation stimulates or dampens a person's tendency to separate from their employer.

To test hypotheses about the impact of motivation on labor force participation, job satisfaction, participation in job-based training, and the likelihood of changing employers we specify the following model:

$$OUT_i = \alpha(M_i) + (HC_i)\psi + (X_i)\theta + \mu_i \qquad (6.1)$$

The dependent variable vector OUT_i is composed of measures capturing four different labor market outcomes; current participation in the labor force, taking part in a job based training program, a person's level of satisfaction with their job, and job attachment.

Equation (6.1) is estimated separately for each of the four labor market outcomes identified above. The four models were estimated with the entire data set and then separately by gender and race/ethnicity. Complete results for each model estimated are presented in Tables 6 through 9. Table 10 presents a summary of the influence of motivation on the labor market outcomes of interest other than the wage rate.

Inspection of Table 6 reveals that more motivated individuals are significantly more likely to participate in the labor force. The inclusion of motivation in the labor force participation equation leaves intact the notion that individual's with greater human capital are more likely to participate in the labor force. Controlling for motivation, a person is likely to work or seek work if they have dependent children.

Employed individuals who experience an increase in motivation are significantly more likely to participate in a formal on-the-job training program (Table 7). Persons with greater human capital also are more likely to partake in formal training opportunities. For the average person in the data set, as education, tenure, or academic knowledge accumulated (AFQT) rises, the likelihood of participating in a formal on-the-job training program increases significantly. Thus, we offer evidence consistent with the view that persons with more human capital are more likely to be trained.

A clear benefit of union membership for white employees is the greater likelihood of acquiring skills through formal job based training programs. A striking finding is that individuals employed by large firms with multiple places of operation are more likely to participate in formal on-the-job training programs. Black and Hispanic employees are just as likely to be learning skills through a formal on-the-job training program as comparable white employees.

The typical individual in the sample who exhibits greater motivation is significantly more attached to their job (Table 8). More motivated employees who are male or Hispanic are more attached to their current employer. However, for the entire sample, workers who are black or Hispanic exhibit the same level of attachment to their employer as the average white employee.

Female employees have the same likelihood of separating from their current employer as an otherwise comparable male worker. Workers who possess more weeks of employment with their current employer or other employers, those affiliated with a union, and persons working for a large multi-location employer are less likely to separate from their current employer.

Table 6. Probit Estimates: Labor Force Participation (*t*-statistics in parentheses)

Variable name	ALl data	Males	Females	Whites	Blacks	Hispanics
M	0.14	0.22	0.99e–01	0.13	0.15	0.14
	(10.81)***	(10.12)***	(5.77)***	(5.96)***	(7.05)***	(4.71)***
EDUC	0.42e–01	0.54e–01	0.30e–01	0.14e–01	.97e–01	0.31e–02
	(3.79)***	(2.69)***	(2.19)**	(0.84)	(4.51)***	(0.15)
EXP	0.98	1.27	0.87	0.36	1.80	1.24
	(9.41)***	(7.00)***	(6.33)***	(2.31)**	(9.44)***	(5.28)***
AFQT	0.60e–02	0.66e–02	0.61e–02	0.71e–02	0.61e–02	0.77e–02
	(5.80)***	(3.56)***	(4.68)***	(4.96)***	(2.72)***	(3.18)***
MALE	0.56			0.83	0.19	0.60
	(13.62)***			(12.34)***	(2.75)***	(6.51)***
BLACK	–0.18e–01	–0.39	0.17			
	(0.35)	(4.36)***	(2.51)***			
HISPANIC	0.43e–01	–0.18	0.10			
	(0.77)	(1.80)*	(1.45)			
MARRIED	0.21	0.53	0.61e–01	.14e–01	.46	0.28
	(4.95)***	(6.81)***	(1.16)	(0.21)	(5.93)***	(3.16)***
KIDS	–0.13	–0.70e–02	–0.21	–0.17	–0.88e–01	–0.12
	(8.26)***	(0.26)	(10.70)***	(6.76)***	(3.66)***	(3.76)***
SMSA	–0.84e–01	–0.70e–01	–0.99e–01	–0.13	–0.71e–01	–0.79e–01
	(1.65)*	(0.77)	(1.56)	(1.86)*	(0.78)	(0.52)
INTERCEPT	–0.95	–1.13	–0.33	–0.17	–1.91	–0.72
	(6.33)***	(4.36)***	(1.80)*	(0.74)	(6.77)***	(2.28)**
Number of Observations	7424	3595	3829	3796	2213	1415
Log of Likelihood Function	–2730	–833	–1812	–1156	–943	–555
Chi Square	1070***	492***	476***	424***	446***	237***
[degrees of freedom]	[10]	[9]	[9]	[8]	[8]	[8]

* Statistically significantly different from zero at the 0.1 confidence level.
** Statistically significantly different from zero at the 0.05 confidence level.
*** Statistically significantly different from zero at the 0.01 confidence level.

Table 7. Probit Estimates: Participation in On-the-Job Training (*t*-statistics in parentheses)

Variable name	All data	Males	Females	Whites	Blacks	Hispanics
M	0.46e–01	0.75e–01	0.19e–01	0.33e–01	0.49e–01	0.84e–01
	(2.30)**	(2.40)***	(0.70)	(1.21)	(1.26)	(1.70)*
EDUC	0.23e–01	0.34e–01	0.12e–01	0.32e–01	0.20e–01	–0.46e–02
	(1.74)*	(1.77)*	(0.65)	(1.77)*	(0.70)	(0.16)
TENURE	0.48	0.39	0.52	0.22	0.79	0.71
	(2.94)***	(1.58)	(2.26)**	(0.99)	(2.52)***	(1.88)*
EXP	0.22	0.40	0.40	–0.25e–01	0.48	0.46
	(1.33)	(0.16)	(1.69)*	(0.92)	(1.54)	(1.22)
AFQT	0.35e–02	0.49e–02	0.20e–02	0.32e–02	0.34e–02	0.50e–02
	(3.09)***	(3.07)***	(1.18)	(2.08)**	(1.45)	(1.89)*
EST SIZE	0.17e–01	0.90e–02	0.28e–01	0.21e–01	0.11e–01	0.37e–02
	(1.93)*	(0.75)	(2.07)**	(1.96)**	(0.60)	(0.11)
MUL LOC	0.29	0.32	0.24	0.27	0.25	0.46
	(4.55)***	(3.38)***	(2.68)***	(3.11)***	(1.82)*	(3.02)***
LG MUL LOC	0.35	0.39	0.31	0.45	0.33	0.66
	(6.33)***	(5.01)***	(3.94)***	(5.96)***	(2.93)***	(0.52)
UNION	0.13	0.13	0.10	0.21	–0.85e–02	0.11
	(2.17)**	(1.58)	(1.21)	(2.54)***	(0.82)	(0.80)
SMSA	–0.59e–01	–0.14	0.16e–01	–0.10	0.93e–01	–0.13e–01
	(0.95)	(1.63)	(0.18)	(1.38)	(0.63)	(0.07)
MARRIED	0.97e–01	0.17	0.26e–01	0.12	0.78e–01	0.49e–01
	(1.98)**	(2.29)**	(0.38)	(1.76)*	(0.85)	(0.43)
KIDS	0.51e–02	–0.14e–01	0.34e–01	0.16e–02	0.28e–01	0.12e–03
	(0.25)	(0.48)	(1.16)	(0.06)	(0.76)	(0.00)
MALE	–0.47e–01			0.16e–01	–0.63e–01	–0.21e–01
	(0.93)			(0.23)	(0.64)	(1.67)*
BLACK	0.89e–01	0.11	0.60e–01			
	(1.41)	(1.22)	(0.67)			
HISPANIC	0.95e–01	0.32	0.14			
	(1.49)	(0.34)	(1.53)*			
PROFESSION	0.39	0.22	0.50	0.33	0.30	1.25
	(3.06)***	(1.45)	(1.81)*	(1.81)*	(1.31)	(2.85)***
MANAGER	0.42	0.36	0.41	0.40	0.46	1.00
	(3.34)***	(2.41)***	(1.47)*	(2.23)***	(2.03)**	(2.26)**
SALES	0.42	0.43	0.34	0.39	0.24	1.26
	(2.71)***	(2.29)**	(1.09)	(1.85)*	(0.80)	(2.56)***
CLERICAL	0.27	0.21	0.28	0.37	–0.17e–01	0.94
	(2.23)**	(1.32)	(1.02)	(2.06)**	(0.08)	(2.17)**
OPERATIVE	0.12e–01	0.25e–01	–0.33e–01	0.11	–0.32	0.69
	(0.09)	(0.17)	(0.11)	(0.58)	(1.50)	(1.54)

Table 7. Continued

Variable name	All data	Males	Females	Whites	Blacks	Hispanics
CRAFT	0.22	0.17	0.56	0.34	–0.33	0.87
	(1.74)*	(1.18)	(1.73)*	(1.92)*	(1.29)	(2.00)**
SERVICE	0.33	0.46	0.18	0.38	0.28e–01	1.16
	(2.58)***	(2.98)***	(0.65)	(2.01)**	(0.14)	(2.64)***
AGCONTR	0.14e–01	0.13e–01	0.14	0.10e–02	0.72e–01	–0.10
	(0.17)	(0.13)	(0.89)	(0.01)	(0.43)	(0.49)
WHOLESALE	–0.17	–0.43	–0.30	–0.92e–01	–0.37	–0.29
	(2.04)**	(0.39)	(2.14)**	(0.84)	(1.87)*	(1.38)
FINANCE	0.15	–0.49	0.29	0.23	0.13	–0.16
	(1.45)	(0.32)	(1.99)**	(1.77)*	(0.59)	(0.62)
BUSINESS	–0.17e–01	–0.13	0.16	0.54e–02	–0.28	0.21
	(0.16)	(0.90)	(0.98)	(0.04)	(1.24)	(0.87)
PERSERV	–0.22	–0.31	–0.12	–0.12	–0.35	–0.40
	(1.56)	(1.34)	(0.64)	(0.64)	(1.24)	(1.21)
PROFSERV	0.57e–01	0.40e–01	0.77e–01	0.90e–01	0.11e–01	–0.59e–01
	(0.70)	(0.34)	(0.62)	(0.84)	(0.07)	(0.30)
PUBADMIN	0.23	0.25	0.23	0.20	0.22	0.23
	(2.39)***	(1.90)*	(1.46)	(1.42)	(1.15)	(0.98)
INTERCEPT	–2.89	–3.19	–2.62	–2.86	–2.73	–3.39
	(11.70)***	(8.97)***	(6.46)***	(8.26)***	(5.62)***	(5.16)***
Number of Observations	6235	3275	2960	3353	1726	1156
Log of Likelihood Function	–2000	–970	–1007	–1093	–518	–360
Chi Square [degrees of freedom]	443*** [29]	280*** [28]	201*** [28]	240*** [27]	162*** [27]	97*** [27]

* Statistically significantly different from zero at the 0.1 confidence level.
** Statistically significantly different from zero at the 0.05 confidence level.
*** Statistically significantly different from zero at the 0.01 confidence level.

Among employed individuals, those who are more motivated report significantly greater satisfaction with their job than comparable but less motivated individuals (Table 9).

Persons with greater experience and tenure, and those who accumulated more academic knowledge, are more satisfied with their job than their counterparts with less of these forms of human capital. An interesting finding is that workers with union cards are less satisfied with their jobs than similar

Table 8. Probit Estimates: Job Separation (*t*-statistics in parentheses)

Variable name	All data	Males	Females	Whites	Blacks	Hispanics
M	–0.43e–01	–0.55e–01	–0.28e–01	–0.24e–01	–0.43e–01	–0.86e–01
	(2.88)***	(2.56)***	(1.28)	(1.13)	(1.53)	(2.52)**
EDUC	–0.84e–02	–0.82e–02	–0.89e–02	–0.75e–02	–0.28e–01	0.68e–02
	(0.76)	(0.52)	(0.56)	(0.50)	(1.17)	(0.29)
TENURE	–3.15	–3.29	–2.99	–3.03	–3.83	–2.71
	(21.90)***	(15.58)***	(14.57)***	(15.25)***	(13.38)***	(8.25)***
EXP	–0.96	–1.02	–0.91	–0.94	–1.09	–0.79
	(7.87)***	(5.66)***	(5.10)***	(5.41)***	(4.81)***	(2.77)***
AFQT	–0.11e–02	–0.28e–02	–0.94e–03	–0.16e–02	–0.15e–02	0.57e–03
	(1.10)	(2.14)**	(0.66)	(1.29)	(0.74)	(0.25)
EST SIZE	–0.14e–01	–0.11e–02	–0.34e–01	–0.28e–01	0.26e–02	0.30e–02
	(1.19)	(0.07)	(1.69)*	(1.49)	(0.12)	(0.09)
MUL LOC	–0.82e–01	–0.44e–01	–0.11	–0.83e–01	–0.48e–01	–0.12
	(1.78)*	(0.69)	(1.60)	(1.32)	(0.53)	(1.15)
LG MUL LOC	–0.13	–0.12	–0.13	–0.87e–01	–0.25	–0.93e–01
	(2.69)***	(1.74)*	(1.94)*	(1.28)	(2.72)***	(0.84)
UNION	–0.12	–0.13	–0.11	–0.14	–0.71e–01	–0.14
	(2.32)**	(1.79)*	(1.43)	(1.68)*	(0.79)	(1.19)
SMSA	0.13	0.16	0.11	0.69e–01	0.39	–0.51e–01
	(2.72)***	(2.33)***	(1.54)	(1.15)	(3.82)***	(0.32)
MARRIED	–0.13	–0.18	–0.57e–01	–0.18	.21e–01	–0.16
	(3.26)***	(3.25)***	(1.02)	(3.35)***	(0.28)	(1.84)*
KIDS	0.19e–01	0.11e–01	0.38e–01	0.15e–01	0.15e–01	0.34e–01
	(1.21)	(0.52)	(1.61)	(0.61)	(0.53)	(0.99)
MALE	–0.68e–01			–0.48e–01	–0.15	–0.55e–01
	(1.60))			(0.81)	(1.84)*	(0.54)
BLACK	0.72e–01	0.18e–02	0.14			
	(1.43)	(0.03)	(1.95)*			
HISPANIC	–0.24e–01	–0.42e–01	–0.13e–02			
	(0.45)	(0.58)	(0.02)			
PROFESSION	–0.20	–0.16	–0.15	–0.15	–0.67e–01	–0.46
	(2.14)**	(1.33)	(0.75)	(1.14)	(0.37)	(2.12)**
MANAGER	–0.92e–01	–0.11	0.69	–0.17e–01	–0.14	–0.15
	(1.02)	(1.05)	(0.35)	(0.14)	(0.73)	(0.72)
SALES	–0.11	–0.16	0.76e–01	–0.11	0.29	–0.24
	(0.98)	(1.08)	(0.34)	(0.71)	(1.16)	(0.89)
CLERICAL	–0.15	–0.63e–01	–0.81e–01	–0.21e–01	–0.15	–0.34
	(1.71)*	(0.51)	(0.44)	(0.17)	(0.99)	(1.74)*
OPERATIVE	–0.18	–0.20	–0.44e–01	–0.82e–01	–0.32	–0.22
	(2.15)**	(2.09)**	(0.22)	(0.64)	(2.23)**	(1.13)
CRAFT	–0.15	–0.13	–0.14	–0.33e–01	–0.22	–0.26
	(1.76)*	(1.40)	(0.57)	(0.28)	(1.39)	(1.37)

Table 8. Continued

Variable name	All data	Males	Females	Whites	Blacks	Hispanics
SERVICE	–0.72e–02	–0.39e–02	–0.20e–02	0.87e–01	–0.12	–0.24
	(0.83)	(0.35)	(0.01)	(0.67)	(0.83)	(1.19)
AGCONTR	–0.52e–01	–0.23e–01	–0.15e–01	–0.96e–01	–0.81e–01	–0.19
	(0.80)	(0.30)	(1.16)	(1.08)	(0.64)	(1.22)
WHOLESALE	0.35e–01	0.26e–01	0.39e–01	0.77e–02	0.62e–01	0.62e–02
	(0.52)	(0.30)	(0.36)	(0.09)	(0.46)	(0.04)
FINANCE	–0.19	–0.20	–0.20	–0.22	–0.39	0.15e–02
	(2.09)**	(1.44)	(1.55)	(1.77)*	(2.05)**	(0.01)
BUSINESS	0.11	0.65e–01	0.19	0.12	0.63e–01	0.69e–01
	(1.42)	(0.64)	(1.44)	(1.12)	(0.42)	(0.36)
PERSERV	–0.40e–01	0.65e–01	0.24e–01	–0.43e–01	–0.86e–01	0.31
	(0.43)	(0.44)	(0.18)	(0.33)	(0.49)	(1.36)
PROFSERV	–0.17	–0.93e–01	–0.20	–0.52e–01	–0.36	–0.28
	(2.41)***	(0.89)	(1.89)*	(0.56)	(2.63)***	(1.66)*
PUBADMIN	–0.74	–0.83	–0.65	–0.64	–0.86	–0.86
	(6.66)***	(5.27)***	(4.06)***	(3.99)***	(4.51)***	(3.16)***
INTERCEPT	–1.13	1.23	–0.79	0.97	1.46	1.32
	(6.17)***	(4.88)***	(2.58)***	(3.69)***	(3.99)***	(3.25)***
Number of Observations	6102	3199	2903	3293	1690	1119
Log of Likelihood Function	–3200	–1634	–1554	–1687	–890	–594
Chi Square [degrees of freedom]	1138*** [29]	621*** [28]	538*** [28]	524*** [27]	440*** [27]	196*** [27]

* Statistically significantly different from zero at the 0.1 confidence level.
** Statistically significantly different from zero at the 0.05 confidence level.
*** Statistically significantly different from zero at the 0.01 confidence level.

workers who are not associated with a union. One possible explanation for this finding is that unions build up expectations of job quality with their members that are unrealized.

VII. CONCLUSION

This chapter advances the view that motivation governs how efficiently a person accesses their human capital. Therefore, the influence of human capital

Table 9. Ordered Probit Estimates: Job Satisfaction
(*t*-statistics in parentheses)

Variable name	All data	Males	Females	Whites	Blacks	Hispanics
M	0.85e–01	0.75e–01	0.95e–01	0.13	0.38e–01	0.65e–01
	(6.98)***	(4.36)***	(5.52)***	(7.34)***	(1.69)*	(2.32)**
EDUC	0.60e–02	0.22e–01	–0.55e–02	0.33e–02	0.11e–01	0.22e–01
	(0.67)	(1.83)*	(0.42)	(0.27)	(0.58)	(1.16)
TENURE	0.26	0.37	0.21	0.31	0.81e–01	0.46
	(2.47)***	(2.44)***	(1.43)	(2.13)**	(0.42)	(1.85)*
EXP	0.49	0.57	0.45	0.52	0.55	0.39
	(4.77)***	(3.76)***	(3.02)***	(3.60)***	(2.95)***	(1.61)*
AFQT	–0.34e–02	–0.47e–02	–0.21e–02	–0.30e–02	–0.42e–02	–0.41e–02
	(4.42)***	(4.48)***	(1.85)*	(3.02)***	(2.62)***	(2.22)**
EST SIZE	0.46e–02	–0.45e–02	0.16e–01	0.51e–02	0.64e–02	0.37e–02
	(0.61)	(0.46)	(1.30)	(0.52)	(0.46)	(0.15)
MUL LOC	–0.13	–0.18	–0.68e–01	–0.17	0.87e–02	–0.18
	(3.35)***	(3.49)***	(1.20)	(3.23)***	(0.12)	(2.02)**
LG MUL LOC	0.45e–01	0.11	–0.15e–01	0.94e–01	–0.37e–01	0.71e–01
	(1.19)	(2.05)**	(0.27)	(1.78)*	(0.51)	(0.79)
UNION	–0.13	–0.13	–0.13	–0.14	–0.94e–01	–0.12
	(3.17)***	(2.31)**	(2.16)**	(2.27)**	(1.35)	(1.27)
SMSA	–0.71e–01	–0.56e–01	–0.98e–01	–0.63e–01	–0.19	0.23
	(1.81)*	(1.03)	(1.70)*	(1.31)	(2.24)**	(1.78)*
MARRIED	0.13	0.80	0.17	0.14	0.11	0.11
	(4.12)***	(1.76)*	(3.66)***	(3.07)***	(1.80)*	(1.50)
KIDS	0.22e–01	0.15e–01	0.29e–01	0.72e–01	–0.14e–01	–0.20e–01
	(1.74)*	(0.85)	(1.50)	(3.76)***	(0.61)	(0.72)
MALE	0.36e–01			0.54e–01	0.86e–01	–0.94e–01
	(1.05)			(1.14)	(1.35)	(1.12)
BLACK	–0.74e–01	–0.70e–01	–0.58e–01			
	(1.80)*	(1.23)	(0.97)			
HISPANIC	0.83e–01	0.31e–01	0.16			
	(1.96)**	(0.53)	(2.50)***			
PROFESSION	0.31	0.31	0.19	0.35	0.47	0.16
	(4.10)***	(3.30)***	(1.15)	(3.25)***	(3.13)***	(0.92)
MANAGER	0.38	0.43	0.22	0.39	0.32	0.52
	(5.00)***	(4.73)***	(1.33)	(3.80)***	(2.11)**	(2.93)***
SALES	0.54e–01	–0.86e–01	0.97e–01	0.12	–0.11	0.12
	(0.57)	(0.71)	(0.52)	(0.95)	(0.51)	(0.51)
CLERICAL	0.73e–01	–0.18e–01	–0.30e–01	0.19	0.10	–0.12
	(1.02)	(0.18)	(0.19)	(1.86)*	(0.78)	(0.75)
OPERATIVE	–0.89e–01	0.13e–01	–0.38	–0.12	0.37e–01	–0.22
	(1.27)	(0.16)	(2.20)**	(1.18)	(0.31)	(1.34)

Table 9. Continued

Variable name	All data	Males	Females	Whites	Blacks	Hispanics
CRAFT	0.20	0.24	0.67e–01	0.19	0.31	0.16
	(2.80)***	(3.20)***	(0.32)	(1.93)*	(2.31)**	(0.97)
SERVICE	0.47e–01	0.11	–0.13	0.14	0.77e–01	–0.11
	(0.66)	(1.23)	(0.80)	(1.28)	(0.62)	(0.64)
AGRINMIN	0.13	0.42e–01	0.47	0.20	0.23	0.15e–01
	(1.36)	(0.38)	(2.01)**	(1.55)	(1.03)	(0.08)
CONSTRUC	0.16	0.14	0.23	0.21	0.19	0.77
	(2.32)***	(1.83)*	(1.01)	(2.30)**	(1.35)	(0.45)
TRANSPORT	0.22	0.21	0.18	0.24	0.17	0.29
	(3.32)***	(2.59)***	(1.47)	(2.53)***	(1.42)	(1.91)*
WHOLESALE	0.37e–01	0.36e–02	0.33e–01	0.75e–01	–0.82e–01	0.80e–01
	(0.70)	(0.05)	(0.38)	(1.07)	(0.75)	(0.63)
FINANCE	0.11	0.29	–0.24e–01	0.15	0.29e–01	0.60e–01
	(1.53)	(2.60)***	(0.23)	(1.60)	(0.19)	(0.35)
BUSINESS	0.82e–01	0.15e–01	0.16	0.26e–01	0.30e–01	0.38
	(1.24)	(0.18)	(1.44)	(0.28)	(0.25)	(2.27)**
PERSERV	0.26	0.27	0.26	0.15	0.36	0.48
	(3.37)***	(2.19)**	(2.41)***	(1.42)	(2.43)***	(2.46)***
PROFSERV	0.28	0.25	0.26	0.26	0.26	0.37
	(5.02)***	(3.05)***	(3.09)***	(3.54)***	(2.33)***	(2.75)***
PUBADMIN	0.20	0.25	0.12	0.36	–0.57e–01	0.42
	(2.73)***	(2.54)***	(1.02)	(3.37)***	(0.45)	(2.40)***
Number of Observations	6235	3275	2960	3353	1726	1156
Log of Likelihood Function	–6096	–3147	–2922	–3209	–1758	–1073
Chi Square [degrees of freedom]	337*** [31]	177*** [30]	205*** [30]	219*** [29]	99*** [29]	92*** [29]

* Statistically significantly different from zero at the 0.1 confidence level.
** Statistically significantly different from zero at the 0.05 confidence level.
*** Statistically significantly different from zero at the 0.01 confidence level.

on productivity and wages is expected to be contingent on motivation. If this hypothesis is valid, then existing estimates of the contribution of human capital to wages – generated under the data imposed constraint that motivation is unobserved by the econometrician – are likely to be biased. Using data drawn from the NLSY and a measure of motivation advanced by psychologists that is

Table 10. Summary Table: The Impact of Motivation on Labor Market Outcomes (*t*-statistics in parentheses)†

	Labor market outcomes			
	Labor force participation	On-the-job training	Job separation	Job satisfaction
ALL DATA	0.14	0.46e–01	–0.43e–01	0.85e–01
	(10.81)***	(2.30)**	(2.88)***	(6.98)***
MALES	0.22	0.75e–01	–0.55e–01	0.75e–01
	(10.12)***	(2.40)***	(2.56)***	(4.36)***
FEMALES	0.99e–01	0.19e–01	–0.28e–01	0.95e–01
	(5.77)***	(0.70)	(1.28)	(5.52)***
WHITES	0.13	0.33e–01	–0.24e–01	0.13
	(5.96)***	(1.21)	(1.13)	(7.34)***
BLACKS	0.15	0.49e–01	–0.43e–01	0.38e–01
	(7.05)***	(1.26)	(1.56)	(1.69)*
HISPANICS	0.14	0.84e–01	–0.86e–01	0.65e–01
	(4.71)***	(1.70)**	(2.52)***	(2.32)***

† Table 10 reports our estimates of the impact of motivation on four different labor market outcomes; current participation in the labor force, taking part in a job based training program, a person's level of satisfaction with their job, and job attachment. The coefficients reported are drawn from the equations we estimate to explain these outcomes which are presented in Tables 6–9 and are discussed in the Section VI of this chapter.

** Statistically significantly different from zero at the 0.05 confidence level.

*** Statistically significantly different from zero at the 0.01 confidence level.

consistent with expectancy theory, we find the wage return to human capital is contingent upon motivation and historically has been understated. In addition, we offer evidence that a person with greater motivation earns substantially more than a comparable but less inspired colleague. Motivation is also found to enhance labor force participation, on-the-job training, job attachment, and employment satisfaction (see Table 10 for a summary of these impacts).

NOTES

1. However, there is evidence (Goldsmith, Veum & Darity, 1996) that self-esteem, an alternative psychological construct, has a direct effect on wages.

2. A wedge between the wage and marginal product can occur for a variety of reasons including discrimination and increasing returns. However, we ignore such factors to clarify our modification of standard marginalist theory.

3. The functions describing the marginal product of labor, human efficiency, and mental proficiency are well behaved, having positive first and negative second derivatives.

4. If equation (2.2) is specified in general form with positive cross partial effects then the same qualitative results are obtained. However, linearizing equation (2.2) simplifies the presentation in two ways. First, it yields expressions for the impact of human capital and motivation on the wage that are simpler and easier to interpret. Second, and more importantly, these expressions more lucidly revel that the wage impact of human capital is contingent upon motivation.

5. Theories have been offered asserting that motivation depends upon satisfaction of needs (Maslow, 1954), goal-setting (Locke, 1968), equity (Adams, 1965), and expectancy (Vroom, 1964). Economists' Summers (1988), Shapiro and Stiglitz (1984), and Yellen (1984) have argued that compensation and 'fear of unemployment' induce motivation at the workplace.

6. The theoretical focus of the Duncan and Dunifon (1998) paper is on the growing importance of 'soft-skills' and how these skills influence a person's productivity. The focal point of the conceptual discussion in Dunifon and Duncan (1998) focus their conceptual discussion on what factors contribute to personal motivation, and the characteristics of alternative psychometric approaches to the measurement of motivation. The empirical work contained in these papers uses the same data and is structurally similar. Therefore, we choose to simply discuss the results presented in Dunifon and Duncan (1998).

7. The items included in the 'abbreviated' Rotter by the designers of the NLSY were aimed at measuring personal control.

8. Many economists are skeptical that psychological constructs such as motivation can be measured accurately by scales constructed from self-reported evaluations collected in the form of responses to survey questions. Psychologists assess the usefulness of scales developed to measure a psychological construct such as locus of control by examining three features of the scale: convergent validity, reliability, and stability. Convergent validity is concerned with whether an alternative scale seeking to measure the same construct yields a similar assessment. A scale is reliable when the questions that comprise the scale are all probing similar or related features of the individual's make-up. A scale is only considered stable if a similar assessment is generated by administering the same scale a short time in the future. Pearlin et al. (1981) found the Mastery Scale correlated well with other scales used to measure to locus of control. In addition to meeting the criteria for convergent validity, they discovered the scale was internally consistent and stable over time. For a detailed discussion of Mastery Scale validity see Seeman (1991, 304–6). Economists have also tended to have an aversion to making interpersonal comparisons using self-reported evaluations (Easterlin, 1974). For a detailed discussion of both the measurement and comparison issues raised by economists, and the procedures that can be adopted to address these concerns see Darity and Goldsmith (1996a) and Goldsmith, Veum and Darity (1996b).

9. Efficiency wage theorists, including (Akerlof 1982), Shapiro and Stiglitz (1984), and Yellen (1984), have questioned the assumption that motivation can be treated as an exogenous variable in a person's wage equation. The efficiency wage hypothesis asserts that wages influence motivation in addition to motivation contributing to wages – that motivation is endogenous. The relative wage version of the efficiency wage hypothesis

states that firms are able to improve worker productivity by paying workers a wage premium – a wage that is above the wage paid by other firms for comparable labor. We have explored this issue in Goldsmith, Veum and Darity (1999b), where we estimated a model in which wages and motivation are determined jointly. In this paper the worker motivation equation specified includes the efficiency wage a worker received, measured by the difference between the wage a person actually earns and the wage they are expected to receive given their personal characteristics. The specified wage equation contains a measure of worker motivation, a person's score on Pearlin's Mastery Scale. We find motivation is a significant determinant of wages whether motivation is treated as an exogenous or endogenous variable.

10. Hanushek, (1986) provides an excellent review of the literature on measurement of personal ability and its subsequent impact on wages.

11. See Goldberger and Manski (1995) for an assessment Herrnstein and Murray (1994), especially the use of the AFQT as a measure of innate ability.

12. Card neglects to discuss the study by Blackburn and Neumark (1993) that offers estimates of the wage return to schooling at different points in a person's working life-cycle using an instrumental variables approach.

13. As suggested by Heckman (1979) a preliminary regression is run to explain the probability of working for pay. This equation is estimated as a probit model and the resulting coefficients are used to construct (SELECTION), the inverse Mills ratio. We rely on differences in functional form to identify (SELECTION) in the wage equation, equation (4.1), since all of the variables thought to influence the probability of working also appear in the wage equation.

14. The factors responsible for 92 percent of the attrition were data unavailability on AFQT (406), establishment size (358), employment wage (298), unemployment (145), Mastery Scale (157), and the date of past employment initiation or termination (95). The latter is needed to calculate tenure.

15. There is evidence that $\hat{\gamma} < \hat{\lambda}$. For instance, for EDUC

VARIABLE NAME	ALL DATA	MALES	FEMALES	WHITES	BLACKS	HISPANICS
$\hat{\lambda}_1$	0.040	0.043	0.035	0.043	0.039	0.029
$\hat{\gamma}_1$	0.015	0.040	0.024	0.030	0.017	0.020

16. Our finding, that individuals with a more internal locus of control – i.e. more motivated individuals – earn higher wages, is consistent with evidence reported by psychologists that persons with a more internal locus of control are more productive. Heckhausen (1991) and Kuhl (1984) found that people with high control are better able to concentrate completely on tasks, enhancing access to their working memory and boosting their persistence in the face of obstacles. Klein et al. (1976) also found individuals with a low sense of control performed poorly in problem solving tasks because of cognitive deficiencies. Bandura (1989) and Dweck (1991) report that persons with a greater sense of control exhibit a pattern of more effective strategy selection, hypothesis testing, problem-solving, and general analytic thinking.

17. See Spence (1973) for a discussion of actions, signals and productivity.

ACKNOWLEDGMENTS

The authors are indebted to Tony Hall, and Stuart Low who offered valuable insights and suggestions during numerous discussions of the ideas in this chapter. We are grateful also to Michael Parkin for providing detailed comments on an earlier draft of this manuscript that led to a thorough restructuring of the presentation. The work benefited from suggestions offered by a referee for *Research in Labor Economics*. Julia Lane also offered helpful comments. This study was initially drafted while Goldsmith was a Visiting Professor of Economics at Bond University, Gold Coast Australia, and Victoria University of Wellington, New Zealand. This research was supported in part, by a R. E. Lee Summer Research Grant from Washington and Lee University. Finally, the views expressed in this chapter are those of the authors and do not reflect the policies or views of Freddie Mac.

REFERENCES

Adams, J. (1965). Inequity in social exchanges. In: L. Berkowitz (Ed.), *Advances in Experimental Social Psychology*. New York: Academic Press.

Akerlof, G. (1982). Labor contracts as partial gift exchange. *Quarterly Journal of Economics*, *97*(4), 543–569.

Altonji, J., & Spletzer, J. (1991). Worker characteristics, job characteristics, & the receipt of on-the-job training. *Industrial and Labor Relations Review*, *45*(1), 58–79.

Andrisani, P. (1978). *Work attitudes and labor market experience*. New York: Praeger.

Atkinson, J. (1964). *An Introduction to motivation*. Princeton: Van Nostrand.

Bandura, A. (1989). Human agency in social cognitive theory. *American Psychologist*, *44*(9), 1175–1184.

Bandura, A. (1986). *Social foundations of thought and action*. Englewood Cliffs, NJ: Prentice-Hall.

Bandura, A., & Cervone, D. (1983). Self-evaluative and self-efficacy mechanisms governing the motivational effects of goal systems. *Journal of personality and social psychology*, *45*(5), 1017–1028.

Baum, A., Fleming, R., & Reddy, D. (1986). Unemployment, stress, loss of control, reactance and learned helplessness. *Social Science Medicine*, *22*(5), 509–516.

Blackburn, M., & Neumark, D. (1993). Omitted-ability bias and the increase in the return to schooling. *Journal of Labor Economics*, *11*(3), 521–545.

Card, D. (1995). Earnings, schooling, and ability revisited. In: S. Polachek (Ed.), *Research in Labor Economics* (Vol. 14). Greenwich, CT: JAI Press.

Card, D., & Krueger, A. (1992). School quality and black-white relative earnings: a direct assessment. *Quarterly Journal of Economics*, *107*(1), 151–200.

Duncan, G., & Dunifon, R. (1998). Soft-Skills and Long-Run Labor Market Success. In: S. Polachek (Ed.), *Research in Labor Economics* (Vol. 17). Greenwich, CT: JAI Press.

Duncan, G., & Morgan, M. (1981). Sense of efficacy and changes in economic status – a comment on andrisani. *Journal of Human Resources*, *16*(3), 649–657.

Dunifon, R., & Duncan, G. (1998). Long-run effects of motivation on labor-market success'. *Social Psychology Quarterly*, *61*(1), 33–48.

Dweck, C. (1990). Self-Theories and Goals: Their Role in Motivation, Personality, & Development. In: R. A. Dienstbier (Ed.), *Nebraska Symposium on Motivation*. Lincoln: University of Nebraska Press.

Easterlin, R. (1974). Does economic growth improve the human lot? some empirical evidence. In: P. A. David & M. W. Reder (Eds), *Nations and Households in Economic Growth – Essays in Honor of Moses Abramovitz*. New York: Academic Press.

Goldberger, A., & Manski, C. (1995). Review article: the Bell Curve by Herrnstein and Murray, *The Journal of Economic Literature*, *33*(2), 762–776.

Goldsmith, A., Veum, J., & Darity, W., Jr. (1999a). Working hard for the money?: Efficiency wages and worker effort. *The Journal of Economic Psychology*, Forthcoming.

Goldsmith, A., Darity, W., Jr., & Veum, J. (1999b). Race, cognitive skills, psychological capital and wages. *The Review of Black Political Economy*, Forthcoming.

Goldsmith, A., Veum, J., & Darity, W., Jr. (1997). The impact of psychological and human capital on wages. *Economic Inquiry*, *35*(4), 815–829.

Goldsmith, A., Veum, J., & Darity, W., Jr. (1996). The impact of labor force history on self-esteem and its component parts, anxiety, alienation and depression. *The Journal of Economic Psychology*, *17*(2), 183–220.

Hanushek, E. (1986). The economics of schooling: production and efficiency in public schools. *Journal of Economic Literature*, *24*(3), 1141–1177.

Harter, S. (1978). Effectance motivation reconsidered: toward a developmental model. *Human Development*, *21*(1), 36–64.

Heckhausen, H. (1991). *Motivation and Action*. Berlin: Springer-Verlag.

Heckman, J. (1979). Sample selection bias as a specification error. *Econometrica*, *47*(1) 153–162.

Heider, F. (1958). *Psychology of Interpersonal Relations*. New York: John Wiley.

Herrnstein, R. & Murray, C. (1994). *The Bell Curve: Intelligence and Class Structure in American Life*. New York: Basic Books.

Hetherington, E. (1972). Effects of father absence on personality development in adolescent daughters. *Developmental Psychology*, *7*(3), 313–326.

Hill, M., Augustyniak, S., Duncan, G., Gurin, G., Gurin, P., Liker, J., Morgan, J., & Ponza, M. (1985). *Motivation and Economic Mobility*. Ann Arbor: Institute for Social Research.

Jacobs, H., Prentice-Dunn, S., & Rogers, R. (1984). Understanding persistence: an interface of control theory and self-efficacy theory. *Basic and Applied Social Psychology*, *5*(4), 333–347.

Johnson, B., & Kilmann, P. (1975). Locus of control and perceived confidence in problem solving abilities. *Journal of Clinical Psychology*, *31*(1), 54–55.

Kiefer, N., & Smith, S. (1977). Union impact and wage discrimination by region. *Journal of Human Resources*, *12*(4), 521–534.

Kim, M., & Polachek, S. (1994). Panel estimates of male-female earnings functions, *Journal of Human Resources*, *29*(2), 406–428.

Klein, D., Ellen, F., & Seligman, M. (1976). Learned helplessness, depression, and the attribution of failure. *Journal of Personality and Social Psychology*, *33*(5), 508–516.

Koppel, R. (1981). *The Role of Social Psychological Variables in the Status Attainment of Young Men*. Ph.D.dissertation, Temple University.

Krueger, A., & Summers, L. (1988). Efficiency wages and the inter-industry wage structure. *Econometrica*, *56*(2), 259–293.

Krueger, A., & Summers, L., (1986). *Efficiency Wages and the Wage Structure*. Working Paper No. 1952, National Bureau of Economic Research.

Kuhl, J., (1984). Volitional aspects of achievement motivation and learned helplessness: toward a comprehensive theory of action control. In: B. A. Maber (Ed.), *Progress in Experimental Personality Research*. New York: Academic Press.

Kuhl, J. (1981). Motivational and functional helplessness: the moderating effect of state versus action orientation. *Journal of Personality and Social Psychology*, *40*(1), 155–170.

Lefcourt, H., (1991). Locus of control. In: J. Robinson, P. Shaver & L. Wrightsman (Eds.), *Personality and Social Psychological Attitudes*. Boston: Harcourt Brace Jovanovich.

Leibenstein, H. (1957). The Theory of underemployment in densely populated backward areas. In: H. Leibenstein (Ed.), *Economic Backwardness and Economic Growth*. New York: Wiley.

Leonard, J. (1987). Carrots and sticks: pay, supervision, & turnover. *Journal of Labor Economics*, *5*(4), S136–S152.

Locke, E. (1968). Toward a theory of task motivation and incentives, *Organizational Behavior and Human Performance*, *14*(2), 157–189.

Lynch, L. (1992). Private-sector training and the earnings of young workers. *American Economic Review*, *82*(1), 299–312.

Maddala, G. (1983). *Limited Dependent and Qualitative Variables in Econometrics*. Cambridge: Cambridge University Press.

Maier, S., & Seligman, M. (1976). Learned helplessness: theory and evidence. *Journal of Experimental Psychology: General*, *105*(1), 3–46.

Maslow, A. (1954). *Motivation and Personality*. New York: Harper and Row.

Mason, P. (1998). Race, culture and skill: interracial wage differences among african americans, latinos and whites. *The Review of Black Political Economy*, Forthcoming.

McArthur, L. (1970). Luck is alive and well in new haven. *Journal of Personality and Social Psychology*, *16*(2), 316–318.

Mincer, J. (1962). On-the-job-training: costs, returns, & some implications. *Journal of Political Economy*, Part 2, 50–79.

Muchinsky, P. (1977). A comparison of within- and across-subjects analyses of the expectancy-valence model for predicting effort. *Academy of Management Journal*, *2*(1), 154–158.

Murnane, R., Willett, J., & Levy, F. (1995). The growing importance of cognitive skills in wage determination. *The Review of Economics and Statistics*, *77*(2), 251–266.

Neal, D. (1995). Industry-specific human capital: evidence from displaced workers. *Journal of Labor Economics*, *13*(4), 653–677.

Neal, D., & Johnson, W. (1996). The role of premarket factors in black-white wage differences. *The Journal of Political Economy*, *104*(5), 869–895.

O'Neill, J. (1990). The role of human capital in earnings differences between black and white men. *The Journal of Economic Perspectives*, *4*(4), 25–45.

Pearlin, L., Lieberman, M., Menaghan, E., & Mullan, J. (1981). The stress process. *Journal of Health and Social Behavior*, *22*(4), 337–356.

Robbins, S. (1993). *Organizational Behavior: Concepts, Controversies, & Applications* (6th ed.). Englewood Cliffs: Prentice Hall, 1993.

Rodgers, W., & Spriggs, W., (1995). *What does AFQT really measure: race, wages, schooling and the AFQT score*. Working Paper, The College of William and Mary.

Rosenberg, M. (1965). *Society and the Adolescent Self-Image*. Princeton: Princeton University Press.

Rotter, J. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs*, *80*(1), 1–28.

Sahling, L., & Smith, S. (1983). Regional wage differentials: Has the south risen again? *Review of Economics and Statistics*, *65*(1), 131–135.
Seeman, M. (1991). Alienation and Anomie. In: J. Robinson, P. Shaver & L. Wrightsman (Eds), *Personality and Social Psychological Attitudes*. Boston: Harcourt Brace Jovanovich.
Seligman, M. (1975). *Helplessness: On Depression, Development and Death*. San Francisco: W. H. Freeman.
Seligman, M., & Maier, S. (1967). Failure to escape traumatic shock. *Journal of Experimental Psychology*, *74*(1), 1–9.
Shapiro, C., & Stiglitz, J. (1984). Equilibrium unemployment as a worker discipline device. *American Economic Review*, 433–444.
Skinner, E. (1996). A guide to constructs of control. *Journal of Personality and Social Psychology*, *71*(3) 549–570.
Skinner, E. (1995). *Perceived Control, Motivation, and Coping*. Thousand Oaks, CA.: Sage Publications.
Skinner, E., Chapman, M., & Baltes, P. (1988). Control, means-ends, and agency beliefs: a new conceptualization and its measurement during childhood. *Journal of Personality and Social Psychology*, *54*(1), 117–133.
Smith, R. (1970). Changes in locus of control as a function of life crisis resolution. *Journal of Abnormal Psychology*, *75*(3), 328–332.
Solow, R. (1979). Another possible source of wage stickiness. *Journal of Macroeconomics*, *1*(1), 79–82
Spence, M. (1973). Job market signaling. *Quarterly Journal of Economics*, *87*(3), 355–374.
Stiglitz, J. (1976). The efficiency wage hypothesis, surplus labor, and the distribution of income in l.d.c.'s. *Oxford Economic Papers*, *28*(2), 185–207.
Stiglitz, J. (1974). Alternative theories of wage determination and unemployment in l.d.c.'s: the labor turnover model. *Quarterly Journal of Economics*, *88*(2), 194–227.
Summers, L. (1988). Relative wages, efficiency wages, and keynesian unemployment. *American Economic Review*, *78*(2), 383–388.
Szekelyi, J. & Tardos, R. (1993). Attitudes that make a difference: expectancies and economic success. Discussion Paper, Institute for Research on Poverty, University of Wisconsin, Madison, WI.
Veum, J. (1995). Sources of training and their impact on wages. *Industrial and Labor Relations Review*, *48*(4), 812–826.
Vroom, V. (1964). *Work and Motivation*. New York: John Wiley.
Weiss, A. (1980). Job queues and layoffs in labor markets with flexible wages. *Journal of Political Economy*, *88*(3), 526–538.
Yellen, J. (1984). Efficiency wage models of unemployment. *American Economic Review*, *74*(2), 200–205.

CAREER HIERARCHY IN DUAL-EARNER FAMILIES

Anne E. Winkler and David C. Rose

ABSTRACT

Recent evidence indicates that dual-earner families are increasing and that spouses' roles may be changing. In light of these changes, this study asks the following question: how might career hierarchy in the family, that is, one spouse's job or career taking precedence over the other's, affect wage outcomes? Previous research by social scientists has considered related topics, but not the relationship between career hierarchy and wages per se. Using information on spouses' earnings and family attitudes about career roles from the National Survey of Families and Households, this study: (1) describes the likely pattern of career hierarchy among full-time, full-year, dual-earner couples, and (2) takes a first step toward assessing the effect of career hierarchy on wage outcomes. The results provide some evidence that wives who have the secondary career in their family tend to have lower wages than those who have the primary career. Results for husbands are inconclusive.

I. INTRODUCTION

Over the period from 1976 to 1998, dual-earner families emerged as the predominant family structure among married-couples, rising from 50 to 60% of all such couples. Even more striking, in 1998 dual-earner families constituted 75% of all married-couples that had a working husband and, in just over 50%

Worker Well-Being, Volume 19, pages 147–172.

ISBN: 0–7623–0693–9