THE IMPACT OF PSYCHOLOGICAL AND HUMAN CAPITAL ON WAGES

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Historically, economists have taken the position that psychological capital is either unobservable or unmeasurable; thus, heretofore, little evidence has been available on the contribution of psychological capital to wages. Using data drawn from two different waves of the National Longitudinal Survey of Youth, we offer evidence that psychological capital has both a direct effect—via self-esteem—and an indirect effect—through locus of control—on an individual's real wage. We find a person's wage is more sensitive to changes in self-esteem than to comparable alterations in human capital. Both relative wages and human capital contribute to self-esteem. (JEL E24, J6)

I. INTRODUCTION AND STATEMENT OF THE PROBLEM

Economists have a long standing interest in the determinants of real wages. Mincer [1962] and Becker [1964] suggested that personal productivity, and hence real wages, depend critically on human capital accumulation. Wages also are likely to be influenced by psychological capital—those features of personality psychologists believe contribute to an individual's productivity. These may include a person's perception of self, attitudes toward work, ethical orientation, and general outlook on life.

Economists acknowledge that the influence of personality on productivity is detectable and is rewarded by employers. But most economists, unlike psychologists, have taken the position that personality is either unobservable or unmeasurable. Rather than find ways to represent psychological capital in wage equations, economists have developed empirical techniques that yield consistent coefficient estimates of observable determinants of wages when other aspects of individual-specific heterogeneity are treated as omitted variables.[1]

However, if the unobservables include features of personality that fluctuate over time and are correlated with the observables, the standard approaches to eliminating heterogeneity bias will be ineffective. To the extent that this is the case, economists can offer neither consistent estimates of the effect of human capital accumulation on wages nor evidence on whether elements of psychological capital are related to wages. As a result, little is known about the relative contributions of psychological and human capital to wage levels.

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1. If the unobservables are time invariant, unobserved individual-specific heterogeneity is swept away by first-differencing the data. When the unobservables are both random and uncorrelated with the observables, estimation by Generalized Least Squares yields consistent and efficient coefficient estimates. For a detailed discussion of estimation in the presence of unobserved individual-specific heterogeneity see Greene [1993].

ABBREVIATIONS

NLSY: National Longitudinal Survey of Youth
SES: Self-Esteem Scale
I-E: Internal-External
AFQT: Armed Forces Qualifying Test

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Recently, however, psychologists have developed and validated measures of various components of psychological capital making it possible to "observe the unobservable." Some of these measures are available in the *National Longitudinal Survey of Youth* (NLSY). These measures make it possible to control directly for some aspects of person-specific heterogeneity in wage equations heretofore unaccounted for. Therefore, using data drawn from the NLSY, this paper offers estimates of the impact of both psychological and human capital on real wages.

The relationship between psychological capital and wages is captured in two ways. First, we offer direct evidence on the influence of self-esteem on wages. Because self-esteem reflects a wide range of personal attributes, it accounts for many dimensions of psychological capital. Theories of self-esteem formation advanced by psychologists suggest that wages and self-perception are determined jointly. Guided by this literature, we estimate a person's level of real wages and self-esteem simultaneously. Second, psychologists expect a person's general outlook on life, a component of psychological capital referred to as "locus of control," to play a central role in shaping a person's conception of self. We offer evidence on whether this element of psychological capital directly influences self-esteem and, thus, contributes indirectly to wages.

The explicit inclusion of both psychological and conventional human capital variables in the wage equation allows us to evaluate the relative contributions of human and psychological capital to real wages. This unique analysis fosters new insights into the determinants of personal productivity.

This paper is organized as follows. In section II we discuss the rationale for a relation between productivity and self-esteem. In section III we describe and evaluate the measurement of psychological capital. Section IV discusses our empirical procedures, including data, model specification, and estimation technique. Our findings on the relation between a person's real wage and their levels of psychological and human capital are presented in section V.

We find that psychological capital, as well as human capital, affects real wages both directly and indirectly. However, a striking result is evidence that an individual's real wage is more sensitive to a change in self-esteem than to comparable alterations in human capital. In addition, achievements that contribute to real wages, including the acquisition of some forms of human capital, are important determinants of self-esteem. A person's self-esteem also depends upon their relative wage. Concluding remarks appear in section VI.

II. PSYCHOLOGICAL CAPITAL AND WAGES

Neoclassical theory predicts that a profit-maximizing firm will pay workers a wage equivalent to their marginal product. Most economists believe a person's human capital is the primary determinant of personal productivity. In practice, human capital generally is treated as job-related skills and physical health (Grossman [1972]). Of course, the quantity and quality of a person's work may depend on their psychological capital as well. A person's psychological capital is likely to govern their motivation and general attitude toward work. Indeed, Erikson [1959], founder of the life span development theory, argued that individuals who were psychologically healthy—those with high self-esteem—would be the most productive.

Following Rosenberg [1965], psychologists treat self-esteem as multidimensional, comprising notions of worth, goodness, health, appearance, and social competence. Deficits in one area can be overcome by strengths in another. Since self-esteem may be changed by events people experience, comparisons they make, or evaluations conducted by others, it is best thought of as a feature of personality, rather than a trait—the latter a stable and enduring property of the individual. The broad scope of factors contributing to self-esteem allows it to capture many features of a person's psychological capital.

Brockner [1988] found self-esteem influenced productivity positively in two ways. First, managers perceived that high self-esteem workers tend to use their time more effectively. The latter needed less direction from supervisors, leading to shorter periods of "down time." Second, workers high in self-esteem exercised a more efficient use of group time by exhibiting a willingness to consider a wider range of solutions to problems; and they were more confident decision makers. These characteristics led to groups with high levels

of cooperation and groups less inclined to seek guidance from managers.

Psychologists believe that a person's general outlook on life, their locus of control, influences self-esteem. Individuals who think they are masters of their own fates and believe they are responsible for what happens to them are called internalizers by psychologists. Externalizers believe their life is controlled by outside forces and that they bear little responsibility for what happens to them. Psychologists (Glietman [1991]; Rotter [1966]) consider locus of control to be a personality trait, a stable feature of self, formed early in life. Lefcourt [1982] and Bandura [1986] suggest that individuals who believe they are in control of situations they face, those with an internal locus of control, are likely to possess a strong sense of self-worth relative to externalizers—who tend to doubt their personal efficacy. Hence, while locus of control may affect labor market outcomes, it appears to do so through its impact on more time-variant psychological variables. As a result, locus of control is an element of psychological capital that is expected to influence wages, but only indirectly through its effect on self-esteem.

Psychologists (Lane [1991]; Glietman [1991]) also expect wages to enhance self-esteem, contingent upon the manner in which self-esteem is derived. Self-esteem may be *achieved*, through actions leading to a heightened sense of self, or *ascribed*, due to the possession of certain characteristics valued by society (e.g., being Protestant, wealthy, attractive). Therefore, success in the labor market, as measured by the wage a person commands, is likely to contribute directly to a positive perception of self. Heretofore, the possibility that real wages and self-esteem are interdependent has been unrecognized by economists.

It certainly is plausible that a link exists between psychological capital and personal productivity, as well as a connection between real wages and self-esteem. Since most economists have operated under the belief that psychological constructs are unmeasurable, generally they have not examined whether such associations exist. Rare exceptions include research on the relation between mental health and wages by Bartel and Taubman [1979; 1986], Frank and Gertler [1991], and Mullahy and Sindelar [1993] indicating that poor men-

tal health significantly reduces an individual's earnings.

In these papers, a person's mental health status is treated as an exogenous determinant of personal productivity and wages. The possibility that emotional well-being also may be influenced by wages is not formally explored.[2] However, poor mental health is likely to damage self-esteem, leading to a decline in productivity and wages that may in turn erode a person's perception of self.

Recent developments in the measurement of psychological capital make it possible for economists to examine more fully the relation between personality and wages. Moreover, these advances make it possible to explore the reciprocal influences of psychological capital and real wages. The following section discusses how psychologists measure two elements of a person's psychological capital, self-esteem and locus of control, and indicates why economists should find these measures useful in their empirical work.

III. MEASURING PSYCHOLOGICAL CAPITAL: METHODS AND VALIDITY

Rosenberg [1965] developed an inventory of questions to measure an individual's "global" self-esteem, and Rotter [1966] constructed a survey instrument to gauge an individual's "locus of control." These scales, contained in the NLSY, are constructed from self-reported evaluations collected as responses to survey questions.

Economists have been reluctant to use subjective data because of their concerns over variable measurement error, their aversion to making interpersonal comparisons using such data, and their lack of familiarity with psychological scales (Easterlin [1974]). In contrast, psychologists believe these problems can be overcome and that variations in these scales across individuals can help explain observed differences in individual behavior and outcomes. We turn now to a brief discussion of the issues raised by economists, and the procedures adopted by psychologists that address these concerns.

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2. Mullahy and Sindelar [1993] and Frank and Gertler [1991] discuss the issue of causality between labor market outcomes and mental health. They also note that poor mental health may make skill acquisition more costly, leading to lower skill productivity and wage levels among the mentally ill.

Economists are predisposed to say subjective interpersonal comparisons are pointless. For instance, individuals might "anchor" their scale at different levels, making interpersonal comparison of responses meaningless. Psychologists assert that the "anchoring" issue can be addressed by careful construction of the questions contained in a scale used to represent a psychological construct.

Consider, for example, the construction of Rosenberg's Self-Esteem Scale (SES). The scale contains ten questions that are used to measure self-esteem as defined by Rosenberg—a favorable or unfavorable attitude towards oneself (Rosenberg [1965, 15]). A four-point Likert-style responses format (strongly agree, agree, disagree, strongly disagree) accompanies each question, but responses are typically scored only as agreement or disagreement, resulting in a two point (0,1) response. This procedure has been adopted by investigators because where a person "anchors" their scale is more likely to influence their intensity of agreement with a statement than whether they agree in principle with the statement.

Two people with *identical reactions* to a statement may evaluate the strength of their reaction differently, one claiming to "agree" with the statement and the other agreeing "strongly." Therefore, a scale based on subjective strength of concordance with a remark is likely to be of little use in analyzing behavior across individuals. However, if the scale is constructed using impressions of agreement or disagreement with a series of remarks, the issue of "anchoring" is less problematic.

Rotter's [1966] Internal-External (I-E) Locus of Control Scale consists of 23 question pairs. Internal statements are paired with external statements. Again, to reduce measurement error caused by different "anchor" points, individuals are asked to reveal which of the widely divergent descriptive statements corresponds to their perception—not the extent of the concordance. One point is given for each internal statement selected. Scores on the I-E can range from 0 (most external) to 23 (most internal).

Rosenberg's SES also was designed originally as a Guttman-type scale where a larger pool of items is reduced through the grouping of questions. Following Rosenberg, the ten questions have been used to construct six sub-scales, each yielding a single measure represented on a two-point (0,1) scale.[3] Therefore, the Rosenberg measure of self-esteem ranges in value from 0 to 6, with a higher value representing a greater level of self-esteem.

Even if measures of psychological constructs can be designed to permit meaningful interpersonal comparisons, economists also have expressed skepticism about the accuracy of constructs purporting to measure components of a person's psychological status such as self-esteem and locus of control.[4] Likewise, many psychologists initially were uneasy about the precision of these measures. However, studies reveal that scales designed to gauge an individual's self-esteem and locus of control are effective.[5] Psychologists assess the usefulness of scales developed to measure a psychological construct 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. For instance, would a person rated as high in self-esteem using Rosenberg's Self-Esteem Scale score correspondingly high on Coopersmith's Self-Esteem Inventory or the Lerner Self-Esteem Scale? A scale is reliable when the questions that comprise the scale are all probing similar or related features of the individual's make-up. If there is a high correlation between responses on each scale item, as reflected by a high Cronbach α, the scale is regarded as reliable. Finally, a scale is only considered stable if a similar assessment is generated by administering the same scale a short time in the future. Two weeks is a common interval to retest for purposes of examining stability.

Silber and Tippett [1965], Crandall [1980], Demo [1985], and Reynolds [1988] found

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3. Crandall [1980] found little difference between using the SES scored by summing the response to each question on a four-point scale, giving a scale range of 10–40, or as a Guttman scale resulting in a range from 0–6.

4. Easterlin [1974] and Freeman [1978] give excellent accounts of measurement issues associated with subjective response data.

5. Robinson and Wrightsman [1991], and Robinson and Shaver [1980] offer an excellent description and psychometric evaluation of measurement instruments for the full range of psychological constructs.

Rosenberg's SES exhibits substantial convergent validity.[6] There is also evidence of relatively high reliability of Rosenberg's SES from Fleming and Courtney [1984], and Dobson et al. [1979]. Finally, analysis by Fleming and Courtney [1984] and Silber and Tippett [1965] reveals the SES is stable.[7]

Although Rosenberg's SES appears to be a viable way to measure a person's self-esteem, some shortcomings of the scale have been identified. Wylie [1989] notes there is a tendency for the majority of subjects to attain scores on the self-favorable end of the scale. This makes it more difficult to distinguish the impact of an event on a person's perception of self. Moreover, Rosenberg assumes that an individual's global self-regard is determined by a combination of self-conceptions and self-evaluations concerning separate aspects of self. Rosenberg's scale questions allow each person to take into account, in their own way, the relative contributions of specific self-evaluations to overall self-esteem. Marsh, Smith and Barnes [1983] point out that such aggregation may prevent investigators from identifying the relative importance of various components of self-esteem to outcomes such as productivity and earnings.

Rotter's Internal-External Locus of Control Scale is correlated with other frequently used measures of locus of control (Phares [1976]). Moreover, MacDonald's [1973] review of the literature on the correlation of the Rotter scale with various Social Desirability Scales led him to conclude that there is little evidence of response bias. Rotter's I-E Scale also exhibits substantial test-retest stability (Rotter [1966]; Hersch and Scheibe [1967]).

Although construct validity and stability evaluations suggest the I-E Scale is an effective way to account for a person's locus of control, initial evidence on reliability identified a potentially problematic characteristic. Factor analysis by Rotter [1966], Mirels [1970], and Watson [1981] reveal that one general factor—personal control—accounted for most of the total scale variance. A second factor, a person's belief that people have control generally—control ideology—was found to explain some of the variance as well. However, according to MacDonald [1973, 229] only those items that pertain to personal control "appear to be reflecting and measuring the construct as it was defined by Rotter."

The multidimensional nature of Rotter's I-E Scale has raised concern about the reliability of the scale itself. For instance, adding items regarding control ideology to those capturing personal control may produce an inaccurate measure of the "personal control" aspect of locus of control. Therefore, Lefcourt [1991] suggests that investigators refrain from using such general scales as the I-E and instead construct their own scales, possibly based on a subset of items from a general scale, that specifically address the construct they are interested in measuring. According to Lefcourt, [1991, 418] "even a four-item scale specifically designed to assess a particular area of concern may prove more useful and stimulating than would a longer, more established, but area-irrelevant locus of control measure."

Only four of Rotter's 23 questions were included in the NLSY. These four items were chosen by the designers of the NLSY based on evidence, provided by psychologists, which indicates that these items, from the set of twenty three, are the strongest indicators of "personal" internality-externality, the construct Rotter sought to measure.[8] Following the procedure suggested by Rotter, the four questions were combined to form a measure of perceived personal locus of control. We refer to this measure, that may range in value from 0 (an external response to each question) to 4 (an internal response to each question), as an "Abbreviated Rotter."

6. Demo [1985] probed convergent validity of the SES in a unique manner. He compared the self-reported measure of self-esteem from the SES with ratings of a person's self-esteem offered by both "peers," who had ongoing relationships with the individual, and "trained observers," following interactions with the individual. Demo concluded the degree of convergence of these nontraditional measures with the self reports contained in the SES upholds its validity.

7. For a more detailed discussion of research assessing Rosenberg's SES and Rotter's I-E scale, see Darity and Goldsmith [1996] and Goldsmith, Veum, and Darity [1996].

8. The rationale for the sole inclusion of these four questions is contained in the 1978 U.S. Government Office of Management and Budget "Clearance Package for the NLS" in a section on content justification. The following statement appears in the Clearance Package, "we have selected the four Rotter items that our work and that of others has shown to be the most powerful predictor of internality-externality."

IV. EMPIRICAL PROCEDURES

Data

The data used in this study are from the NLSY, a sample of 12,686 males and females who were between the ages of 14 and 21 in 1978 and who have been interviewed annually since 1979. The NLSY is a unique data set, rich in economic and demographic information. It includes data on wages and multiple aspects of human capital. It also contains measures of psychological capital. In 1980 and again in 1987 the entire set of questions which comprise Rosenberg's [1965] SES were asked. At the time of the 1979 interview, information was collected on locus of control.

Another interesting feature of the NLSY is that information on each respondent's adolescent home environment at age 14 was collected. Socialization processes influencing attitudes and values occurs in the home. These attitudes and values, many of which are formed by age 14, may contribute to subsequent personal productivity. Although self-esteem is multifaceted and captures a person's psychological capital in a broad sense, additional aspects of individual-specific heterogeneity are likely to remain. A portion of the remaining person-specific heterogeneity may be captured by variables describing a person's home circumstances as a youth.

The NLSY enables us to determine whether the link between psychological capital and real wages is similar for workers at two different points in their working life cycle—1980 and 1987. Analysis of the 1980 data is restricted to individuals who were old enough to obtain a work permit in 1979 and had completed their formal schooling—2,225 young individuals. The data set drawn from the 1987 wave of the NLSY is composed of 8,132 individuals who were not enrolled in school in 1987. Because we treat locus of control as a personality trait, it is expected to be stable. Therefore, in 1987 a person's locus of control is represented by their locus of control measured in 1979, the only time period for which such information is available as of the 1987 interview date.[9]

Model Specification

Following the convention initiated by Mincer [1962], the productivity of a worker is expected to depend on their personal attributes as well as characteristics of their workplace. Although Mincer [1962; 1974] and Becker [1964] chose to focus on human capital, psychological capital also should be included as a relevant personal characteristic. Psychologists have identified self-esteem as a broad measure of psychological capital that is determined, in part, by the wage level a person commands. Therefore, wages and self-esteem should be viewed both as being endogenous and simultaneously determined. In order to account for the joint determination of wages and self-esteem, the following two-equation structural model is specified:

$$(1) \quad Wage_i = \phi(Self\text{-}Esteem_i)$$
$$+ (Human\ Capital_i)\gamma$$
$$+ (X_i)\beta + (Y_i)\pi$$
$$+ \delta(Selection_i) + \varepsilon_i$$

$$(2) \quad Self\text{-}Esteem_i = \varphi(Wage_i) + (\tilde{w}_i)\theta$$
$$+ (Human\ Capital_i)\lambda$$
$$+ (Z_i)\alpha + \mu_i$$

Variable names, descriptions of how each variable used in the estimation of equations (1) and (2) was constructed, and sample summary statistics are provided in Table I. Frequency distributions for SES scores in 1980 and 1987, and for Rotter's I-E scale score in 1979 for persons in the data set in 1980 and 1987 are presented in Table II. Many features of a person's psychological capital are captured by their self-esteem score. Thus, a person with greater self-esteem, measured by their score on the Rosenberg SES, is expected to be more productive and realize a higher wage.

The vector *Human Capital_i* is composed of measures capturing four different aspects of human capital. Broad based formal skills are captured by *Education*. An individual's verbal and mathematical skills developed while attending school and at home are measured by

9. In 1992 the NLSY contained the questions which comprise Pearlin et al.'s [1981] *Mastery Scale* which is analogous to Rotter's I-E Scale. Because of the lengthy duration between interviews with information on self-esteem—seven years—and because a small portion of the data set were employed in 1980, we decided not to estimate a fixed-effects model.

TABLE I
Variable Names, Definitions, and Sample Means

Variable Name	Variable Definition	1980 DATA		1987 DATA	
		Wage Equation Means (std. dev.)	Self-Esteem Equation Means (std. dev.)	Wage Equation Means (std. dev.)	Self-Esteem Equation Means (std. dev.)
Wage	Natural log of hourly wage on current/most recent job	1.45 (.37)		1.91 (.52)	
Wage Hat	Predicted value of the natural log of hourly wage		1.06 (.41)		1.85 (.33)
High Wage	1 if a person's Wage Hat is more than one standard deviation > mean Wage Hat for the sample, 0 otherwise		.17 (.37)		.17 (.38)
Low Wage	1 if a person's Wage Hat is more than one standard deviation < mean Wage Hat for the sample, 0 otherwise		.21 (.41)		.17 (.38)
Self-Esteem	Product of the score on to the six subscales constructed from Rosenberg Self-Esteem Inventory		3.69 (1.27)		5.32 (.96)
Self-Esteem Hat	Predicted value of the product of the score on the six subscales constructed from Rosenberg Self-Esteem Inventory	3.69 (.47)		5.32 (.31)	
Education	Years of education completed	11.39 (1.67)	11.05 (1.85)	12.07 (2.24)	12.52 (2.27)
Experience	Weeks worked since 1978	77.99 (28.30)	61.89 (36.700)	274.94 (126.49)	253.78 (135.65)
*Tenure**	Weeks of continuous work with current employer	56.57 (44.52)		126.68 (128.73)	
AFQT	Score on the Armed Forces Qualifying Test	64.45 (21.52)	60.12 (22.20)	65.23 (21.68)	63.28 (22.20)
SMSA	1 if live in SMSA, 0 otherwise	.68 (.46)	.68 (.47)	.78 (.41)	.77 (.42)
Unemployment	County unemployment rate	6.99 (2.21)	7.06 (2.19)	7.10 (2.55)	7.18 (2.58)
Locus of Control	Sum of the response to the four Rotter questions	2.57 (1.07)	2.46 (1.06)	2.53 (1.04)	2.50 (1.05)
Male	1 if male, 0 otherwise	.51 (.50)	.46 (.50)	.51 (.50)	.47 (.50)
Black	1 if black, 0 otherwise	.18 (.39)	.22 (.41)	.26 (.44)	.27 (.44)
Age	Age	20.56 (1.41)	20.42 (1.51)	25.85 (2.26)	25.86 (2.26)
Married	1 if married, 0 otherwise	.32 (.47)	.34 (.47)	.44 (.50)	.44 (.50)
Kids	1 if respondent has a child in the household, 0 otherwise	.22 (.42)	.33 (.47)	.42 (.49)	.46 (.50)
Wealth	Value of household wealth/1,000	10.87 (12.70)	10.26 (11.20)	10.90 (15.75)	10.87 (15.52)
Professional Parent	1 if occupation of either parents in household at age 14 was professional or manager, 0 otherwise.	.16 (.37)	.14 (.35)	.21 (.41)	.20 (.40)
Both Parents	1 if both parents lived in household when respondent was 14, 0 otherwise.	.71 (.45)	.69 (.46)	.69 (.46)	.67 (.47)
Parent Education	Average highest grade completed by respondent's parents.	10.51 (2.69)	10.33 (2.67)	11.10 (2.85)	10.94 (2.91)
Religion	1 if affiliated with any religious group, 0 otherwise.	.85 (.35)	.84 (.37)	.95 (.21)	.95 (.21)
Selection	Selection control variable.	.64 (.51)		.26 (.28)	
Number of Observations		1411	2225	6911	8132

TABLE II

Frequency Distributions for Self-Esteem in 1980 and, 1987, and Trait Locus of Control
Measured in 1979 for the Samples in 1980 and 1987

Score Range	Self-Esteem 1980		Self-Esteem 1987		Locus of Control 1980 Sample		Locus of Control 1987 Sample	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
0	3	0	2	0	83	4	246	3
1	69	3	39	0	328	15	1181	15
2	349	16	106	1	684	31	2480	30
3	544	24	301	4	741	33	2698	33
4	704	32	918	11	389	17	1527	19
5	337	15	2127	26				
6	219	10	4639	57				
Number of Observations	2225	100	8132	100	2225	100	8132	100

scores on the Armed Forces Qualifying Test (*AFQT*). General and specific workplace skills are represented by *Experience* and *Tenure*, respectively.

The X_i vector contains variables describing a person's work environment. It includes dummy variables for *Occupation* and *Industry* of employment, size of the local labor market (*SMSA*), and local labor market conditions as represented by the area-specific *Unemployment* rate.

The vector Y_i contains demographic information and measures of personal characteristics, aside from human and psychological capital, that are expected to influence personal productivity or result in work-related constraints. Demographic factors taken into account include gender (*Male*), race (*Black*), *Age*, marital status (*Married*), presence of young dependents (*Kids*), and financial wealth (*Wealth*).

Families and significant others are the agents that socialize youths, affecting the evolution of their sense of self-esteem. These interactions also may contribute to the formation of values and attitudes, not fully captured by self-esteem, that influence subsequent productivity. The vector Y_i contains variables to account for the possible role of a person's adolescent youth environment in generating such individual-specific heterogeneity. Socialization leading to greater subsequent productivity and wages is presumed to occur in families where *Both Parents* are present, *Parent Education* is greater, a *Professional Parent* resides, and there is an affiliation with a *Religion*.

Wages are observed only for those individuals working for pay (1,411 of the 2,225 observations in the 1980 data, and 6,911 of the 8,132 observations in the 1987 data). Heckman [1979] has suggested that unobservable characteristics of the individual both govern a person's decision about whether or not to participate in the labor force and their productivity if they opt to work. If these factors are omitted from the estimated equation, then the estimated coefficients will suffer from selectivity bias. Following Heckman a selection-correction variable (*Selection*) is included in equation (1) to control for labor force participation.

A person's self-esteem level, S_i, is expected to be governed by equation (2). Achievements such as the accumulation of human capital and success in the labor market are expected to contribute positively to a person's perception of self. Wages are a commonly used standard for gauging economic success. Absolute wages and relative wages are expected to influence a person's perception of self. Receiving a greater real wage, given a position in the wage distribution, should enhance an individual's self-esteem. In forming an opinion of self a person also may care about their compensation relative to others.

A person earning a "high" wage level relative to others, for a given absolute wage rate, is expected to exhibit greater self-esteem. Those receiving "low" hourly pay in comparison to others are likely to possess a lower level of self-esteem. The vector $\tilde{w}_i$ contains two variables, *High Wage* and *Low Wage*, to identify where an individual is located in the wage distribution.[10]

Demographic characteristics and personal attributes expected to affect a person's self-esteem are elements of the vector Z_i. All the variables contained in Y_i are included in Z_i, plus a measure of a person's *Locus of Control*. Individuals who possess a more internal locus of control are likely to have greater self-efficacy—a belief they can accomplish tasks. Following Bandura [1986], persons with stronger self-efficacy are expected to possess a more favorable view of self. Thus, holding a more internal locus of control is expected to contribute to greater self-esteem. Does better self-esteem lead a person to be more internal in their outlook, resulting in joint determination of these two components of psychological capital?

Psychologists such as Rosenberg [1965] believe self-esteem fluctuates over a person's life-cycle in response to experiences. However, the foundation upon which a person evaluates themselves is developed as a youth. An important component of this foundation is a person's locus of control that is established early in life and is relatively time invariant. Factors causing adjustments in self-esteem are not expected to alter a trait-like feature of personality molded as a youth. Therefore, we treat locus of control as an exogenous determinant of self-esteem.

Intact families, with well-educated and professional parents affiliated with a religious organization, are expected to provide a foundation yielding a more positive perception of self in their offspring. Having a spouse, children, and greater financial wealth, is expected to enhance a person's self-esteem. Socialization patterns are likely to reduce self-esteem for women relative to men. Discrimination can be expected to harm a person's self-esteem.

Wage appears in the self-esteem equation (2), and *Self-Esteem* is included in the wage equation (1) to account for their joint determination. Self-esteem is independent of current labor market conditions (represented by *SMSA* and *Unemployment*) which are expected to affect wages. As a result, these variables are used to identify the self-esteem equation, equation (2). A person's locus of control is expected to exert a direct influence on their self-esteem while only indirectly effecting their wage, through its impact on self-esteem. Because the locus of control is included in the self-esteem equation, but is excluded from the wage equation, it identifies the wage equation.

Estimation Technique

Two-stage least squares (2SLS), is used to estimate equations (1) and (2). In the first stage each endogenous variable is regressed on all of the exogenous variables in the system by OLS. Using the coefficient estimates from the reduced-form equations, estimated values of the endogenous variables—instruments— are created.[11] In Stage II these estimated values, of w_i and S_i, denoted as $\hat{w}_i$ and $\hat{S}_i$ respectively, which are uncorrelated with the disturbance terms, replace the endogenous variables in structural equations (1) and (2). The structural equations are then estimated by OLS and ordered probit respectively, an appropriate procedure when the dependent variable is categorical and sequential, such as our Rosenberg measure of self-esteem, and when errors

10. A person was presumed to earn a relatively high (low) wage if their wage was more than one standard deviation above (below) the mean wage for the entire sample. The authors wish to thank a referee for this journal for suggesting a specification of equation (2) in which relative, as well as absolute, wages are hypothesized to influence a person's self-esteem. To avoid simultaneous equations bias the predicted wage is used in the structural self-esteem equation, thus predicted wages are used to define a person's position in the wage distribution. We also utilized dummy variables to represent a person's position in the wage distribution for the occupation in which they are working or last worked. Estimating the structural wage equation with these dummy variables provided weaker support for the hypothesis that relative wages influence self-esteem. These estimates are not reported in Table III but are available from the authors upon request.

11. It might be argued that using a nonlinear estimation technique is more appropriate given that self-esteem is a noncontinuous dependent variable. However, predicted means and actual means can vary substantially using nonlinear methods. Fortunately, the coefficients from an OLS estimation, which are used to create the predicted values, are consistent; only the standard errors are inconsistent. See Heckman [1978] for a detailed discussion of these points.

are assumed normally distributed (Maddala [1983]).

V. RESULTS

The results for the structural wage equation appear in Table III along with estimates of the sensitivity of the wage rate to changes in human capital and self-esteem. Table IV presents our estimates of the structural self-esteem equation.

Wages

Self-esteem, a broad measure of psychological capital, is positively and significantly related to the real wage for each of the data sets. The coefficient estimates on each of the four different types of human capital (*Education, Tenure, Experience, AFQT*), are positive and significant for the data set primarily composed of people at a very early stage of their working life-cycle, and for the data set containing more mature individuals.

A striking result is evidence that an individual's real wage is more sensitive—based on elasticities calculated at the sample means—to a change in self-esteem than to comparable alterations in human capital. For the average person in the entire data set, a 10% increase in self-esteem improves the real wage by 4.8% using 1980 data and 13.3% using 1987 data.[12] In 1980, a 10% expansion of education, work tenure, or basic skills (*AFQT*), ceteris paribus, enlarges wages by 1.1%, .4%, and 1.2% respectively. Additional work experience has a similar, but slightly smaller, impact on wages than self-esteem. The real wage grows by 4.3% when work experience expands by 10%. In 1987 wages were more sensitive to a change in education than other forms of human capital. The impact on a person's wage rate of an increase in education is essentially one-fourth as large as would occur for a comparable improvement in self-esteem.

An *F*-test for the hypothesis that the wage rate is independent of both *SMSA* and *Unemployment* rejects the hypothesis at the .01 level for both the 1980 and 1987 data sets.

Thus, the self-esteem equation is identified both theoretically and empirically.

Studies by O'Neill [1990], Ferguson [1993], Maxwell [1994], and Neal and Johnson [1996] using the NLSY find that when the *AFQT* is included in the wage equation as a measure of basic skills, the gap between white and black wages declines dramatically. Moreover, Neal and Johnson [1994, 9] report that results using the wage "as the dependent variable, show small statistically insignificant race differences in wages for either sex when *AFQT* is included." They conclude that the racial wage differential is largely due to a racial skill differential—not discrimination.[13] However, their model suffers from omitted variable bias, and the omitted variable, psychological capital, is jointly determined with their dependent variable. When the joint determination of wages and psychological capital is taken into account explicitly, we find that blacks with comparable skill characteristics earn significantly less than whites.

Males earn significantly higher wages than females. Age contributes positively to the wage rate, and married persons earn significantly lower wages for workers in the 1980 data set. Marriage may act as a constraint, or married people may be choosing more flexible jobs that pay less. Having young dependents, another potential labor market constraint, is associated negatively with the real wage level but the relation is statistically insignificant. Greater financial wealth contributes positively to the real wage level of employees in the 1987 data set but is independent of the real wage level for workers in 1980. The sample-selection correction is positive and significant in each estimated model, implying a positive correlation between unobservables in the labor force participation equation and the wage equation.

Variables describing a person's family background characteristics as a youth, used to

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12. What can account for the greater magnitude of the effect of improvements in self-esteem upon wages for workers in 1987 relative to those employed in 1980? It is possible that the factors contributing to self-esteem are more closely linked to productivity as individuals move through their working life cycle.

13. Rodgers and Spriggs [1996] argue that *AFQT* measures basic skills with substantial error, particularly for blacks. They suggest caution in drawing inferences or making policy statements based on the estimated relationship between *AFQT* and real wages. For an excellent discussion of issues in interpreting the correlation between *AFQT* and wages see Currie and Thomas [1995]. In their work, Currie and Thomas separate *AFQT* into its component parts and find that each element of *AFQT* affects subsequent wages differently. For certain components they note that blacks experience a higher monetary return than whites.

TABLE III
Structural OLS Log Wage Estimates
(*t*-statistics in parentheses)

Variable Name	Expected Sign	1980 Data	1987 Data
Self-Esteem Hat	+	.13 (2.97)***	.25 (3.73)***
Education	+	.12e-01 (1.67)**	.27e-01 (6.75)***
Tenure	+	.69e-03 (3.11)***	.54e-03 (12.07)***
Experience	+	.76e-02 (5.29)***	.51e-03 (3.92)***
AFQT	+	.19e-02 (2.34)***	.12e-02 (1.58)*
Male	+	.19 (8.21)***	.17 (11.84)***
Black	–	–.53e-01 (1.98)**	–.30e-01 (1.73)**
Age	+	.20e-01 (2.92)***	.60e-01 (1.23)
Married	–	–.56e-01 (2.44)***	–.18e-01 (1.25)
Kids	–	–.25 (.84)	–.12 (.89)
Wealth	+	.63e-06 (.94)	.54e-06 (1.56)*
Professional Parent	+	–.40e-01 (1.62)**	.41e-01 (2.75)***
Both Parents	+	.27e-01 (1.42)*	–.20e-01 (1.72)**
Parent Education	+	.30e-02 (.84)	.41e-02 (1.90)**
Religion	+	–.43e-01 (1.76)**	.37e-02 (.15)
SMSA	+	.79e-01 (3.80)***	.86e-01 (6.32)***
Unemployment	–	–.23e-02 (.57)	–.18e-01 (8.45)***
Selection	+	.59 (4.47)***	.90e-01 (1.30)*
Intercept	+	–.66 (2.41)**	–.31 (.91)
Number of Observations		1411	6911
F		18.90*** (34,1376)	115.84*** (34, 6876)
R^2		.32	.36
$\dfrac{\%(\Delta\ Wage)}{\%(\Delta\ Self\text{-}Esteem\ Hat)}$		.48	1.33
$\dfrac{\%(\Delta\ Wage)}{\%(\Delta\ Education)}$		11	.34
$\dfrac{\%(\Delta\ Wage)}{\%(\Delta\ Tenure)}$		.04	.07
$\dfrac{\%(\Delta\ Wage)}{\%(\Delta\ Experience)}$		.43	.14
$\dfrac{\%(\Delta\ Wage)}{\%(\Delta\ AFQT)}$		.12	.08

All equations included industry and occupation dummies
*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 IV
Structural Ordered Probit Estimates: Degree of Self-Esteem
(*t*-statistics in parentheses)

Variable Name	Expected Sign	1980 Data	1987 Data
Wage Hat	+	−.12 (.50)	.63e-01 (.57)
High Wage	+	.13 (1.50)*	.32e-01 (.58)
Low Wage	−	−.15 (1.58)*	−.72e-01 (1.41)*
Education	+	.37 (2.15)**	.33e-01 (3.74)***
Experience	+	.13e-02 (.73)	.42e-03 (2.80)***
Tenure	+	−.28e-03 (.41)	.33e-03 (2.48)***
AFQT	+	.98e-02 (6.09)***	.10e-01 (10.81)***
Locus of Control	+	.17 (7.39)***	.93e-01 (7.04)***
Male	+	.13 (1.76)**	.54e-01 (1.55)*
Black	−	.16 (2.57)***	.14 (4.05)***
Age	+	−.15e-02 (.09)	−.41e-01 (6.06)***
Married	+	.93e-01 (1.67)**	.13 (4.04)***
Kids	+	−.68e-01 (1.13)	.35e-01 (1.08)
Wealth	+	.13e-05 (.68)	.16e-05 (1.75)**
Professional Parent	+	.71e-01 (1.05)	−.97e-01 (2.53)***
Both Parents	+	−.38e-01 (.76)	.50e-01 (1.75)**
Parent Education	+	.74e-02 (.80)	.60e-02 (1.12)
Religion	+	.97e-01 (1.58)*	−.76e-01 (1.25)
Number of Observations		2225	8132
Log of Likelihood Function		−3468	−8710
Chi Square (Degrees of Freedom)		317*** (18)	851*** (18)

*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.

account for individual-specific heterogeneity not captured by a person's self-esteem level, do play a role in the subsequent determination of a person's wage level. At the earliest stages of the working life-cycle, those who were raised in an "intact" family—one with both parents present—command a significantly higher real wage. However, having a professional parent results in significantly lower wage level. One possible explanation is that youths raised in such families are likely to continue in school for advanced degrees and not be in the labor force. Those working simply may possess other unaccounted for characteristics that make them less productive.

Interestingly, being affiliated with a religious organization as a youth at age fourteen also exerts a *negative* impact on subsequent

wages very early in a person's working life. Later in the working life-cycle a person's wage is independent of having been raised in a religiously affiliated family. However, persons raised in families with a professional parent and with greater parent education earn significantly more. A puzzling finding is that people from intact families earn significantly less by 1987.

The key finding is that various components of skill-based human capital and a broad measure of psychological capital, self-esteem, significantly affect real wages. Moreover, psychological capital, relative to human capital, has a greater impact on wages. Thus, an aspect of personality that typically is part of unobserved individual-specific heterogeneity is an important determinant of hourly compensation.

Self-Esteem

Achievements, including the completion of more years of education, the accumulation of greater "basic skills" and more extensive work experience all exert a positive and significant effect on self-esteem for workers in 1987. Work experience with current and former employers fails to influence a person's self-esteem for the very young workers who comprise the 1980 data set, but their accumulation of education and "basic skills" contribute positively to their perception of self. Interestingly, although these same components of human capital are significantly related to the wage level, self-esteem is independent of improvements in a person's real wage, so long as their position in the societal wage distribution is held constant.

However, people who receive a relatively "low" real wage report possessing a significantly lower level of self-esteem than workers in the middle of the wage distribution. Commanding a "high" relative wage is associated with a more favorable view of self, and this perception is measured with precision using the 1980 data set. These findings suggest that wages do significantly influence a person's self-esteem. However, it is not necessarily how much that is earned, but where earnings place an individual in the wage distribution that affects a person's self-esteem.

Individuals who are more internal in their outlook possess a significantly higher level of self-esteem than comparable individuals whose locus of control is more external. This finding means that the structural wage equation is identified empirically as well as theoretically. Moreover, because locus of control is an important determinant of self-esteem that contributes to a higher real wage, we find evidence that psychological capital has both a direct effect—via self-esteem—and an indirect effect—through locus of control—on a person's real wage level.

Males hold a significantly more favorable view of self-worth than females, ceteris paribus. Although mean self-esteem is lower for blacks than whites, when achievements, personal characteristics, and adolescent home environment are controlled for in the structural self-esteem equation, being black is positively and significantly related to self-perception. Marriage significantly enhances self-esteem, while people with young dependents do not hold a significantly different level of self-esteem than comparable persons without the responsibility of young dependents.

People who grew up in an intact family had a significantly greater level of self-esteem in 1987. But those who had a professional parent report a lower level of self-esteem in 1987. Using the 1980 data of the variables reflecting a person's adolescent family environment, only religious affiliation—which contributed positively—was related to subsequent self-esteem.

The key findings are that relative, but not absolute, hourly wages are an important determinant of self-esteem. Investments in human capital also contribute to a more favorable view of self. In addition, individuals whose upbringing and experiences lead them to hold a more internal outlook on life have greater self-esteem. Recall that individuals higher in self-esteem, ceteris paribus, earn significantly more. Thus, human capital contributes both directly to a person's wage level and indirectly through its influence on self-esteem—a channel heretofore unexplored.

VI. CONCLUSION

This paper offers evidence that psychological capital, as well as conventionally measured human capital, are important determinants of the real wage. We find that self-esteem, a broad measure of psychological capital, contributes significantly to a person's real wage level. By controlling directly for indi-

vidual-specific heterogeneity due to differences in psychological capital and alternative adolescent home environments, we are able to report new estimates of the impact of human capital formation on wages. These estimates reveal that formal schooling, the accumulation of basic skills, and work experience—all aspects of a person's human capital—are significantly related to the wage. However, the impact of improved psychological capital on a person's real wage is large relative to the influence of a corresponding expansion of human capital.

Because economists historically have treated psychological capital as both unobservable and unmeasurable, heretofore little evidence has been available on the contribution of psychological capital to real wages and hence living standards. Results from this analysis suggest that increased psychological capital is an important avenue to subsequent economic well-being that warrants greater consideration in future research aimed at understanding the determinants of personal productivity and other labor market outcomes. Psychological factors also undoubtedly play a role in other areas such as the acquisition of education and training, job search, and labor supply.

Yet psychological constructs are rarely used in empirical analyses of these topics. More and better data are needed to improve economists' understanding of the contribution of psychological capital to labor market outcomes. For instance, commonly used data sets such as the NLSY might explore the possibility of more frequent collection of information on psychological constructs. Moreover, psychological variables could be introduced into other data sets widely used by labor economists.

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