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The Effects of Personality Traits on Wages: A Quantile Regression Approach

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Abstract

Past research suggests that both adolescent self-esteem and locus of control have a positive effect on adult wages. Drawing data from the 1979 cohort of the National Longitudinal Survey of Youth, I refine the empirical relationship between locus of control, self-esteem and wages. Articles discussing these relationships thus far have been mainly limited to OLS and other mean effect models. I extend the analysis of the effects of self-esteem and locus of control on wages by examining the effects of these traits across the wage distribution using a quantile regression framework. I find that the effect of self-esteem varies across the wage distribution. The effect of self-esteem on wages for those in the 60th wage decile and above is approximately 1.5 to 2 times stronger than those in the 30th wage decile and below. These results indicate that self-esteem has a higher effect on wages, at the margin, for those in higher paid occupations. I also find that the effect of locus of control on wages does not vary across the wage distribution and is statistically insignificant at most wage deciles.

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1. Introduction, Motivation, and Brief Literature Review

Economists have recently begun to study the effects that personality traits have on various economic outcomes, such as wages, educational attainment, and decisions in experimental games. Two specific personality traits have been used in numerous economic studies: self-esteem and locus of control.

Self-esteem is an assessment of one's self worth. Persons who have a high self-esteem consider themselves to be considerably worthwhile as an individual, whereas a person with a low self-esteem believes the converse (Rosenberg 1965). Locus of control is defined as "a generalized attitude, belief, or expectancy regarding the nature of the causal relationship between one's own behavior and its consequences," (Rotter 1966). Persons with an internal locus of control believe that their actions have a direct effect on their outcomes, whereas persons with an external locus of control are more likely to believe that the outcomes they experience are simply out of their control.

Research has generally shown that adolescents with higher self-esteem (SE) experience higher wages as adults. (Goldsmith, Veum and Darity 1997; Waddell 2006; Drago 2011; Girtz 2012; Murnane, Willett, Braatz and Duhaldeborde 2001; Graham, Eggers and Sukhtankar 2004). The established reasoning in the literature as to why this relationship occurs is that those with higher SE are more productive and persistent when faced with difficult tasks. (Brockner 1988; Wylie 1979; Dweck and Leggett 1988; Goleman 1995).

Past studies involving adolescent locus of control and adult wages generally find that persons with internal loci of control end up having higher wages, either contemporaneously or in the future (Andrisani 1977; Duncan and Dunifon 1998; Coleman and DeLeire 2003; Osborne Groves 2005; Cebi 2007). There are, however, some studies which show that locus of control does not directly affect labor market outcomes (Duncan and Morgan 1981; Goldsmith, Veum and Darity 1997). The theoretical link between locus of control and wages arises due to the perceived relationship between initiative and success. If a person believes there is a causal link between his actions and his outcomes then it is much more likely that a person will demonstrate initiative. Internal persons believe that success results from hard work and determination. They feel that failure is their responsibility. This perception of their hard work being important increases the chance that they will work hard and experience higher wages (Andrisani 1977).

In this article, I attempt to empirically refine the effects that adolescent locus of control and SE have on adult wages. The effect of these personality traits on wages has been studied numerous times, as mentioned above. However, studies thus far have been mainly focused on the mean effect that these personality traits have on wages. I expand this analysis by estimating the effects of SE and locus of control on wages using a quantile regression framework. Quantile regression has been employed in a similar study by Lee (2008). In this study, Lee found that both noncognitive and cognitive skills contribute to reducing the college wage premium and wage dispersions within college graduates. However, this paper did not estimate the differential direct effects of SE and locus of control on wages, as I do in this study.

Using quantile regression, I find that the effect of SE on wages is statistically significant at all wage deciles at the 30th decile and above, and that the effect of self-esteem on wages for the 60th wage decile and above is approximately 1.5 to 2 times stronger than those in the 30th

wage decile and below. This can be interpreted as those in whiter collar jobs experience higher wage premiums, at the margin, for having higher self-esteem as adolescents than do those in bluer collar jobs. I also find that the effect of locus of control on wages is largely statistically insignificant for most wage deciles, and that there is no noticeable change in the strength of the effect of locus of control on wages at different wage deciles¹. The statistical insignificance of locus of control on wages adds to the historical debate in the literature as to the importance of this trait in the estimation of wages.

2. Data, Survey Information, and Descriptive Statistics

The data I use are from the National Longitudinal Survey of Youth 1979 (NLSY79) which is a longitudinal survey administered by the Bureau of Labor Statistics. It is a nationally representative sample of 12,686 young men and women between the ages of 14 and 22 at the time of the first interview in 1979. Since their first interview, they have been interviewed annually until 1994, and biennially thereafter. The NLSY79 is a rich data set that includes annual measures of education, occupational status, marital status, wages, health data and many other variables that are person-specific. For my research the key explanatory variables of interest are locus of control and self-esteem. The main outcome variable is logged hourly wages in the year 2012, which is currently the most recent data available in the NLSY79.

To measure SE I use the Rosenberg SE scale. In the NLSY79 it was administered during the 1980, 1987 and 2006 surveys. It is a 10-item scale that measures self-evaluation, that is, how people feel about themselves. The Rosenberg scale is meant to describe a degree of approval or disapproval toward oneself (Rosenberg 1965). Each question is extracting self-approval or disapproval from the respondent, where in answering, they specify whether they strongly agree, agree, disagree, or strongly disagree.²

I use only the 1980 wave of SE data, as the effect of an adolescent SE on adult economic outcomes is what I need to test my main hypotheses. I am interested in finding the effect of a person's core SE on their adult outcomes; therefore I do not utilize later SE measurements which face feedback relationships with the outcome variables. I standardize the Rosenberg SE scale, so that the variable is expressed with a mean of zero and standard deviation of 1.³ This allows for a more meaningful economic interpretation of the effects of SE on wages. The coefficient is interpreted as the effect on wages of increasing SE by one standard deviation.

To measure locus of control I use the Rotter Internal-External Locus of Control Scale. In the NLSY79 it is a four-item abbreviated version of a 23-item forced choice questionnaire, adapted from the 60-item Rotter Adult I-E scale developed by Rotter (1966). The scale measures

¹ For those deciles that show statistical significance.

² The Rosenberg questionnaire in the NLSY79 is as follows:

1. I am a person of worth. 2. I have a number of good qualities. 3. I am inclined to feel that I am a failure. 4. I am as capable as others. 5. I feel I do not have much to be proud of. 6. I have a positive attitude. 7. I am satisfied with myself. 8. I wish I had more self respect. 9. I feel useless at times. 10. I sometimes think I am "no good" at all.

³ As is standard practice with noncognitive variables (see Drago 2011, Cebi 2007, Goldsmith, Veum and Darity 1997)

the extent to which someone feels they are in control of their lives. Persons exhibiting an internal locus of control will feel that through their own self-motivation or self-determination they can have control over the outcomes they experience in their lives. People exhibiting an external locus of control will feel that the environment or, similarly, random chance controls their lives. Respondents are asked to select one of each of four paired statements and then decide whether the selected statement is much closer or slightly closer to the view they hold of themselves.⁴ The scale is created so that the higher the score, the more external a person is. I invert the scale, so that an increase in the locus of control variable can be interpreted as the change in wage resulting from a person becoming more internal. As with the Rosenberg SE scale, I standardize the Rotter scale, so that the variable is expressed with a mean of zero and standard deviation of 1. The coefficient is interpreted as the effect on wages of increasing locus of control by one standard deviation (towards becoming more internal).

Cognitive and noncognitive skill formation has been explored by Cunha and Heckman (2008). They show that there are several sensitive periods for parental investment to foster positive growth in both cognitive and noncognitive skills and that the formative period for cognitive skills precedes that of noncognitive skills. Cunha and Heckman (2008) show that SE and locus of control⁵ are mainly affected by family background characteristics, and then remain relatively stable.⁶ This result from the literature allows me to estimate the effects of adolescent traits on adult outcomes without worrying too much about the traits varying greatly over time, after a person's adolescence.

Debate often arises as to whether these relatively subjective measurements of personality are reliable. Is a person's response consistent from period to period, given other control variables collected between the periods? Krueger and Schkade (2008) used Day Reconstruction Methods (DRM) and found that exhibited test-retest correlations for subjective well-being measurements generally fall in the range of 0.50 – 0.70. They note while these figures are lower than the reliability ratios found for variables such as education, income and other microeconomic variables, they argue they are sufficiently high to yield informative estimates for much of the research that uses subjective well-being measurements.

Table I shows basic descriptive statistics for the final sample of 4,902 individuals.⁷ The average Rosenberg scale is 22.42 out of a possible 30 points. The average Rotter scale is 11.19

4. The Rotter questionnaire in the NLSY79 is as follows:

1.(a) What happens to me is my own doing; or (b) Sometimes I feel that I do not have enough control over the direction my life is taking.

2. (a) When I make plans, I am almost certain that I can make them work; or (b) It is not always wise to plan too far ahead, because many things turn out to be a matter of good or bad fortune anyhow.

3. (a) In my case, getting what I want has little or nothing to do with luck; or (b) Many times, we might just as well decide what to do by flipping a coin.

4. (a) Many times, I feel that I have little influence over the things that happen to me; or (b) It is impossible for me to believe that chance or luck plays an important role in my life.

⁵ The research investigates noncognitive traits in general – which includes SE and locus of control.

⁶ This is when the core, and as I am interpreting, most important SE measurement is collected. This core SE has the least potential to be endogenous with an individual's economic outcomes.

⁷ Individuals with missing data for any of the key independent variables, the dependent variable, or the control variables were deleted from the sample. In addition, there has been significant attrition in the NLSY79 dataset over time. Many participants have stopped responding since 1979 for various reasons.

out of a possible 16 points. The average hourly wage is 23.7 dollars. In the sample, 51 percent are female, 28.9 percent are black, 18.4 percent are Hispanic, and 56.6 percent are married. The average person is 51.22 years old in 2012, and has consumed 13.65 years of formal education. This indicates that the average person has completed slightly more than a high school diploma.

3. Methods and Results

First, to show the basic qualitative results found in most past studies, I estimate a standard OLS regression model⁸ with log wages in 2012 as the dependent variable and either locus of control or self-esteem as the key independent variable of interest.⁹

The results of these models are provided in Table II. The first row of Table II¹⁰ shows that adult wages rise by 2.5 percent for each one standard deviation increase in SE. This result is statistically significant at the 1 percent level, and indicates that a higher SE as an adolescent leads to higher wages as an adult, as the literature generally shows. The second row of Table II¹¹ shows that adult wages rise by 1.4 percent for each one standard deviation increase in locus of control (i.e., becoming more internal). This result is statistically significant at the 5 percent level, and indicates that a more internal locus of control as an adolescent leads to higher wages as an adult. This is usually what the literature has shown, but some articles as mentioned before, do not show this relationship.

Second, I estimate quantile regression models using the same dependent variable, key explanatory variables, and control variables as the OLS models previously estimated. However, as it is the quantile regression method, I am estimating the effect of the key independent variable of interest, be it locus of control or SE, on log wages in the year 2012 separately for the 10th through 90th wage deciles. Quantile regression has been used to estimate wages in a number of studies. For some examples see Machado and Mata 2005; Buchinsky 1998; Buchinsky 1994; Martins and Pereira 2004. Again, my motivation in using quantile regression is to test whether or not self-esteem and/or locus of control affect wages differently at different wage levels.

The results from the quantile regression models are provided in Table III. The hourly wages for each decile are listed on the bottom row. For example, those at the 10th wage decile make 8.75 dollars per hour, those at the 50th wage decile (the median) make 18.65 dollars per hour, and those in the 90th wage decile make 43.26 dollars per hour.

The effect of SE on wages varies across the wage distribution. The effect of SE on wages is lowest in the lowest wage jobs, and the effect rises as the wage rises. The effect of SE on wages shows a relative spike from the 30th to the 40th decile, another relative spike from the 50th

⁸ See Becker (1967) and Mincer (1970) for standard examinations of the human capital model.

⁹ Control variables are listed in Table 2, and the coefficients for these variables are available upon request. The key explanatory variable of interest used is noted in the rows of the table.

¹⁰ This row is labeled 'Self-esteem'

¹¹ This row is labeled 'Locus of Control'

to the 60th decile and the effect remains relatively consistent thereafter. The increase in magnitude of effect from the lowest wage deciles to the highest wage deciles is 1.5 to 2 times stronger. Additionally, the effect of SE on wages is statistically significant at all wage deciles at the 30th decile and above. The statistical insignificance of SE on wages at the 10th and 20th wage decile give further evidence for a distinct variation in how SE affects wages across the wage distribution. Those in the bluest collar jobs may not experience any noticeable increase in their wages for having higher SE. This result that I find showing differing effects based on wage distribution is a novel finding, while the general statistical significance between SE on wages is not novel, but does coincide with previous findings in the literature.

The effect of locus of control on wages, on the other hand, does not appear to vary across the wage distribution, and also is statistically insignificant at most wage deciles. The statistical significance is spotty throughout the wage deciles, showing no clear pattern.

4. Concluding Remarks

In this paper I more precisely estimate the effects of SE and locus of control on wages than previous studies in the literature by employing a quantile regression framework.

I find that the effect of SE on wages varies across the wage distribution, and is most prominent for individuals in occupations at the 60th wage decile and above. I interpret this result as individuals in whiter collar jobs experiencing a more prominent wage gain from having higher SE than do individuals in bluer collar jobs. Perhaps the theoretical link between SE and productivity positively affects wages more-so at the higher wage levels. In other words, the portion of gained productivity caused by SE matters more, at the margin, in whiter collar positions. This result adds to previous findings in the literature, where the effect was assessed mainly at the mean level. This result also supports new evidence that the dynamic between SE and wages is more complex than previously thought.

Additionally, I find that the effect of locus of control on wages does not vary much across the wage distribution, and is largely statistically insignificant. This result lends support towards previous literature finding locus of control as an unimportant human capital investment variable.

The effects that soft skills (such as personality traits) have on economic outcomes are research topics that economists are beginning to study comprehensively. Studies that help show the importance of fostering high SE (or an internal locus of control) in youth¹², and studies that establish causal links between personality traits as adolescents and positive adult outcomes are fruitful future research endeavors for economists and other applied social science researchers.

¹² Fostering these traits through parental involvement and investment, for example.

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Tables

Table I. Selected Basic Descriptive Statistics

Variable	Mean	Std Dev
Rosenberg Scale	22.42	3.95
Rotter Scale	11.19	2.58
Female	0.51	0.50
Black	0.289	0.453
Hispanic	0.184	0.388
AFQT Score (cognition measurement)	142.60	27.30
Age 2012	51.22	2.22
Education 2012	13.65	2.50
Hourly Wage 2012	23.70	19.15
Married 2012	0.566	0.495
N	4902	

Notes: In subsequent models, the standardized version of the Rosenberg Scale, Rotter Scale and AFQT Score are used. If these standardized versions were presented in this descriptive statistics table, they would not be providing any further information than a mean of 0, and a standard deviation of 1. Hence, the non-standardized versions of these variables are presented above.

Table II. The Effects of Self-esteem and Locus of Control on Wages using OLS Regression

	Coefficient
Self-esteem	0.025** (0.07)
R ²	0.471
Locus of Control	0.014* (0.07)
R ²	0.471
N	4902

Notes: Presented in each column is the coefficient on the key explanatory variable of interest (self-esteem or locus of control) in the OLS model. Standard errors are in parentheses.

The dependent variable is the log(hourly wage) in 2012. The covariates/controls used are as follows: AFQT score (for cognition), years of education, age, a quadratic in age, height, weight, tenure, dummies for: residence in an SMSA, residence in an urban area, gender, race/ethnicity, union membership, region of residence, occupation, and marital status. All Covariates except for the race/ethnicity, height and gender are measurements from the year 2012.

Coefficients on all other control variables are available upon request.

To get an economic interpretation of the effect of self-esteem or locus of control on log-wages, a transformation of the original estimate must be made. $(\exp(\text{estimate}) - 1)$ will garner the true percentage effects. These are the economic interpretations I mention in the essay.

* = significant at the 5% level. ** = significant at the 1% level.

Table III. The Effects of Self-Esteem and Locus of Control on Wages using Quantile Regression

	<u>Decile</u>								
	10 th	20 th	30 th	40 th	50 th	60 th	70 th	80 th	90 th
Self-Esteem	0.016 (0.014)	0.020 (0.011)	0.021* (0.009)	0.027** (0.008)	0.026** (0.006)	0.031** (0.009)	0.031** (0.008)	0.032** (0.009)	0.034** (0.011)
Pseudo-R ²	0.231	0.268	0.289	0.301	0.308	0.314	0.317	0.320	0.318
Locus of Control	-0.007 (0.010)	0.004 (0.005)	0.009 (0.009)	0.016* (0.007)	0.019* (0.009)	0.021* (0.008)	0.014 (0.010)	0.020* (0.008)	0.019 (0.013)
Pseudo-R ²	0.230	0.267	0.289	0.299	0.308	0.313	0.317	0.319	0.318
Hourly Wage	\$8.75	\$11	\$13.39	\$15.8	\$18.65	\$21.64	\$25.96	\$31.92	\$43.26

Notes: Presented in each column is the coefficient on the self-esteem or locus of control variable for the given decile in the quantile regression model. Standard errors are in parentheses. Or, in the hourly wage row, the columns show the hourly wage for individuals at that exact decile.

The dependent variable is the log(hourly wage) in 2012. The covariates/controls used are as follows: AFQT score (for cognition), years of education, a set of degree attainment dummies, age, a quadratic in age, height, weight, tenure, dummies for: residence in an SMSA, residence in an urban area, gender, race/ethnicity, union membership, region of residence, occupation, and marital status. All Covariates except for the race/ethnicity, height and gender are measurements from the year 2012.

The results are found using 100 bootstrap replications.

Coefficients on all other control variables are available upon request.

To get an economic interpretation of the effect of self-esteem on log-wages, a transformation of the original estimate must be made. $(\exp(\text{estimate}) - 1)$ will garner the true percentage effects. These are the economic interpretations I mention in the essay.

* = significant at the 5% level. ** = significant at the 1% level.