

Estimating the simultaneous relationship among job satisfaction, wage and positive attitude of matured adults: the US evidence

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Abstract

The current study tests the hypothesis that the worker's job satisfaction is related not only to the objective variable wage rate, but also to the psychological variable positive attitude, and that the latter two variables are endogenous in a typical job satisfaction regression. Using data on matured adults from the United States and following a two-stage procedure the current study estimates job satisfaction, wage and positive attitude equations in a simultaneous equations framework. The study confirms the presence of this simultaneous relationship, and suggests that job satisfaction of matured adults in fact is related to both objective (wage) and subjective (attitude) factors. We also find interesting results on the covariates of wage and positive attitude which remain disguised when the simultaneous relationship among these three variables is ignored.

1. Introduction

Numerous studies in recent years have demonstrated that the worker's wage rate influences his/her job satisfaction positively (Freeman, 1978; Borjas, 1979; Clark, 1996, 1997; Bender and Sloane, 1998; Brown and McIntosh, 2003; Grund and Sliwka, 2005; Gazioglu and Tansel, 2006; Carleton and Clain, 2012; Mohanty, 2013a). Most of these studies consider the pecuniary and non-pecuniary benefits associated with a job as the primary determinants of job satisfaction. A new line of research in psychology, however, presents a different set of determinants of satisfaction at workplace based on the worker's personality (Staw et al., 1986; Arvey et al., 1989; Motowidlo, 1996; Weiss and Cropanzano, 1996; Judge et al., 1998; Judge and Bono, 2001; Judge and Larsen, 2001; Judge et al., 2002; Saari and Judge, 2004). These studies focus on the dispositional sources of job satisfaction and claim that the worker's personality traits and temperaments may also affect his/her job satisfaction. To control for these characteristics, they recommend including different subjective variables related to the worker's personality in job satisfaction regressions (Judge, Heller and Mount, 2002). Following the recent literature in economics that emphasizes the role of psychological capital variables in the determination of different facets of an individual's economic performance (Goldsmith et al., 1997; Groves, 2005; Waddell, 2006; Mohanty, 2009a, 2009b, 2012, 2013c), the current study claims that the worker's positive attitude is one of such subjective variables that is likely to affect his/her job satisfaction probability positively.

Mohanty (2009a, p.358) characterizes an individual with positive attitude as follows: "A person with a positive attitude always sees the brighter side of every situation and thus concentrates on good aspects only. Such a person has the conviction that whatever is going to happen will work out well. Positive attitude thus brings optimism to life." This definition clearly suggests that, holding other benefits associated with the job constant, positive attitude by fostering optimism may enhance satisfaction at workplace still further. Note that job satisfaction entails psychological assessment of wellbeing associated with a given job, and consequently it may easily be affected by the worker's positive attitude, a psychological variable that guides this assessment in a positive direction. Numerous studies in psychology and economics during the last two decades have already associated life satisfaction (or happiness) with positive thinking (McCrae and Costa,

1986; Seligman, 1991; Scheier and Carver, 1993; Taylor and Armor, 1996; Folkman, 1997; DeNeve and Cooper, 1998; Mohanty, 2009b, 2014). Since job satisfaction constitutes an integral part of an individual's overall life satisfaction, it is quite tempting to hypothesize that positive attitude may also influence job satisfaction positively. Recently, Mohanty (2015) has already tested this hypothesis, and has demonstrated that positive attitude, in fact, is a significant covariate of job satisfaction. The current study extends Mohanty's hypothesis in an important direction explained in the following paragraphs.

Note that job satisfaction may not only be influenced by wage rate, it may also influence the wage rate in a direct manner. In fact, Lyndon and Chevalier (2002) and Mohanty (2013a) have already shown that the worker's job satisfaction affects his/her wage positively. Wage and job satisfaction may thus affect each other simultaneously. In the same line, one can also argue that positive attitude, while affecting job satisfaction (Mohanty, 2015) and wage (Mohanty, 2009a), may also be influenced by those variables. A higher wage by helping the worker fulfil most of his/her material needs may enhance self-esteem which in turn may improve his/her attitude. Similarly, higher satisfaction at workplace by making the worker happier may have a positive effect on his/her attitude. In fact, Mohanty (2009b) in a different context has already demonstrated that an individual's happiness measured by self-satisfaction improves his/her attitude significantly. Since job satisfaction constitutes a major part of an individual's overall satisfaction, it is natural to assume that the former may influence his/her attitude in a positive direction. These arguments suggest that the three variables – job satisfaction, wage and positive attitude – are simultaneously related and therefore should be estimated in a simultaneous equations framework.

The current study for the first time in the literature introduces this simultaneity. We estimate these three equations using the US data on matured adults from the National Longitudinal Survey of Youth (NLSY79) and following a two-stage procedure introduced earlier by Maddala (1983) and extended subsequently by Liu and Mohanty (2015).

2. The Model and the Test Strategy

This section presents a theoretical model of how the psychological variable positive attitude like other objective factors may affect the job satisfaction (JS) function. Earlier researchers have classified different covariates of job satisfaction broadly into four categories – wage or income (W), hours of work (H), a vector of personal characteristics (X_P) and a vector of job-specific characteristics (X_J) (Clark, 1997; Sloane and Williams, 2000; Carleton and Clain, 2012). The traditional job satisfaction function for the i^{th} worker can thus be written as

$$(1) \quad JS_i = U(W_i, H_i, X_{Pi}, X_{Ji}).$$

The current study goes a step further. Following the recommendation of psychologists to control for the dispositional sources of job satisfaction, the study includes positive attitude (A) as an additional argument in the job satisfaction function. Equation (1) which is used extensively in the traditional job satisfaction literature thus is extended to

$$(2) \quad JS_i = U(W_i, H_i, A_i, X_{Pi}, X_{Ji}), \text{ where } 0 < A_i < 1.$$

Note that equation (2) is simply an augmented utility function with the usual characteristics of a standard neo-classical utility function. Positive attitude in this function is a continuous variable that assumes values between 0 and 1. For example, an individual who demonstrates positive attitude 75 percent of the time is considered to have an $A = 0.75$.

Of all the arguments of job satisfaction function introduced in equations (1) and (2), the wage (W) the worker receives is considered in the literature as one of the most important determinants of his/her satisfaction at workplace (Freeman, 1978; Borjas, 1979; Clark, 1996, 1997; Bender and Sloane, 1998; Brown and McIntosh, 2003; Grund and Sliwka, 2005; Gazioglu and

Tansel, 2006; Carleton and Clain, 2012; Mohanty, 2013a). The current study introduces the worker's positive attitude as yet another important covariate of job satisfaction. This is an empirical issue that deserves an appropriate statistical test.

Estimation of job satisfaction equations in (1) and (2) is straight forward because in most data sets the job satisfaction variable is available as an ordered categorical variable, and under the assumption of normality of their error terms these equations can be estimated by ordered probit. The current study, however, introduces a new layer of complexity in the estimation strategy as it recognizes a possible simultaneous relationship among the three variables - job satisfaction, wage and attitude. This calls for a simultaneous equations procedure.

Note that both job satisfaction (JS) and positive attitude (A) are reported in most labor market data sets as ordered categorical variables. The hourly wage rate of the worker (W), on the other hand, is traditionally reported as a continuous variable. A simple two-stage least squares (2SLS) procedure therefore is not appropriate for the estimation of this simultaneous equations system. Maddala (1983) provides an alternative two-stage procedure for estimating simultaneous systems of two equations with at least one binary dependent variable. Recently, Liu and Mohanty (2015) have extended Maddala's procedure to estimate simultaneous equations models that involve a mixture of any number of continuous and binary dependent variables. In our framework, although wage is continuous, job satisfaction and positive attitude are ordered categorical. However, we can easily generate binary variables from these categorical variables by assigning 1 to the strongest response and 0 to other responses. Our model thus reduces to a simultaneous equations system with a mixture of one continuous and two binary dependent variables which calls for the application of the two-stage procedure of Liu and Mohanty (2015).

Define the continuous variable log wage as y_1 , the binary job satisfaction variable as y_2 and the binary positive attitude variable as y_3 . The binary variables assume the values 1 when the latent continuous variables, y_2^* and y_3^* , are positive. The model that recognizes the simultaneous relationship among wage, attitude and job satisfaction is then written as follows:

$$(3) \quad y_1 = \delta_{11}y_2^* + \delta_{12}y_3^* + X_1\beta_1 + \varepsilon_1$$

$$(4) \quad y_2^* = \delta_{21}y_1 + \delta_{22}y_3^* + X_2\beta_2 + \varepsilon_2$$

$$(5) \quad y_3^* = \delta_{31}y_1 + \delta_{32}y_2^* + X_3\beta_3 + \varepsilon_3$$

$$(6) \quad y_2 = 1, \text{ if } y_2^* > 0; = 0, \text{ o.w.}$$

$$(7) \quad y_3 = 1, \text{ if } y_3^* > 0; = 0, \text{ o.w.}$$

where X_1, X_2, X_3 respectively are $n \times K_1, n \times K_2, n \times K_3$ matrices of exogenous variables. This simultaneous system of equations can be estimated by the following two-stage procedure.

In the first stage, we obtain the following reduced form equations:

$$(8) \quad y_1 = X\pi_1 + v_1,$$

$$(9) \quad y_2^* = X\pi_2 + v_2,$$

$$(10) \quad y_3^* = X\pi_3 + v_3,$$

where X is a $n \times K$ matrix of all distinct exogenous variables obtained from X_1, X_2, X_3 , and π_1, π_2, π_3 are the reduced form parameter vectors each with the dimension $K \times 1$. Under the normality assumption on the reduced form error terms, equation (8) is estimated by OLS, and equations (9) and (10) along with equations (6) and (7) respectively are estimated by probit

maximum likelihood method. The first stage reduced form estimators, $\hat{\pi}_1, \tilde{\pi}_2, \tilde{\pi}_3$, are used to compute $\hat{y}_1 = X\hat{\pi}_1$, $\hat{y}_2^* = X\tilde{\pi}_2$ and $\hat{y}_3^* = X\tilde{\pi}_3$ which enter structural equations as instruments for respective endogenous explanatory variables. With these instruments, the structural equation (4) is estimated in the second stage by OLS, and equations (4) and (5) along with (6) and (7) respectively are estimated by a second stage probit.

The corrected asymptotic variance-covariance matrices of these second stage estimators are derived in Liu and Mohanty (2015). The significance levels of the coefficients $\delta_{11}, \delta_{12}, \delta_{21}, \delta_{22}, \delta_{31}$ and δ_{32} in equations (3), (4) and (5) would indicate whether or not the three endogenous variables are simultaneously related, and their signs would suggest the direction of their relationship. The signs and significance levels of these coefficients would also help us test whether or not job satisfaction is related to the worker's wage rate, as demonstrated by numerous earlier researchers, and to the dispositional variable positive attitude, as predicted by several psychologists.

Note that the simultaneous equations procedure outlined in the above paragraph presupposes y_1, y_2^* and y_3^* in the right-hand-sides of equations (3), (4) and (5) to be endogenous. In the absence of this endogeneity, the two-stage estimates are less efficient than the traditional OLS estimates. It is necessary therefore to test for the endogeneity of these variables in the right-hand-side of each equation before applying the proposed two-stage procedure. To conduct these tests, equation (8) is estimated by OLS and equations (9) and (10) are estimated by linear probability method. The residual from each regression is then included as an explanatory variable in the structural equations of the other two endogenous variables, and its statistical significance is verified. For example, the residual \hat{v}_1 obtained from equation (8) is entered in equations (4) and (5) as an explanatory variable which are then estimated by linear probability method. Desired statistical significance of \hat{v}_1 in these equations would indicate that the variable y_1 is endogenous in y_2^* and y_3^* equations.

3. Data

To examine the simultaneous relationship among job satisfaction, wage and positive attitude, a sample was drawn from the 2006 survey of the National Longitudinal Survey of Youth, 1979 (NLSY79). NLSY79 is a longitudinal data set from the United States which started in 1979 with 12,686 individuals aged between 14 and 21. It was then continued annually until 1994 and was changed subsequently to biennial surveys. Three surveys - 1980, 1987 and 2006 - in the entire data set contain information on the worker's positive attitude. The 1980 survey consists mostly of youths and teens aged between 15 and 22. In the 1987 survey, they are between 22 and 29. Most of the respondents in the 1980 sample were at school with no jobs, and a large percentage of respondents in the 1987 survey worked part-time. These surveys therefore are not suitable for a study that focuses primarily on the job satisfaction of regular matured adult workers. Moreover, these surveys are from a time period too long ago in the past (almost three decades), and thus may hardly have any relevance in recent years. The 2006 survey, on the other hand, is from a recent year and consists of matured adults aged between 41 and 48. Most of these respondents are employed with fulltime jobs, and hence this survey is most suitable for the job satisfaction study under consideration. This is the reason why only one sample from the 2006 survey was chosen for this study.

Out of the three dependent variables considered in this study, the hourly wage rate is reported as a continuous variable. Following the standard practice in the literature, we used log hourly wage (LOGWAGE) as the dependent variable in the wage equation. The other two

dependent variables job satisfaction and positive attitude are reported as ordered categorical variables with four responses which are coded as 3, 2, 1 and 0, with 3 representing the strongest response and 0 denoting the weakest. For example, the information on the worker's global job satisfaction was obtained from four responses to the question, "How [do/did] you feel about [(your job/current assignment/business)] with [(employer name)]? [Do/Did] you like it very much, like it fairly well, dislike it somewhat, or dislike it very much?" These responses for the job satisfaction variable are coded as 3 = "like it very much," 2 = "like it fairly well," 1 = "dislike it somewhat," and 0 = "dislike it very much." Similarly, the positive attitude variable has four responses to the statement, "I take a positive attitude toward myself." It assumes values 3, 2, 1 and 0 respectively for responses "strongly agree," "agree," "disagree," and "strongly disagree."

For the binary probit estimation of the job satisfaction equation, we generated the dependent variable JBSTBNRY which assumes the value 1 when job satisfaction is 3, and is 0, otherwise. For the binary probit estimation of the positive attitude equation, we generated PSATBNRY which assumes the value 1 when positive attitude is 3, and is 0, otherwise. Note that two of these three dependent variables LOGWAGE and JBSTBNRY are relevant to employed workers only, and consequently our sample is restricted strictly to employed workers in the survey under consideration. After eliminating missing observations from relevant explanatory variables listed in the following paragraphs, we obtained a sample of 5,569 workers from the 2006 survey.

Under the proposed hypothesis, the variables that are most likely to be related to the worker's job satisfaction probability are his/her wage rate (LOGWAGE) and positive attitude (PSATBNRY). In addition, the human capital variables, such as years of schooling (YRSCHL), innate ability (or intelligence) measured by the armed forces qualification test (AFQT) score, work experience (EXP, EXPSQ), tenure with the current employer (TENURE), current school enrollment (ENROLL) and fulltime employment status (FULLTIME) may be related to the worker's job satisfaction probability. This probability may also be related to numerous demographic characteristics of the worker, such as gender (MALE), race (WHITE), marital status (MARRIED), health condition (HLTHPROB), location of residence (URBAN) and the region of residence (NOTHEAST, NOTHCENT, WEST). Other job related characteristics that may be related to the job satisfaction probability are government employment (GOVT), unionized employment (UNION), size of the workplace (PLNTSIZE), type of industry (MANUFACT, TRADE, TRNSFINC, SERVIND, HLTHRECN, PUBADMN), occupation (MANAGER, PROFESNAL, MANGPROF, TECHNICAL, SERVOCP, SALES, ADMNSUPT, CONSTRUC, CRFTREPR, OPERATOR, TRANSPOT) and weekly hours (WEEKHR, WKHRSQ). All these variables are included in the job satisfaction regression as explanatory variables. Employer sponsored benefits, such as promotion opportunity (PROMOSN), training opportunity (TRAINOPT), social security contribution (SOCSEC) and pension plan (PENSION) may affect job satisfaction, and therefore are included as explanatory variables.

Note that positive attitude (PSATBNRY), as hypothesized in this study, is related to the worker's wage (LOGWAGE) and job satisfaction (JBSTBNRY). In addition, the human capital and demographic variables listed in the above paragraph and the worker's age (AGE, AGESQ) may be related to his/her attitude and therefore are included in the positive attitude equation (Mohanty, 2009a, 2009b). Some family related variables, such as family income (FAMINC), family poverty level (POVERTY), size of the family (FAMSIZE), number of children (CHILDNUM), home ownership (OWNHOUSE, LIVEPRNT) and the employment status of the spouse (SPOUSEMP), may influence his/her attitude. Variables relating to the parental family, such as mother's and father's schooling (MOTHGRAD, FATHGRAD), may also genetically

influence the worker's inner attitude. All these family-related variables may affect one's attitude regardless of whether or not he/she is employed, and hence they are less relevant for his/her wage rate and job satisfaction. Similarly, numerous workplace-related variables, such as occupation, industry, workplace size and employer-sponsored benefits, listed in the above paragraphs that affect the worker's job satisfaction probability and wage may not have any impact on the worker's attitude, and consequently they are omitted from the attitude equation. With all these variable restrictions, both job satisfaction and positive attitude equations are identified.

The two most important psychological variables likely to have significant positive relationship with the worker's wage rate are job satisfaction (JBSTBNRY) and positive attitude (PSATBNRY). These variables therefore are included in the wage regression. Following the standard labor economics literature, we included in the set of wage covariates a number of human-capital, demographic, occupational, industry and job related variables already listed in the above paragraphs. The parental and family related variables that affect the worker's attitude do not necessarily affect his/her wage rate because they are hardly observed by the employer, and consequently they are excluded from the wage equation. Similarly, several benefit and other job related variables that are likely to affect the worker's job satisfaction are quite unlikely to influence his/her wage rate, and consequently are omitted from the wage regression. With all these variable restrictions, all three equations of the proposed simultaneous equations model are identified. The means and standard deviations of all these variables can be obtained from the author on request.

4. Results

Before obtaining two stage estimates of job satisfaction, positive attitude and wage equation parameters, we first conducted the endogeneity tests for each variable in other two equations. The results are reported in Table 1.

Table 1
Endogeneity Tests in Wage, Job Satisfaction and Positive Attitude Equations. ^a

Variable	Log (wage)		Job Satisfaction			Positive Attitude	
	\hat{v}_2	\hat{v}_3	\hat{v}_1	\hat{v}_3	\hat{v}_1	\hat{v}_2	
Jbstbnry	2.1515** (19.69)	0.0439** (3.10)	—	—	0.1342** (10.20)	0.2530** (3.19)	
Psatbnry`	0.0372** (2.67)	2.2741** (13.22)	0.1323** (9.90)	1.1735** (3.72)	—	—	
Logwage	—	—	0.1299** (4.63)	0.0399** (3.06)	0.0755** (2.23)	0.0467** (3.55)	
\hat{v}_1	—	—	-0.1013** (3.22)	—	-0.0341 (0.93)	—	
\hat{v}_2	-2.1261** (19.32)	—	—	—	—	-0.1224 (1.52)	
\hat{v}_3	—	-2.2396** (12.99)	—	-1.0427** (3.30)	—	—	
Other	YES	YES	YES	YES	YES	YES	

Variables

Sample	5,569	5,569	5,569	5,569	5,569	5,569
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^a The quantities in parentheses are absolute t-ratios.

** (*) The coefficients are statistically significant at 5 percent (10 percent) level.

Statistical significance of residuals in columns 1 and 2 suggests that job satisfaction and positive attitude are endogenous explanatory variables in the wage regression. Similarly, results in columns 3 and 4 indicate that both wage and positive attitude are endogenous in job satisfaction equation. Results on positive attitude equations in columns 5 and 6, on the other hand, do not indicate strong evidence of endogeneity of the other two variables. Although with an absolute t-value of 1.52, endogeneity of job satisfaction in the positive attitude equation cannot be ignored completely; there is no strong evidence of wage being an endogenous variable in the positive attitude equation. The evidence of endogeneity of most of the variables on the right-hand-side of other equations clearly suggests the presence of a simultaneous relationship among the three variables considered in this study, and this justifies the use of the proposed two-stage procedure for their estimation.

Table 2
Binary Probit and Two-Stage Estimates of Job Satisfaction Equations.^a

Variable PA	Exogenous Wage and PA		Endogenous Wage and PA	
	Binary Probit		Two-Stage Estimates	
	Coefficient	Absolute t-ratio	Coefficient	Absolute t-ratio
Constant	0.2499	1.16	0.5569	1.49
Log WAGE	0.1317**	3.91	—	—
PSATBNRY	0.3441**	9.83	—	—
WAGEHAT	—	—	0.2647**	2.44
POSHAT	—	—	0.8485*	1.92
YRSCHL	-0.0048	0.49	-0.0304**	1.98
AFQT	-0.0036**	4.28	-0.0040**	3.64
TENURE	-0.0027	0.97	-0.0022	0.57
EXP	-0.0087	0.57	-0.0065	0.34
EXPSQ	0.0003	0.67	0.0001	0.14
ENROLL	0.0453	0.44	-0.1461	0.80
FULTIME	0.0900	1.45	0.0067	0.08
WEEKHR	-0.0203**	5.61	-0.0122*	1.92
WKHRSQ	0.0002**	5.23	0.0001*	1.69
MALE	-0.0971**	2.33	-0.2103**	2.99
WHITE	0.1279**	2.98	0.3166**	2.34
MARRIED	0.0655*	1.77	-0.0104	0.17
HLTHPROB	-0.0423	0.68	0.0267	0.32

GOVT	0.0332	0.51	0.0546	0.67
PLNTSIZE	-0.1271**	3.14	-0.1402**	2.73
UNION	-0.0261	0.49	-0.0421	0.62
URBAN	0.0141	0.35	0.0074	0.15
PROMOSN	0.1002**	2.66	0.0254	0.41
EMPSOC	-0.0724	1.40	-0.1537**	2.02
PENSION	0.0650	1.46	0.0344	0.60
TRAINOPT	0.0243	0.46	-0.0972	1.01
Region Dummies	YES		YES	
Industry Dummies	YES		YES	
Occupation Dummies		YES		YES
Sample	5,569		5,569	
Log likelihood		-3695.18		-3738.36

^a The quantity in the parenthesis is the absolute t-ratio.

** (*) The coefficients are statistically significant at 5 percent (10 percent) level.

Two-stage estimates of the job satisfaction equation parameters are reported in columns 3 and 4 of Table 2. For comparison purposes, we also present the one stage binary probit estimates of this equation which treats wage and positive attitude as exogenous variables in columns 1 and 2. The results under both approaches indicate that most of the variables except a few retain the same signs and significance levels under both approaches. Although years of schooling assume statistical significance under two-stage procedure, the variable “promotion” loses significance under this approach. Contrary to our expectation, social security payment by the employer under both approaches has a negative relationship with job satisfaction.

It is interesting to note that both wage and positive attitude are related to job satisfaction not only positively, but also significantly under both approaches. This supports our argument that both objective and subjective factors play a significant role in the determination of job satisfaction. Just as wage by enhancing the pecuniary reward associated with a job may improve job satisfaction, so also positive attitude by helping one accept everything with an optimistic outlook may augment his/her satisfaction at workplace. This finding also supports the psychologists’ argument that personality factors are important covariates of job satisfaction and should not therefore be ignored when examining its determinants. Statistical significance of these two variable coefficients under two-stage estimation, along with the results in Table 3 and Table 4, provides further support to the findings of our endogeneity tests and confirms the presence of a simultaneous relationship among job satisfaction, positive attitude and wage.

Other important variables related to job satisfaction under two-stage estimation are the worker’s years of schooling and intelligence (AFQT). Both these variables are negatively related to job satisfaction. This negative relationship may partly be attributed to higher aspirations of more educated and highly intelligent workers. These workers are high achievers and it is their nature to aspire more, and consequently they are more likely to be disappointed when their expectations are not fulfilled (Mohanty, 2015). Moreover, the frontiers of their aspiration may expand further as they achieve more leaving them in a perennial state of dissatisfaction. In fact, numerous earlier studies also find the similar evidence of a negative relationship between education and job satisfaction (Clark, 1996, 1997; Carleton and Clain, 2012).

As expected, weekly hours under both approaches is negatively related to job satisfaction. Interestingly, job satisfaction decreases with a decreasing rate with the rise in weekly hours. Females and whites are more likely to have higher job satisfaction than their otherwise identical male and non-white counterparts. Note that workers in larger workplaces (with a large number of employees) have lower job satisfaction than those in smaller workplaces (Mohanty, 2015). Although the reason is not clear, it may be attributed partly to a lower degree of autonomy in large workplaces compared to that in smaller workplaces. Promotion opportunity improves job satisfaction probability under both approaches, although it is statistically significant under one-stage estimation only.

The above results indicate that in terms of sign and significance levels of coefficients, two-stage estimation results are very similar to those obtained under one-stage estimation. A question may thus arise, "Why should we use two-stage estimation procedure, if the results are not so much different from those obtained from one-stage estimation?" Clearly, the two-stage procedure not only recognizes the simultaneous relationship among the three endogenous variables, but also overcomes the endogenous explanatory variable problem associated with the one-stage procedure. These two-stage estimates therefore are preferred to one-stage estimates even though general findings under both approaches are not much different, especially in the case of job satisfaction regression.

Table 3
Binary Probit and Two-Stage Estimates of Positive Attitude Equations.^a

Variable	Exogenous Wage and JS		Endogenous Wage and JS	
	Binary Probit		Two-Stage Estimates	
	Coefficient	Absolute t-ratio	Coefficient	Absolute t-ratio
Constant	-2.2571	0.32	-1.1948	0.17
Log Wage	0.1222**	3.53	—	—
JBSTBNRY	0.3485**	10.11	—	—
WAGEHAT	—	—	0.1964**	2.19
JBSTHAT	—	—	0.2517**	3.10
YRSCHL	0.0204**	2.15	0.0149	1.46
AFQT	0.0006	0.67	0.0008	0.84
ENROLL	0.2816**	2.77	0.2649**	2.57
FULTIME	0.0610	1.51	0.0603	1.33
MALE	0.1139**	3.14	0.1045**	2.60
WHITE	-0.2903**	6.93	-0.2995**	6.95
MARRIED	0.0526	0.97	0.0581	1.06
HLTHPROB	-0.0519	0.83	-0.0348	0.54
URBAN	-0.0060	0.15	-0.0118	0.29
AGE	0.0608	0.19	0.0175	0.06
AGESQ	-0.0007	0.20	-0.0002	0.06
FAMINC	-0.0001	0.26	-0.0006	1.26
POVERTY	-0.0564	0.84	-0.0322	0.45

CHLDNUM	0.0134	0.41	0.0103	0.31
FAMSIZE	-0.0088	0.32	-0.0076	0.27
MOTHGRAD	0.0084	1.61	0.0078	1.48
FATHGRAD	-0.0064	1.57	-0.0055	1.31
OWNHOUSE	-0.0303	0.72	-0.0373	0.84
LIVEPRNT	-0.0656	0.59	-0.0491	0.44
SPOUSEMP	0.0504	1.11	0.0540	1.16

Sample size	5569	5569
Log likelihood	-3695.99	-3747.27

^a The quantity in the parenthesis is the absolute t-ratio.

** (*) The coefficients are statistically significant at 5 percent (10 percent) level.

Table 3 reports the one-stage binary probit and two-stage estimates of the positive attitude equation coefficients. The two primary variables of interest, job satisfaction and hourly wage rate, assume positive coefficients and are statistically significant under both approaches. This further confirms that positive attitude like job satisfaction is related to both objective and subjective factors. A higher wage by enhancing material wellbeing is likely to improve the attitude of the worker. Satisfaction at workplace, on the other hand, by augmenting psychological wellbeing may also have a positive effect on the worker's attitude. Statistical significance of both these variables in the positive attitude equation along with the two-stage estimation results in Table 2 and Table 4 further confirms the presence of a simultaneous relationship between job satisfaction and positive attitude. Interestingly, males have better attitudes than otherwise identical females, and the probability of having a positive attitude is lower among whites than among non-whites. As expected, years of schooling and current school enrollment are positively correlated with attitude (Mohanty, 2009a). Note that more schooling leads to greater accomplishments and higher self-esteem, leading to better attitude. Since current school enrollment adds to further schooling, it is likely to be positively related to one's positive attitude.

Table 4 reports one-stage OLS and two-stage estimates of wage equation coefficients. Most of the variable coefficients except a few assume desired signs and significance levels under both approaches. The two variables relevant to our study are positive attitude and job satisfaction. Interestingly, job satisfaction is statistically significant under both approaches, whereas positive attitude does not assume a desired level of significance under two-stage estimation. Although the reason for the lack of significance of positive attitude in the wage equation is not clear, it is not surprising. Note that a higher level of job satisfaction indicates that the workers enjoy their work, and consequently they are likely to put their best efforts in what they do at work. This leads to higher productivities visible to the employer and so higher wages. Positive attitude, on the other hand, is an inner characteristic that may not be observed by the employer so easily, and hence it may not necessarily be rewarded with higher wages always.

Table 4
One Stage and Two-Stage Estimates of Wage Equations. ^a

Variable	Exogenous JS and PA		Endogenous JS and PA	
	One-Stage OLS		Two-Stage Estimates	
	Coefficient	Absolute t-ratio	Coefficient	Absolute t-ratio
Constant	1.0023**	11.85	0.8859**	3.99
PSATBNRY	0.0477**	3.31	—	—
JBSTBNRY	0.0576**	4.02	—	—
POSHAT	—	—	0.0168	0.08
JBSTHAT	—	—	0.8486**	6.43
YRSCHL	0.0615**	15.77	0.0527**	5.35
AFQT	0.0032**	9.20	0.0058**	6.49
TENURE	0.0105**	9.54	0.0116**	4.63
EXP	0.0096	1.55	0.0149	1.07
EXPSQ	0.0002	1.04	-0.0001	0.23
ENROLL	-0.0913**	2.20	-0.1626	1.53
FULTIME	0.1139**	6.67	0.1832**	4.18
MALE	0.1910**	11.47	0.2087**	4.44
WHITE	0.0478**	2.73	-0.0215	0.28
MARRIED	0.0763**	5.06	0.0019	0.05
HLTHPROB	-0.1541**	6.10	-0.0917	1.59
GOVT	-0.0147	0.56	-0.0444	0.75
PLNTSIZE	0.1340**	8.47	0.2202**	5.53
UNION	0.1439**	6.65	0.1603**	3.30
URBAN	0.0464**	2.80	0.0288	0.77
Region Dummies	YES		YES	
Industry dummies	YES		YES	
Occupation Dummies		YES		YES
Sample size	5569		5569	
Adj. R ²	0.4161		0.4542	

** (*) The coefficients are statistically significant at 5 percent (10 percent) level.

Comparison of results in tables 2, 3 and 4 reveals an interesting fact. Note that the two-stage estimates in Table 2 and Table 4 suggest a simultaneous relationship between wage and job satisfaction which confirms the presence of a strong correlation between these two variables. Comparison of results in Table 3 and Table 4, on the other hand, indicates a recursive relationship between positive attitude and wage that may have a possible causal interpretation. In their seminal article, Strotz and Wold (1960, p. 417) have quite aptly remarked, "While the

triangularity of the coefficient matrix is a formal property of the recursive models, the essential property is that each relation is provided a causal interpretation in the sense of a stimulus-response relationship."

Note that wage emerges as a significant covariate of positive attitude in the positive attitude equation, whereas positive attitude does not assume a desired level of significance in the wage equation. Following the above statement of Strotz and Wold (1960), we can thus conclude that wage has a causal effect on positive attitude. Such a finding is not unrealistic because higher wages by helping satisfy an individual's material needs may reduce financial worries and thus may improve his/her attitude in a causal sense. This important causal connection between wage and positive attitude remains disguised under one-stage estimation and is revealed when these equations are estimated under the proposed simultaneous equations framework. This further justifies the application of the two-stage procedure in estimating all three equations.

5. Summary and Conclusion

Following the recommendations of psychologists, the current study tests the hypothesis that the worker's job satisfaction is related not only to the objective variable wage rate, but also to the psychological variable positive attitude. The study further claims that wage and positive attitude are endogenous in the job satisfaction regression, and that these three variables are simultaneously related. Using data from the National Longitudinal Survey of Youth (NLSY) on matured adults and following a two-stage procedure, the current study for the first time in the literature estimates job satisfaction, wage and positive attitude equations in a simultaneous equations framework. The study confirms the presence of this simultaneous relationship and suggests that job satisfaction of matured adults in fact is positively correlated with both wage and positive attitude. Interestingly, positive attitude is also found to be related to the objective factor wage and the psychological variable job satisfaction. The wage equation results, however, are slightly different. For these matured adults, job satisfaction, and not positive attitude, emerges as one of the significant covariates of their wages. This finding has an interesting causal interpretation. It suggests that higher wage has a positive causal effect on positive attitude of matured adult workers in the United States. This important finding remains disguised under the traditional one-stage estimation that does not recognize the endogeneity of the three variables considered in this study, and is revealed when an appropriate two-stage procedure is followed.

The above findings have interesting policy implications. They suggest that any policy to augment the worker's job satisfaction must consider both objective and psychological factors, and that any attempt to enhance the worker's wage income must consider policies that improve satisfaction at workplace. Since higher levels of job satisfaction, as demonstrated in this study, are positively correlated with better attitude, we strongly recommend appropriate training in behavioral skills as a means of improving attitude (Sai Baba, 2007; Mohanty, 2012, 2013a, 2013b) which in turn is likely to enhance satisfaction at workplaces (Groves, 2005; Judge et al., 2002), and earnings eventually.

We conclude with a precautionary note. While examining the effects of subjective and objective factors on job satisfaction or positive attitude, the study does not enter into the debate on whether or not these relationships are due to causation or correlation. This issue can never be resolved without additional information (Painter and Levine, 2000).¹⁰In the absence of such information, we simply claim that job satisfaction is positively related to both wage and positive attitude, and hence any policy to improve satisfaction at workplace is likely to succeed if it takes into consideration both objective and subjective factors. Although following Strotz and Wold (1960) we provide a causal interpretation of the relationship between positive attitude and wage,

it is not applicable to all three endogenous variables considered in this study. Our results should therefore be interpreted with caution. Further research in this direction is highly recommended.

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