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Discussion Paper No. 568

**COMPENSATING WAGE DIFFERENTIALS
AMONG SELF-EMPLOYED WORKERS:
EVIDENCE FROM
JOB SATISFACTION SCORES**

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June 2002

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Compensating Wage Differentials among Self-Employed Workers: Evidence from Job Satisfaction Scores

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Abstract

Previous studies have found that self-employed workers with long business tenure earn less than other workers with similar characteristics. This difference in earnings can be explained by the compensating wage differential theory when self-employed jobs have attractive non-earnings aspects. Using the National Longitudinal Survey of Youth 79 (NLSY79), I test whether moves in and out of self-employment are associated with changes in recorded job satisfaction scores. By looking at changes in individuals' job satisfaction over time, I overcome the difficulty of interpreting differences in subjective job satisfaction scores across individuals associated with cross-sectional analysis. Using my estimates, I calculate the monetary value of the non-pecuniary aspects of self-employment and find that the value of self-employment in terms of job satisfaction is sufficiently high enough to support the compensating differential hypothesis as an explanation for lower earnings among self-employed workers.

1 Introduction

Self-employed workers comprised 10.5% of the total U.S. workforce in March 1996.¹ Despite this large share of self-employed workers, self-employment has not attracted much attention among labor economists until recently, and the workings of the labor market among self-employed workers are still largely unknown. One of the remaining puzzles about self-employed workers is their lower earnings, which this paper attempts to explain with the compensating wage differential theory. The compensating differential theory predicts lower earnings among self-employed workers when non-earnings aspects of self-employed jobs positively affect workers' utility. This paper directly tests the theory using job satisfaction scores available in the National Longitudinal Survey of Youth 79 (NLSY79).

Several studies report lower earnings among self-employed workers as compared with their salaried and wage-earning counterparts. For example, Hamilton [2000] found that self-employed workers earn less than salary/wage workers with similar observable qualifications, using several measures of self-employed workers' earnings available in the Survey of Income and Program Participation (SIPP) 1984 panel. These lower earnings are mainly due to a lower growth in earnings among self-employed workers. According to Hamilton's findings, on average, self-employed workers with 10 years of business tenure earn 19% less than salary/wage workers with the same amount of

¹For recent trends of self-employment in the U.S., refer to Manser and Picot [1999].

work experience. Lower earnings growth among self-employed workers was also found by Lazear and Moore [1984]. Krashinski [2000] found 10 to 30% lower median earnings among self-employed workers, except for college graduates, after controlling for observable workers' characteristics, using CPS files over the period of 1979 - 1992. Carrington et al. [1996] also found similar earnings differences using the Current Population Survey (CPS) March files between 1967 and 1992.

These observed lower median and mean earnings among self-employed workers are rather puzzling, however, considering the self-employed workers' labor income risk as reported by Carrington et al. [1996].² They found that self-employed workers' labor earnings are three times as sensitive to macro aggregates as salary/wage workers' and concluded that the labor earnings of self-employed workers are much more pro-cyclical. In addition, self-employed workers tend to use their own assets as capital for their businesses due to liquidity constraints (Evans and Jovanovic [1989]) and, as a result, their labor earnings and asset income tend to co-move. This co-movement makes it difficult for self-employed workers to insure their future consumption, compared with wage/salary workers who can insure this by saving in a safe asset. In addition, Moskowitz and Vissing-Jorgensen [2001] showed that self-employed workers tend to invest a large portion of their assets in their own businesses. As a result, self-employed workers' portfolios are riskier

²Labor income risk among self-employed workers is intuitively appealing, and consequently several theoretical papers employ it as *an assumption* that characterizes self-employed jobs. See Kihlstrom and Laffont [1979] and Kanbur [1982] for example.

than those of salary/wage workers, whose assets are invested in more diversified funds. Despite this risk, the average return on portfolios held by self-employed workers is almost equivalent to the average return on portfolios held by salary/wage workers. To compensate for this total income risk, at least at the first glance, the average earnings of self-employed workers should be higher than that of salary/wage workers. In addition to income risks, self-employed workers enjoy fewer fringe benefits, such as employer-provided health insurance, than salary/wage workers, as pointed out by Hamilton [2000]. Considering the negative aspects of self-employment, the lower earnings of self-employed workers is a puzzle.

Workers' negative self-selection into self-employment is one possible explanation for these observed lower earnings. If workers with negative, unobserved characteristics self-select into self-employment, the lower earnings observed among self-employed workers may be due to these negative traits. To evaluate this possibility, Hamilton [2000] compared the earnings of two groups of salary/wage workers during a two year period; the first group consisted of workers who became self-employed workers in the second year, and the second group consisted of workers who continued to be salary/wage workers. He did not find any significant difference in salary/wage earnings for these two groups in the first year and concluded that self-selection does not explain lower earnings among self-employed workers, since if negative selection into self-employment occurs then we should observe lower earnings among workers who become self-employed in the second year. Krashinski [2000] did the

same exercise using matched CPS data for 20 years and found no evidence of positive or negative selection into self-employment.³ Borjas and Bronars [1989] even found positive self-selection into self-employment among white males, using a Heckman-style, self-selection correction method.⁴ To summarize, previous research shows that negative self-selection into self-employment does not explain the lower earnings of self-employed workers.

Hamilton [2000] offered compensating differentials as an alternative explanation. He claimed that self-employed workers enjoy non-earnings aspects of self-employment, such as being their own boss, and, accordingly, they accept lower earnings. His claim was not supported by direct empirical evidence, however. In one significant study, Blanchflower and Oswald [1998] tested compensating differentials for self-employed workers using the job/life satisfaction variable available in the British National Child Development Survey. Using cross section data from 1981 and 1991, they found that self-employed workers are more satisfied with their job/life than salary/wage workers. However, as the authors admitted in their paper, there is a possibility that “self-employed people may be intrinsically more optimistic,” and higher job/life satisfaction among self-employed workers might be due to

³Krashinski [2000] used this finding as evidence that self-employed workers are a good control group for testing the institutional hypothesis to explain wage inequality during the 1980s and 90s among salary/wage workers because self-employed workers are relatively free from such institutional factors as minimum wage restrictions and labor union involvement.

⁴The wife’s educational attainment and the SMSA-level aggregate labor market conditions are used as instruments in the first stage selection equation. The variables are unemployment rate, population growth rate, crime rate, the level of local government expenditure, and the mean of income and education level. These variables are assumed to affect the labor market mobility but do not influence the determination of earnings.

the intrinsic characteristics of self-employed workers. Several psychological studies, in fact, have revealed that people with positive attitudes toward life are more likely to be self-employed.⁵ This problem arises from the interpersonal comparison aspect of the job/life satisfaction score that is determined by subjective perception. This problem can be resolved by considering the change of job satisfaction associated with changing jobs, because these satisfaction scores are compared within individuals. This possibility, however, cannot be explored without using panel data. In addition, contrary to the findings in Blanchflower and Oswald [1998], Clark and Oswald [1994], using a medical measure of psychiatric health, found that self-employed workers are more highly stressed than salary/wage workers. Considering the risks that self-employed workers face, this result is not surprising. Thus, while the evidence for the compensating differential among self-employed workers found in Blanchflower and Oswald [1998] is very informative, it does not decisively support the compensating differential hypothesis. This paper attempts to overcome the limitation of Blanchflower and Oswald [1998] by using panel data with a subjective job satisfaction measure (National Longitudinal Survey Youth 79).

The rest of this paper is organized as follows: Section 2 overviews the use of job satisfaction measures in economics. Section 3 briefly describes the data and confirms the lower earnings of self-employed workers. Section 4 discusses job satisfaction scores in the data and implements a descriptive

⁵See Brockhaus and Horwitz [1986] for a review of the literature.

analysis. Section 5 describes a simple model of the compensating differential among self-employed workers and estimates the model's parameters. Section 6 extends the analysis in Section 5, relaxing the imposed assumptions. Section 7 provides a summary and conclusion.

2 How Economists Have Used Job Satisfaction Measures

Economists often hesitate to use subjective job-satisfaction measures because linking these measures with underlying utility is thought to be difficult.⁶ In the empirical literature, however, labor economists have made significant efforts to incorporate job satisfaction measures into economic analyses of labor market outcomes. Job satisfaction is generally used in two different ways in economic analyses of labor markets.

The first uses job satisfaction scores as an independent variable to examine the effect of job satisfaction on economic outcomes. Freeman [1978] showed that job satisfaction predicts workers' job quitting behavior fairly well, even after controlling worker and job characteristics, including their wages. Carrington et al. [1996] and Clark [2001] obtained similar results using German and British data respectively. These findings establish that job satisfaction is a very informative economic variable. The method that

⁶Job satisfaction is regarded as one of most important concepts by industrial and organizational psychologists, and textbooks in the field typically devote an entire chapter to job satisfaction and its effect on job performance. For example, see McCormick and Ilgen [1985] and Siegel and Lane [1987].

will be applied to the data set in this study will help determine whether job satisfaction is a reliable economic variable. The results of the analysis appear in data section of this paper.

The second set of studies has analyzed the determination of job satisfaction, given that the job satisfaction variable is a reliable economic variable. For example, the job satisfaction variable has been widely used to examine the effect of unionism on job satisfaction (Borjas [1979], Leigh [1979] and Bender and Sloane [1998]). Somewhat surprisingly, researchers typically have found lower job satisfaction among union as compared with non-union workers. They have offered this counter-intuitive finding as evidence that labor unions possess an exit-voice mechanism; even though workers are not happy with their jobs, they do not quit because their “voice” is heard through their labor union.

Several studies have used job satisfaction scores to test the relative income concern hypothesis; job satisfaction is not only determined by individual earnings, but also by the relative position of the individual's earnings compared with workers who share similar characteristics (Hamermesh [1977], Clark and Oswald [1996], Hamermesh [2001]). All of these studies have found evidence supporting the relative income concern hypothesis.

This review of literature shows that the job satisfaction variable contains rich information usable by economists.

3 Data and Lower Earnings among Self-Employed Workers

The National Longitudinal Survey of Youth (NLSY79) is used in this study. The analysis sample consists of observations between 1985 and 1998 that was restricted to white males in order to be consistent with previous studies (Hamilton [2000] and Krashinski [2000]). Individuals who work for money and are out of school are included in the sample. Individuals are dropped if their job classifications are unknown. The construction of the analysis sample is tabulated in Table 1.

As the first step of the analysis, the lower earnings of self-employed workers, which have been observed in previous studies, are replicated with this data. The following wage equation is estimated to see the earnings differentials between self-employed and salary/wage workers.

$$\ln w_{it} = \beta_0 + x_{it}\beta_1 + \beta_2 self_{it} + self_{it}x_{it}\beta_3 + c_i + e_{it} , \quad (1)$$

where w_{it} is hourly rate of earnings,⁷ x_{it} is the vector of human capital and demographic variables, $self_{it}$ is the dummy that indicates self-employed, c_i

⁷Hourly rate of pay is constructed by the Center for Human Resource Research (CHRR) based on respondents' usual earnings (inclusive of tips, overtime, and bonuses, but before deductions). CHRR requests wages/salaries/tips income and business/firm income along with other income categories from both wage/salary workers and self-employed workers. Thus there is less concern that self-employed workers earnings contains capital income, in addition to labor income, which is the main concern for the measurement of income among self-employed when CPS is used. Therefore, the measurement of earnings for self-employed workers in NLSY 79 is as good as those in SIPP that were used in Hamilton [2000]. Although Hamilton [2000] also used the earnings that include capital gain as an alternative earnings measure of self-employed workers, I just focus on the labor earnings of self-employed worker here.

is unobserved individual heterogeneity, and e_{it} is idiosyncratic error that satisfies $E[e_{it}|self_{it}, x_{it}, c_i] = 0$. The model is estimated through OLS assuming $[c_i|self_{it}, x_{it}] = 0$, and this assumption ensures that self-selection into self-employment does not occur on the basis of unobserved characteristics. When the assumption $[c_i|self_{it}, x_{it}] = 0$ is violated through self-selection based on unobservables, the OLS estimator is biased. To deal with this possibility, the model is also estimated through a fixed effects estimation. The fixed effects estimator is unbiased if e_{it} is strictly exogenous (i.e. $E[e_{it}|self_i, x_i, c_i] = 0$, where $self_i = [self_{i1}, \dots, self_{iT}]$, $x_i = [x_{i1}, \dots, x_{iT}]$); thus self-selection into self-employment based on time-constant unobserved characteristics is allowed.

The differences in earnings between salary/wage and self-employed workers are evaluated at several points during the job market experience and job (business) tenure.⁸ The point of evaluation is important, since the life-cycle earnings profile is much flatter among self-employed workers as pointed out in Lazear and Moore [1984].

The results of the estimation and the estimated difference of earnings appear in Table 2. Both the results of OLS and the fixed effects estimation show that the earnings of self-employed workers are higher without job experience or tenure, as we can see from the positive coefficients for the self-

⁸Hamilton [2000] evaluated the differences at 10 years of tenure and 20 years of experience. However, in the sample used in this analysis, only 1.54% of the total sample has more than 20 years of job experience. Thus the difference was instead evaluated at 10 years of experience. About half of the observations in the total sample has more than 10 years of experience and about 10 % of total sample has more than 10 years of job tenure.

employment dummy. However, the earnings-experience/tenure profiles are flatter for self-employed workers than for salary/wage workers. Because of the flatter earnings profile, self-employed workers with 10 years of actual job experience and 10 years of business tenure earn 18% ($t = -1.44$) less than salary/wage workers, depending on their educational background and marital status, according to the OLS result. This result almost directly corresponds to the 19% self-employment penalty evaluated at 10 years of job (business) tenure and 20 years of potential experience found by Hamilton [2000] using labor income as self-employed workers' earnings.

According to the fixed effects result, however, self-employed workers with 10 years of job actual experience and 10 years of business tenure earn almost the same amount as salary/wage workers on average. The lower predicted wage of self-employed workers from OLS estimates than the predicted wage from FE estimates implies that self-employed workers with 10 years of job experience and 10 years of business tenure have lower unobserved characteristics than salary/wage workers with 10 years of job experience and tenure. This unobservable can be either worker specific or worker-job matching specific. The difference of the self-selection mechanism based on job matching quality suggested in Jovanovic [1979] may explain the negative correlation between unobserved characteristics and self-employment among workers with 10 years of job (business) tenure. Self-employed workers are required to invest in their business at its start up, as previous empirical studies indicate,⁹

⁹For example, see Evans and Jovanovic [1989].

and if this investment is sunk, the self-employed workers are “foot fixed” to their job because of the capital income flow from their business. On the other hand, salaried and wage workers are “foot loose” compared with self-employed workers, since they do not make this type of commitment at the beginning of their job. Thus self-selection over time based on worker-job (business) matching quality, which is unknown *ex ante*, may occur at a faster rate among salaried workers. This story reconciles the OLS result and the FE result; however, this story does not explain the lower earnings among self-employed workers since prospective self-employed workers recognize this cost of commitment before starting up their business, but they still choose to be self-employed anyway.

To summarize the findings, self-employed workers earn less mainly due to a lower return to job experience and job tenure. When the difference is evaluated at 10 years of job experience and 10 years of job (business) tenure, self-employed workers earn 18% less than comparable salary/wage workers on average. Next I attempt to explain this earnings difference with the compensating earnings differential theory.

4 Job Satisfaction Scores and Descriptive Analysis

The main survey item used in this study is global job satisfaction. The question reads

How [do/did] you feel about your job with [name of employer]?

[Do/Did] you (1) like it very much, (2) like it fairly well, (3) dislike it somewhat, or (4) dislike it very much?(CODE ONE ONLY.)

The distribution of responses for this question is tabulated in Table 3. This distribution remains nearly constant over time. Examination of Table 3 reveals that about 65% of self-employed workers chose “like it very much,” while only about 45% of salary/wage workers chose this answer. It is also notable that only about 3-5% of self-employed workers chose “dislike” (“dislike somewhat” and “dislike very much” combined), while about 8-10% of salary/wage workers chose this answer. This rough examination of the distribution clearly indicates that self-employed workers report more satisfaction with their jobs. One sensible criticism of the comparison of this subjective measure between salary/wage and self-employed workers is that self-employed workers may be overly positive about their jobs since they are their own employers and they may want to justify themselves (cognitive dissonance explanation).

Before developing a detailed discussion of the compensating earnings differential based on job satisfaction scores, I examine whether this score is a meaningful economic variable and comparable between salary/wage and self-employed workers. If the job satisfaction score contains meaningful information about a worker’s actual job satisfaction, the score should predict the observed worker’s behavior, in particular, the worker’s future job change. The concern for cognitive dissonance can be addressed by comparing the relationship of job satisfaction and job change between salary/wage and self-

employed workers. If cognitive dissonance resulted in higher job satisfaction among self-employed workers, we should observe more frequent job change for given level of reported job satisfaction, since self-employed workers report high job satisfaction while they are actually not satisfied with their job.

Table 4 tabulates the probability of job change between time t and $t - 1$ classified by the level of job satisfaction at time $t - 1$. This table clearly tells us that the worker who dislikes his/her job is more likely to change his/her job. The tabulation indicates less frequent job change among self-employed workers who self-report they like their job very much than salary/wage workers with the same response. Although the differences in the distribution for other job satisfaction categories are not systematic, the difference in the relationship between job satisfaction and job change behavior is not consistent with the cognitive dissonance explanation for higher job satisfaction among self-employed workers.

Since the probability of job change may depend on the worker's demographic characteristics that may be correlated with job satisfaction, a probit model in which the probability of job change depends on demographic variables as well as job satisfaction is estimated. In addition, the effect of job satisfaction on job change is allowed to be different between salary/wage and self-employed workers. The results of the probit estimation appear in Table 5, Column 1. The results indicate that those who dislike their jobs very much are 22% more likely to change their jobs than those who like their jobs very much. The inclusion of control variables hardly changed the results obtained

in Table 4. The interaction of lagged self-employment status and job satisfaction indicate that the effect of job satisfaction on job change is not different between salary/wage and self-employed workers, except for the case of “dislike very much.” This exceptional case contradicts the cognitive dissonance explanation for higher job satisfaction among self-employed workers.

I also tried the specification that included lagged log wage as an independent variable, as used in Clark [2001]. The estimated results for this specification appear in Table 5, Column 2. The results indicate that a 10% increase in hourly earnings decreases the probability of job change by 0.26%. The size of this effect is relatively small compared with the effect of job satisfaction on job change. For example, changing job satisfaction from “like somewhat” to “like very much” decreases the job change probability by 10.8% ($=0.231-0.123$). This larger effect of job satisfaction on job change than wage effect can be explained as follows. If the job match quality is more significant in job satisfaction determination than in wage determination, job satisfaction is a more crucial determinant of job change than wage because workers have a greater chance to improve their job satisfaction but less chance to improve their wage through job change. This relatively small effect of hourly earnings on job change compared with job satisfaction was also found in Clark [2001], although the result in his study was not this extreme. We should also notice that the size of the coefficients for job satisfaction dummies hardly changed due to the inclusion of log of hourly earnings.

The results displayed in Table 4 and Table 5 clearly indicate that the job satisfaction score contains valuable information about the worker’s actual satisfaction in his or her job.

One of the main drawbacks of using the job satisfaction score, as noted in the existing literature, is the difficulty in the interpersonal comparison of subjective measures. This study attempts to overcome this difficulty by using panel data because panel data enables the researcher to examine the change in job satisfaction associated with job change. In the following analysis, the job satisfaction score is assumed to be comparable within each individual over time. This assumption is much weaker than the assumption of interpersonal comparability of subjective measures.

As a simple way to examine the change in job satisfaction associated with job change, the transition matrices of job satisfaction for job stayers and job changers appear in Table 6. Findings from these matrices are summarized as follows:

- Among job stayers, self-employed workers are more likely to stay in the “like very much” category as compared with wage/salary workers. (Panel A and Panel B)
- Job changers who move from salary/wage jobs to self-employed jobs are more likely to experience a positive transition and less likely to experience a negative transition of job satisfaction than job changers within salary/wage jobs. It is also notable that job changers’ job satisfaction

as salary/wage workers are originally slightly higher than stayers'. This may be evidence of self-selection. (Panel C and Panel E)

- This positive transition of job satisfaction is less likely to occur among those who change from self-employed jobs to wage/salary jobs. Moreover, about 20% of job changers experience a *negative* transition of job satisfaction. (Panel F)

These findings suggest the conclusion that self-employed jobs are more satisfying than salary/wage jobs. However, other demographic characteristics that also might affect job satisfaction, such as marital status, may vary at the time of job change and this might result in the findings above. To address this possibility, the effects of workers' observed and unobserved characteristics on job satisfaction are controlled in the following analysis. In addition, I attempt to calculate the monetary value of self-employment status in terms of job satisfaction.

5 Compensating Differentials among Self-Employed Workers

To test the compensating differential hypothesis among self-employed workers, this section attempts to calculate the monetary value of self-employment status in terms of job satisfaction to see whether it is large enough to explain the earnings differential between salary/wage workers and self-employed workers.

A straightforward way to see whether the difference in job satisfaction between self-employed workers and salary/wage workers explains the difference in earnings is to estimate the following equation:

$$\ln w_{it} = \beta_0 + x_{it}\beta_1 + \beta_2 self_{it} + \beta_3 js_{it} + e_{it} , \quad (2)$$

and see whether $H_0 : \beta_2 = 0$ holds. If the null hypothesis is not rejected, then we can conclude that the difference in earnings originated from job satisfaction, not from self-employment status. However this obvious method neglects the fact that job satisfaction is also the function of earnings, as shown in previous studies. This endogeneity biases the estimates of β_3 upward because js_{it} and e_{it} are positively correlated. This bias causes a downward bias in the estimates of β_2 since job satisfaction and self-employment status are positively correlated, as we saw in the previous section. This downward bias may result in the false acceptance of the null hypothesis. Thus, this avenue is not pursued in this paper.

Instead, I examine how self-employment status and earnings affect job satisfaction to see whether the compensating earnings differential explains lower earnings among self-employed workers. To calculate the monetary value of self-employment status in terms of job satisfaction, the relative importance of self-employment status and monetary earnings in the determination of job satisfaction is examined. The link between the job satisfaction score and

utility is specified as

$$js_{it} = \begin{cases} 4 & \text{if } js_{it}^* \geq \mu_3, \\ 3 & \text{if } \mu_3 > js_{it}^* \geq \mu_2, \\ 2 & \text{if } \mu_2 > js_{it}^* \geq \mu_1, \\ 1 & \text{if } \mu_1 > js_{it}^*, \end{cases} \quad (3)$$

where js_{it} is a categorical variable indicating worker i at time t 's response to the job satisfaction question (1: “Dislike Very Much” - 4: “Like Very Much”), whereas js_{it}^* is the latent, continuous variable of job satisfaction and $\mu_k (k = 1, 2, 3)$ are the thresholds of job satisfaction that determine the answer for the job satisfaction question. Although many factors may affect a worker’s job satisfaction, to see the trade-off between self-employment status and monetary compensation, those two factors are mainly considered as the determinants of job satisfaction. To estimate the monetary value of self-employment status in terms of job satisfaction, three additional assumptions are imposed.

First, as a shape of the job satisfaction function, a linear function is assumed as a first order approximation. Several demographic variables are also assumed to affect job satisfaction. Moreover, unobserved factors that may affect job satisfaction are assumed to be independent of self-employment status, wage, and demographic variables, and these factors are assumed to be normally distributed. This assumption results in

Assumption 1 (Linear job satisfaction function)

$$js_{it}^* = \theta_0 + \theta_1 s_{it} + \theta_2 w_{it} + x_{it} \theta_3 + c_i + e_{it}, \quad e_{it} | s_{it}, w_{it}, x_{it}, c_i \sim N(0, 1), \quad (4)$$

where s_{it} is the dummy variable for self-employment status, w_{it} is hourly rate

of pay, x_{it} is the vector of a worker's attributes, and c_i is individual heterogeneity in utility level. Specifically x_{it} contains a marital status dummy; a sex dummy; age and racial or ethnic group dummies; educational background; labor market experience; and job (business) tenure.

The next step is to calibrate the monetary value of self-employment status in terms of job satisfaction. As a measure of monetary value, we can calculate how much workers can give up in terms of salary/wage earnings in exchange for one dollar earnings as self-employed workers while keeping their job satisfaction constant. The α in the following equation gives this ratio of trade-off:

$$\underbrace{\theta_2(\alpha w_{it}) + x_{it}\theta_3 + c_i + e_{it}}_{j_{s^*} \text{ of a salary/wage worker}} = \underbrace{\theta_1 + \theta_2 w_{it} + x_{it}\theta_3 + c_i + e_{it}}_{j_{s^*} \text{ of a self-employed worker}} . \quad (5)$$

When a worker receives α dollars of earnings per hour as a salary/wage worker, the worker has the same level of job satisfaction when the worker earns one dollar per hour as a self-employed worker. The solution for the equation is $\alpha = \theta_1/(\theta_2 \times w_{it}) + 1$. In other words, α dollars of earnings as a salary/wage worker is equivalent to one dollar of earnings as a self-employed worker. This value evaluated at the mean of w_{it} is reported as a monetary value of self-employment status in terms of job satisfaction.

To simplify the econometric model, two additional assumptions that will be relaxed later are made:

Assumption 2 (Independence of Heterogeneity)

$$c_i \perp s_i, w_i, x_i . \quad (6)$$

where $s_i = [s_{i1}, s_{i2}, \dots, s_{iT}]$, $w_i = [w_{i1}, w_{i2}, \dots, w_{iT}]$ and $x_i = [x_{i1}, x_{i2}, \dots, x_{iT}]$. This assumption assures that individual heterogeneity is independent of observables and that the heterogeneity does not cause any inconsistency of the pooled, ordered probit estimator.

Assumption 3 (No feedback from current job satisfaction shock to future self-employment status)

$$e_{it} | s_i, w_i, x_i, c_i \sim N(0, 1) . \quad (7)$$

This assumption rules out the feedback from current shock on job satisfaction to future self-employment status or wage through job change, since if the feedback exists, the distribution of current e depends on future s and w .

These three assumptions result in the pooled, ordered probit model, and the parameters in (4) can be estimated. To estimate the model, I dropped the observations whose hourly rate of pay were either above the 99 percentile or below the 1 percentile in each year, and this sample selection results in sample (5) in Table 1. Since those who earned extremely high wages and were extremely satisfied with their jobs could only report “like their job very much” at the maximum and vice versa for low wage earners, including those extreme earners would attenuate the coefficient on hourly rate of pay toward zero, and this would make the estimates of the monetary value of self-employment status upwardly biased.¹⁰ The results of the estimation appear in Table 7, Column 1 and Column 2. The result that appears in Column 1

¹⁰I tried several trimming rules. The results were not essentially changed when I applied 5%-95% or 10%-90% rules.

is the specification that only includes the self-employment dummy and the hourly wage as independent variables. The coefficient for self-employment is 0.472. The size of the coefficient is not large enough to change the worker's response to the job satisfaction question from "dislike very much" to "like somewhat" or from "dislike somewhat" to "like very much," since the critical values of the ordered probit are -1.710, -0.987, and 0.551. However, the size of the coefficient is much larger than the coefficient for hourly wage. The coefficient for hourly wage is 0.037, which is surprisingly small if we compare this value with the critical values. Due to this small effect of earnings on job satisfaction, one dollar earnings of self-employed workers are evaluated as more than two dollars and fifty cents of salary/wage workers' earnings evaluated at the mean of hourly wage. This value is large enough to compensate for the lower earnings among self-employed workers, whose earnings are about 20% lower than salary/wage workers' when workers have 10 years of job experience and 10 years tenure.

The results essentially do not change when marital status, educational attainment, and job experience are included in the specification.

6 Extensions

A surprisingly large estimate of the monetary value of self-employment was obtained in the previous section. Now, I consider several possible reasons why the effect of self-employment status on job satisfaction may be overestimated. To do so, I will relax the assumptions made so far one by one in

this section. As partly suggested in the analysis of transition matrices of job satisfaction, workers who become self-employed seem to have a positive attitude toward their jobs independent from self-employment status. If this is the case, the coefficient for self-employed workers was overestimated in the pooled probit model, since c_i and s_{it} are positively correlated. In addition, if workers with high ability have high expectations for their earnings, workers with high ability are less happy with their current earnings. As a result, unobserved heterogeneity and current earnings, which is a proxy for ability, may be negatively correlated and the coefficient for hourly rate of pay may be negatively biased. Considering this heterogeneity or other possibilities that unobserved heterogeneity in job satisfaction are dependent upon observable characteristics, *the assumption 2* (Interpersonal comparability of job satisfaction) is replaced with

Assumption 2' (the “Fixed Effects” assumption)

$$c_i | s_i, w_i, x_i \sim N(\gamma_1 \bar{s}_i + \gamma_2 \bar{w}_i + \gamma_3 \bar{x}_i, \sigma_c^2). \quad (8)$$

This assumption allows dependence between c_i and s_i or x_i in a restrictive way,¹¹ where \bar{s}_i , \bar{w}_i and \bar{x}_i are the means of s_i , w_i and x_i respectively.¹² The consistent estimators are obtained through a pooled, ordered probit estimation of the model that includes individual means of independent variables. The importance of assumption 3 should be emphasized here. If current shock

¹¹Mundlak [1978] proposed a variant of this assumption in a linear regression framework.

¹²The analysis under this assumption is called a fixed effect analysis because this assumption allows dependent unobserved heterogeneity.

to job satisfaction, e_{it} , affects the future value of self-employment status or wage through job change behavior, e_{it} and (\bar{s}_i, \bar{w}_i) is dependent and a consistent estimator cannot be obtained.

The results of estimation appear in Table 6, Column 3. The coefficient for self-employment slightly decreases as expected from the positive correlation of c_i and s_{it} . As a result, the calculated monetary value of self-employment status becomes 251% of hourly wage.

As confirmed in the previous section and in previous studies (Freeman [1978], Clark et al. [1998] and Clark [2001]), job changes tend to follow low job satisfaction. In light of this fact, ruling out the feedback from e_{it} to s_{it+1} and w_{it+1} is a strong assumption. In particular, if a salary/wage worker experiences low job satisfaction because of some shock (after conditioning on individual heterogeneity) and become a self-employed worker, we tend to overestimate the effect of self-employment on job satisfaction because a salary/wage workers with current negative shock is more likely to be self-employed in the following period. To take care of this possibility, feedback effects are allowed through the assumption,

Assumption 3' (Existence of feedback from current shock on job satisfaction to future job change)

$$e_{it}|s_i, x_i, a_i \sim N(\delta_0 s_{it+1} + \delta_1 w_{it+1}, 1), \quad (9)$$

This model allows feedback from current shock to future self-employment status and wage in $t + 1$. The model is estimated with a pooled, ordered

probit model with an individual mean of independent variables, s_{it+1} and w_{it+1} as independent variables.

The estimated results of the “fixed effects” probit model with feedback effects appear in Table 7, Columns (4). Neither of the estimated coefficients for the feedback terms is significant. Since the coefficients for the feedback terms are not significantly different from zero, I take the fixed effects estimate, which is $\hat{\alpha} = 2.510$ ($s.e. = 0.362$), as the most preferable estimate for the monetary value of self-employment status in terms of job satisfaction.

Now, the very high valuation of self-employment status is the puzzle that should be explained. Although self-employed workers with 10 years of job experience and 10 years of business tenure earn about 20% less than their salaried/wage-earning counterparts, the estimated results imply that one dollar of earnings as a self-employed worker is equivalent to about 2.5 dollars earned as a salary/wage worker in terms of job satisfaction.¹³ If we consider job satisfaction as equivalent to utility, this value means that self-employed workers do not move to salary/wage jobs even when they are offered 2.5 times more than their current earnings. While this finding is counterintuitive, there are four explanations that may account for these surprising findings.

The first is the fact that job satisfaction is only a segment of utility function. Suppose the simplest form of utility function, which consists of

¹³Although I tried several specifications in which the monetary value depended on job experience and tenure, the result essentially did not change.

only consumption and job satisfaction:

$$u(c(w), js(se, w)) \quad , \quad (10)$$

where c is consumption that is presumably a function of earnings. Then the monetary value of self-employment is the β in the following equation:

$$u(w, js(se = 1, w)) = u(\beta w, js(se = 0, \beta w)). \quad (11)$$

However, the monetary value of self-employment status in terms of job satisfaction, which is the α in the equation:

$$js(se = 1, w) = js(se = 0, \alpha w), \quad (12)$$

has been estimated in this paper. Ideally, the monetary value of self-employment status in terms of utility should be estimated to appraise the validity of the compensating differential hypothesis. Regardless of this limitation, calculating the monetary value of self-employment status in terms of job satisfaction is a useful exercise in light of the reality that a numerical measure of utility is not available.

The second explanation concerns the overestimation of success among self-employed workers. Empirical studies have found that self-employed workers are overly confident in their future success as compared with salary/wage workers (Cooper et al. [1988] and Arabsheibani et al. [2000]). For example, Arabsheibani et al. [2000] report that self-employed workers expect better financial outcomes in the following year than salary/wage do, even though they, in fact, experience worse outcomes. When self-employed workers expect

future monetary success, self-employment status has a subjective “option” value for future earnings and this option value may make self-employed workers more satisfied with their jobs. Although this effect is attributed to the non-monetary value of self-employment status in this study, it instead should be attributed to the monetary value of self-employment status. This overestimation of the non-monetary aspect and underestimation of the monetary aspect result in an overestimation of the non-monetary aspect of self-employed jobs in terms of job satisfaction.

The third explanation relates to underreporting in self-employed workers’ earnings; if this is the case, the value of self-employment is overestimated, since the utility from underreported earnings is captured through self-employment status. Although NLSY makes good efforts to collect reliable labor income from self-employed workers, many may refer to their tax forms when they answer earnings questions. In many cases, self-employed workers may have underreported income on their tax forms in the previous year, so these numbers may be inaccurate. For example, Joulfaian and Rider [1998] show that the underreport rate of self-employed earnings is about 20% on average, using the Taxpayer Compliance Measurement Program.¹⁴ Also, self-employed workers may consume out of business expenses. For example, they may drive company-owned cars for personal purposes. This also may increase the monetary value of self-employment status, but it should not be

¹⁴The Taxpayer Compliance Measurement Program data are stratified samples of individual tax returns subject to intensive line-by-line examinations (Joulfaian and Rider [1998]).

interpreted as a compensating differential since it simply captures consumption.

The fourth explanation relates to heterogeneity in the marginal job satisfaction from self-employment. When heterogeneity is explicitly modeled, the utility function becomes

$$\begin{aligned}
 js_{it}^* &= \theta_0 + \theta_{1i}s_{it} + \theta_2w_{it} + x_{it}\theta_3 + c_i + e_{it}, \\
 &= \theta_0 + \bar{\theta}_1s_{it} + \theta_2w_{it} + x_{it}\theta_3 + c_i + v_{it}, \\
 v_{it}|s_{it}, w_{it}, x_{it}, c_i &\sim N((\theta_{1i} - \bar{\theta}_1)s_{it}, \sigma_v). \tag{13}
 \end{aligned}$$

Marginal job satisfaction and self-employment, θ_{1i} and s_{it} , are likely to be positive correlated since those who derive greater job satisfaction from self-employment are more likely to be self-employed. Consequently, s_{it} and the error term are positively correlated and $\text{plim}\hat{\theta}_1 > \bar{\theta}_1$. Thus the pooled, ordered probit estimator overestimates the *average* of θ_{1i} over individuals. This positive correlation can be very large for workers who want to be self-employed at any cost. Thus the calculated monetary value of self-employment from the pooled probit model can be interpreted as the upper bound of the *average* evaluation of self-employment throughout the population. In addition, the entry to self-employment continues as long as a worker's evaluation of self-employment status is above the earnings penalty of self-employed workers. Thus, the earnings penalty of self-employed workers is determined at the *margin* through a market mechanism. It is no surprise to find a higher *average*

evaluation of self-employment status than the evaluation of self-employment status by the last worker who *marginally* becomes a self-employed worker.

The interpretation of the monetary value of self-employment status becomes more restricted for the fixed effects model. The coefficient θ_{1i} is identified as those who changed self-employment status during the sample period, since if s_{it} is constant over sample period, the variable is perfectly multicollinear with \bar{s}_i and only $\theta_{1i} + \gamma_1$ is identified for those observations. Thus the estimated monetary value of self-employment status from the fixed effects model is the average evaluation of self-employment status among workers who experience a transition between a salary/wage job and a self-employed job. As we can see from Table 6, there are more observations that transit from a salary/wage job to a self-employed job, so it is not surprising to find higher evaluations of self-employment status among workers who become self-employed during the sample period. Those who leave self-employment might also do so because of financial reasons but not because of job satisfaction.

These four considerations may well reconcile the estimated self-employment penalty (20% of earnings for a worker with 10 years of job experience and 10 years of job tenure) with the estimated monetary value of self-employment jobs (about 250%) in terms of job satisfaction.

7 Conclusion

Analyses of job satisfaction scores show that self-employed workers are more satisfied with their jobs than salary/wage workers. Moreover, one dollar of

earnings while a self-employed worker is equivalent to 2.5 dollars of earnings while a salary/wage worker in terms of job satisfaction. This finding is preserved even when individual heterogeneity, which is potentially correlated with self-employment status, and the feedback effect, which runs from current job satisfaction to future job change, are considered.

This high valuation of self-employment status in terms of job satisfaction may overestimate the actual trade-off between self-employment status and monetary income in terms of utility. However, even after taking the effect of unavoidable overestimation into consideration, the value of self-employment status in terms of job satisfaction, which is about 250% of other workers' earnings, seems high enough to explain the lower earnings of self-employed workers. Thus, the results obtained in this paper support the compensating differential hypothesis as an explanation for lower earnings among self-employed workers.

Promising future research would develop a rigorous appraisal of the compensating wage differential hypothesis by using a better measurement of utility or principles of revealed preference.

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Table 1: Sample construction

	Total	Salary / Wage workers	Self- Employed Workers
Original NLSY79 1985-1998	152232	–	–
Non Black and Non Hispanic	90120	–	–
Male	45480	–	–
Employed + out of school	24756	–	–
Work in private, government and self-employed	24580	–	–
Valid answer for job satisfaction: Sample (1)	24533	22095	2438
Employed + out of school for two consecutive interviews	19893	–	–
Valid class + tenure variables	19402	–	–
Work in private, government and self-employed for two consecutive interviews	19298	–	–
Valid answer for job satisfaction: Sample (2)	19222	17265	1957
Sample (2) + lagged demographic variables are available: Sample (3)	13889	12512	1377
Sample (1) + valid covariate + more than 2 years of observation: Sample (4)	20454	18585	1869
Hourly wage/earnings are between 5 percentile and 95 percentile: Sample (5)	14199	13163	1036

Note:

Tenure variable is used to identify job change. Sample (1) is used in the analysis of Table 3. Sample (2) is used in the analysis of Table 6. Sample (3) is used in the analysis of Table 4 and Table 5. Sample (4) is used in the analysis of Table 2. Sample (5) is used in the analysis of Table 7.

Table 2: OLS regression coefficients
 Dependent variable: log hourly wage
 Sample: Non Black and Non Hispanic Male (Sample (4))

	(1)	(2)
	OLS	Fixed Effects
Self-employment	-0.011 (0.030)	0.022 (0.016)
Married-Spouse present	0.093 (0.014)	0.056 (0.010)
Education	0.078 (0.003)	–
Experience	0.047 (0.006)	0.109 (0.010)
Experience ² / 100	-0.068 (0.028)	-0.115 (0.021)
Tenure	0.046 (0.004)	0.029 (0.003)
Tenure ² / 100	-0.223 (0.028)	-0.186 (0.021)
Self-employment × (Married – Mean (Married))	-0.059 (0.061)	-0.000 (0.028)
Self-employment × (Education – Mean (Education))	-0.008 (0.012)	–
Self-employment × (Experience – Mean (Experience))	-0.020 (0.023)	-0.024 (0.013)
Self-employment × (Experience ² / 100 – Mean (Experience ² / 100))	0.115 (0.095)	0.080 (0.053)
Self-employment × (Tenure – Mean (Tenure))	-0.050 (0.016)	-0.027 (0.009)
Self-employment × (Tenure ² / 100 – Mean (Tenure ² / 100))	0.221 (0.102)	0.194 (0.058)
Constant	5.162 (0.044)	–
Observations	20454	20454
R-squared	0.30	–
Number of individuals	2661	2661
<hr/>		
Earnings differentials between self employed and Salary wage workers		
With 0 years of experience and 0 years of job (business) tenure	0.184 (0.128)	0.209 (0.071)
With 5 years of experience and 5 years of job (business) tenure	-0.084 (0.064)	0.027 (0.036)
With 10 years of experience and 10 years of job (business) tenure	-0.184 (0.064)	-0.018 (0.037)

Standard errors robust against panel clustering are in parentheses for OLS estimates. Standard errors are in parenthesis for F.E. estimates.

Table 3:
 Panel A Job satisfaction among salary/wage workers
 Sample: White Male (Sample (1))

year	Like very much Row %	Like fairly well Row %	Dislike somewhat Row %	Dislike very much Row %	Total observation
85	45.97	43.27	8.65	2.11	1849
86	43.25	48.13	6.13	2.49	1926
87	41.95	50.56	5.97	1.52	2043
88	41.28	48.82	8.20	1.70	2122
89	43.59	46.89	7.43	2.09	2154
90	41.58	49.84	6.23	2.35	2167
91	43.17	47.58	7.41	1.84	1633
92	43.00	48.49	6.51	1.99	1658
93	42.19	48.85	7.69	1.27	1652
94	41.51	50.60	6.39	1.51	1660
96	43.11	48.93	6.55	1.41	1633
98	46.12	46.62	5.32	1.94	1598
Total	43.00	48.24	6.89	1.87	22095

Panel B: Job satisfaction among self-employed workers

year	Like very much Row %	Like fairly well Row %	Dislike somewhat Row %	Dislike very much Row %	Total observation
85	72.61	22.29	3.18	1.91	157
86	63.07	31.25	1.70	3.98	176
87	59.90	36.04	2.54	1.52	197
88	64.71	31.22	3.17	0.90	221
89	64.38	33.48	1.72	0.43	233
90	65.07	31.00	3.06	0.87	229
91	70.05	26.40	2.54	1.02	197
92	63.26	33.95	2.33	0.47	215
93	63.59	33.98	1.94	0.49	206
94	62.56	33.33	3.08	1.03	195
96	74.52	22.60	2.40	0.48	208
98	65.69	29.41	3.92	0.98	204
Total	65.67	30.60	2.63	1.11	2438

Table 4: Probability to change job by the next interview (N=13884)

Sample: Sample (3)

Job satisfaction in the previous interview	SW	SE	Mean
Dislike very much	0.388	0.267	0.379
Dislike somewhat	0.256	0.383	0.263
Like fairly well	0.178	0.206	0.179
Like very much	0.148	0.108	0.143
Total	0.173	0.153	0.171
N	12512	1377	13889

Note:

Sample is constructed to be consistent with the sample used for the job change regression.

Table 5: Job change Probit model

Dependent variable: Job Change between t and $t-1$ (Yes=1; No=0)

Sample: Sample (3)

	(1)	(2)
Lagged job satisfaction: Dislike very much	0.250 (0.038)	0.243 (0.038)
Lagged job satisfaction: Dislike somewhat	0.127 (0.017)	0.124 (0.017)
Lagged job satisfaction: Like somewhat	0.037 (0.007)	0.036 (0.007)
Lagged Self Employment	-0.002 (0.015)	-0.004 (0.015)
Lagged SE \times Lagged job satisfaction: Dislike very much	-0.101 (0.036)	-0.112 (0.032)
Lagged SE \times Lagged job satisfaction: Dislike somewhat	-0.012 (0.065)	-0.029 (0.061)
Lagged SE \times Lagged job satisfaction: Like somewhat	0.033 (0.027)	0.035 (0.027)
Lagged education	-0.004 (0.001)	-0.002 (0.001)
Lagged experience	-0.003 (0.001)	-0.002 (0.001)
Lagged tenure	-0.011 (0.001)	-0.011 (0.001)
Lagged log wage		-0.026 (0.006)
Observations	13884	13884

Marginal effects of Probit model is presented.

Robust standard errors against panel clustering are in parentheses.

Lagged job satisfaction: like very much is the omitted category.

Table 6: Transition of job satisfaction associated with job change (Percentage)
 (SE: Self-Employment Job, SW: Salary and Wage Job)
 Sample: White Male (Sample (2))

<u>Job Satisfaction in Current Year</u>	<u>Job Satisfaction in Previous Year</u>			
	Like Very Much	Like Fairly Well	Dislike Somewhat	Dislike Very Much
<u>SW in previous year</u>				
<u>Panel A: Job Stayers</u>				
<u>(salary/wage-salary/wage) N=13910</u>				
Like Very Much	30.17	10.34	0.96	0.19
Like fairly well	13.11	33.26	2.95	0.52
Dislike somewhat	1.03	3.79	1.62	0.29
Dislike Very Much	0.31	0.74	0.45	0.27
<u>Panel B: Job Stayers</u>				
<u>(SE-SE) N=1327</u>				
Like Very Much	54.56	9.87	0.38	0.15
Like fairly well	13.49	17.71	0.75	0.30
Dislike somewhat	0.53	0.75	0.60	0.15
Dislike Very Much	0.08	0.30	0.23	0.15
<u>Panel C: Job Changers</u>				
<u>(salary/wage-salary/wage) N=2838</u>				
Like Very Much	21.71	21.04	3.84	1.41
Like fairly well	12.37	25.55	5.25	1.27
Dislike somewhat	1.30	2.85	1.30	0.42
Dislike Very Much	0.42	0.81	0.25	0.21
<u>Panel D: SE in previous year</u>				
<u>Job Changer</u>				
<u>(SE-SE) N=41</u>				
Like Very Much	51.22	12.20	2.44	0.00
Like fairly well	4.88	24.39	2.44	0.00
Dislike somewhat	0.00	0.00	0.00	2.44
Dislike Very Much	-	-	-	-
<u>Panel E: Job Changer</u>				
<u>(wage/salary-SE) N=589</u>				
Like Very Much	40.41	23.09	3.23	0.85
Like fairly well	7.13	17.15	2.89	0.68
Dislike somewhat	1.19	1.87	0.51	0.17
Dislike Very Much	0.17	0.51	0.17	0.00
<u>Panel F: Job Changer</u>				
<u>(SE-salary/wage) N=517</u>				
Like Very Much	39.26	12.19	1.74	0.39
Like fairly well	18.76	20.50	0.58	0.58
Dislike somewhat	2.32	1.35	0.39	0.19
Dislike Very Much	0.97	0.77	0.00	0.00

Table 7: The results of ordered probit estimation

Dependent variable:

“Like very much”=4, “like fairly well”=3, “dislike somewhat”=2, “dislike very much”=1”

Sample: Sample (5)

	(1)	(2)	(3)	(4)
	Pooled Ordered Probit	Pooled Ordered Probit	"Fixed Effect" Ordered Probit	Test of Weak Exogeneity
Self Employed	0.472 (0.059)	0.476 (0.060)	0.451 (0.061)	0.461 (0.067)
Wage	0.037 (0.005)	0.036 (0.006)	0.035 (0.006)	0.035 (0.006)
Married	–	0.041 (0.028)	-0.067 (0.031)	-0.066 (0.033)
Education	–	0.021 (0.007)	0.043 (0.034)	0.027 (0.040)
Experience	–	0.011 (0.006)	0.003 (0.010)	0.005 (0.011)
Mean (self employed)	–	–	0.043 (0.098)	0.031 (0.116)
Mean (wage)	–	–	0.000 (0.000)	0.000 (0.000)
Mean (married)	–	–	0.176 (0.051)	0.178 (0.054)
Mean (education)	–	–	-0.024 (0.035)	-0.009 (0.040)
Mean (experience)	–	–	0.007 (0.010)	0.006 (0.011)
Self _{t+1}	–	–	–	0.003 (0.054)
Hourly Wage _{t+1}	–	–	–	0.000 (0.000)
Year dummies?	Yes	Yes	Yes	Yes
3rd Cut Point (μ_3)	-1.710 (0.048)	-1.502 (0.095)	-1.460 (0.101)	-1.477 (0.106)
2nd Cut Point (μ_2)	-0.987 (0.043)	-0.779 (0.092)	-0.736 (0.099)	-0.733 (0.104)
1st Cut Point (μ_1)	0.551 (0.044)	0.765 (0.094)	0.810 (0.100)	0.807 (0.105)
Monetary Value of SE	2.513 (0.281)	2.542 (0.341)	2.510 (0.362)	2.556 (0.385)
Observations	14199	14199	14199	12823
Log Likelihood	-13877	-13831	-13819	-12459

Note: Panel clustering robust standard errors are in parenthesis for pooled ordered probit estimates.

Standard errors are in parenthesis for "Fixed Effects" effect ordered probit estimates. Married dummy is one if married and spouse present, zero otherwise. Monetary value of self-employment status is calculated by $1+(\text{coefficient for self-employment})/(\text{coefficient for log wage} \times \text{average hourly rate of pay})$. Standard error for this value is calculated through bootstrapping of 500 repetitions.