

# **Incentive-Enhancing Preferences: Schooling, Behavior and Earnings**

Samuel Bowles  
Herbert Gintis  
Melissa Osborne \*

December 21, 2000

## **1 Introduction**

One cares about the preferences of those with whom one interacts in part because these preferences affect not only the degree of conflict in the interaction, but also the effectiveness of the incentives that one may deploy to induce others to act in ways advantageous to oneself. The desire to interact with others whose preferences are favorable to the strategic pursuit of one's own objectives is distinct from concerns about one's associates' beliefs and capabilities, and if we are correct, is an important and neglected aspect of economic interactions. Taking account of these reasons for concern about the preferences of others, we think, may help resolve a number of puzzles in economics.

Concerns with the preferences of others are both ubiquitous and rational, involving the choice of a business associate, a neighbor, a spouse, a teacher or care-giver for one's children, or an employee. But to fix ideas, we consider here a

---

\*We are grateful to Roland Bénabou, Steven Durlauf, Henry Farber, Edward Glaeser, James Heckman, Alan Krueger, Charles Manski, Edward McPhail, Yona Rubinstein, and participants in seminars at the University of Wisconsin, MIT, the University of Chicago, and Harvard, Princeton, and Northwestern Universities for comments on an earlier draft, to Bridget Longridge for research assistance, and to the MacArthur Foundation for financial support. A more extensive treatment of this topic and related issues is presented in Bowles, Gintis, and Osborne (2000). Affiliations: Samuel Bowles University of Massachusetts and Santa Fe Institute; Herbert Gintis, University of Massachusetts; Melissa Osborne, Towson University.

single concrete case: the employer's concern with the preferences of his employees, and the bearing this has on the economic returns to schooling. According to the canonical model, human capital consists of capacities to contribute to production. Individuals possess a vector of capabilities  $c$  and sell these on the labor market at prices  $p$ , with wages  $w = pc$ . One of these capacities, cognitive performance as measured by standardized tests, has been exhaustively studied by labor economists and others. Many have interpreted the substantial economic returns to schooling primarily as a result of the cognitive skills produced by schooling. The evidence that schools produce cognitive skills and that these skills are important in production is compelling. But cognitive skill production explains only a small part of the contribution of schooling to individual earnings.<sup>1</sup> Using fifty-seven estimates from twenty-four different studies, Bowles, Gintis and Osborne (2000) conclude that the return to schooling holding constant a measure of cognitive performance is only one fifth lower than the unconditioned return. We conclude that only about twenty percent of the return to schooling is due to the covariation of earnings and available measures of cognitive performance.

Schooling raises earnings, we believe, by contributing to student personality and behavioral characteristics. There are many reasons why an employer would care about the preferences of his employees, since the employee's preferences affect the cost of securing labor services. We will study the case where there is a principal-agent relationship between employer and employee in which effort is not contractible. We term preferences that allow the employer to induce effort at lower cost *incentive enhancing*. They are valuable to the employer, and though they are not capacities in the sense that they appear in a production function, they may nonetheless be rewarded by profit maximizing employers facing a competitive labor market.

We begin by showing how such preferences affect earnings in a standard principal agent model, and then provide evidence that one of the relevant behavioral traits, efficacy, is a robust predictor of earnings. We relate paying for preferences to human capital formation by showing that the return to schooling can include the effect of education on preferences as well as capacities.

---

<sup>1</sup>Schooling may affect earnings by other avenues as well, for example by enhancing the individual's ability to respond flexibly to disequilibrium situations associated with rapid change (Schultz 1975, for example) or by fostering productivity-enhancing neighborhood effects in the production or diffusion of social capital.

## 2 Incentive Enhancing Preferences

Suppose the amount of labor services an employee supplies to a firm is the product of two terms: the number of hours  $h$  worked and the employee's effort level  $e$ , where  $0 \leq e \leq 1$ . We assume the employer can contract for hours  $h$ , but effort  $e$  is not verifiable and hence cannot be determined by contractual agreement. However the employer has an imperfect measure of  $e$  that indicates with probability  $\tau(e)$  that the employee has 'shirked,' where  $d\tau/de < 0$ . Employees whose shirking is detected are dismissed and replaced by a new employee (identical to the one replaced). The employer as first mover chooses  $h$  and  $w$  to maximize profits, in the knowledge that a higher wage may induce the employee to supply more effort, since the cost of job loss increases with the wage. The employee then chooses effort  $e$  to maximize the present value of expected utility, given the employee's beliefs about the termination function  $\tau(e)$ . We call this a *contingent renewal* model of the employment relationship.

The employee's best response function  $e = e(w, z)$  shows the level of effort  $e$  chosen by a employee faced with a wage rate  $w$  and fallback position  $z$ , defined as the expected present value of lifetime utility for a dismissed agent. One may think of  $z$  as depending on the availability of income-replacing transfers such as unemployment benefits, the expected duration of a spell of unemployment, and the expected stream of utility both during unemployment and in the employee's subsequent employment. We abstract from reputation effects and so represent  $z$  as exogenous to the employer and employee in their choices of  $w$  and  $e$ .

Suppose the employee has the utility function  $u(w, e)$ , which is smooth, strictly increasing and concave in the wage  $w$ , and strictly decreasing in effort  $e$ . If the discount rate is  $\rho$ , then the present value  $v(e)$  of having the job is given by  $v(e) = [u(w, e) + (1 - \tau(e))v(e) + \tau(e)z]/(1 + \rho)$ , assuming (without loss of generality) that the wage and the utility accrue at the end of the period. This simplifies to

$$v(e) = \frac{u(w, e) - \rho z}{\rho + \tau(e)} + z. \quad (1)$$

The first term on the right hand side of (1) is the per period net returns  $u(w, e) - \rho z$ , converted to an asset value using the discount rate  $\rho$  plus the probability of dismissal  $\tau(e)$ . This equation thus has a simple interpretation: the value  $v$  of the job equals the value  $z$  of the fallback plus the employee's *job rent*, namely the excess of the present value of the job over the next best alternative. The employee then chooses effort  $e$  to maximize  $v(e)$ . The employee's first order condition  $v_e = 0$  can be

written

$$\frac{\partial u}{\partial e} = (v - z) \frac{d\tau}{de}; \quad (2)$$

i.e., the marginal subjective cost of effort must equal the marginal subjective benefit, namely the job rent times the marginal effect of increased effort on the probability of keeping the job. Equation (2) defines the employee's best response function  $e(w, z)$ .

We say a parameter  $b$  is *incentive-enhancing* if it shifts the employee's best response function upward, an increase in incentive enhancing preferences leading an employee to work harder at every wage rate and holding all else constant. This being the case, if otherwise identical individuals employed by a firm have differing levels of some incentive enhancing preference  $b$ , and employers can determine the worker's type, the one with the higher level of  $b$ —the “good worker”—will be paid more in competitive equilibrium than the “bad worker.” Were this not the case the employer would not hire the “bad worker” at all.

Here are two examples of incentive enhancing preferences. First, it is easy to see that a reduction in the individual's rate of time preference—that is, a greater orientation toward the future—is an incentive enhancing preference as it raises the importance, in the individual's evaluations, of the prospect of retaining the job in the future and thus in avoiding any behavior that might result in termination. This may be confirmed by differentiating (2) with respect to  $\rho$ , using (1): a lower  $\rho$  results in a larger job rent for a given wage.

Second, individuals differ greatly in the strength of their sense of personal efficacy, a personality trait frequently measured (inversely) by the Rotter “locus of control” scale. Highly fatalistic, low efficacy persons believe that their actions have little impact on the outcomes they experience. We thus rewrite the employee's belief concerning the termination probability as  $\tau(e, f)$  where  $f$  is the Rotter measure of fatalism, so that more fatalistic people believe that their work effort has less effect on the probability of their job being terminated. Because greater fatalism lowers the absolute value of  $\tau'$ , it also lowers the marginal subjective benefit to exerting effort and so reduces the employee's desired effort level. So fatalism is an incentive depressing trait (efficacy is incentive enhancing).

Other incentive enhancing preferences include a sense of shame at being without a job and a distaste for receiving “handouts,” both of which reduce  $z$ , raising the marginal subjective benefit of effort.

We may summarize the importance of incentive-enhancing preferences by representing the production process as a two-equation system including not simply by

a production function (3) but the employee's best response function (4) as well:

$$q = q(h\lambda(e, c), k) \quad (3)$$

$$e = e(w, z, b), \quad (4)$$

where  $c$  is a vector of productive capacities of the worker (skills),  $e$  is as before the level of effort,  $\lambda(\cdot)$  represents hourly labor services devoted to the production process,  $h$  the number of hours of labor hired,  $k$  is a vector of all other inputs, and  $b$  is a vector of behavioral characteristics of the employee, including such traits as the rate of time preference, efficacy, and the other examples mentioned above. The above reasoning and examples show that incentive-enhancing preferences such those in  $b$  but not in  $c$  may earn a competitive reward by a profit-maximizing employer.

We turn now to consider empirical evidence on skills and incentive-enhancing preferences as determinants of earnings.

### 3 Empirical Evidence

Early research by Jencks (1979) found personality and behavioral traits such as industriousness, perseverance, and leadership to have statistically significant influences on measures of labor market success controlling for standard human capital variables. The estimated effects of the behavioral and personality variables, suitably normalized, were comparable in size to the estimated effects of schooling, IQ, and parental socioeconomic status. But until recently (see Heckman et al. 1999, Duncan and Dunifon 1998, and others surveyed in Bowles, Gintis, and Osborne 2001)—few studies have sought to replicate or extend his work. Two empirical challenges have impeded econometric work in this area. The first is that conventional economic theory provides little guidance in *which* personality or behavioral traits may influence earnings and there is little reason to expect that any given trait will have the same effect across different jobs. The sociological theory of social exchange initiated by Peter Blau (1964) provides somewhat more, but still quite inadequate, guidance. Second, whatever traits makeup the  $b$  vector of incentive enhancing preferences or other behavioral and personality determinants of earnings, it is quite likely that they are endogenous—that is, both a cause and a consequence of labor market success.

One recent study (Osborne 2000) addresses these concerns using the (U. S.) National Longitudinal Survey of Young Women (NLSYW) and the (U. K.) National Child Development Survey (NCDS). Both are panel data sets that include

personality and behavioral measures prior to labor market experience, as well as subsequent earnings.

The Rotter locus of control (Fatalism) measure is the only personality variable considered from the NLSYW. The NLSYW collects measures of fatalism by using the eleven-item abbreviated Rotter scale, and measures of personal control, evaluated from four of these eleven questions, are used. From the NCDS, two orthogonal personality variables are extracted, termed Aggression and Withdrawal, using principal components from a 146 item and 12-syndrome inventory of social adjustment evaluated when the respondents are eleven years of age. The inventory is evaluated by an outside investigator based on lengthy observations of the child's behavior at school.

Measurement error in each variable is corrected using reliability estimates from paired responses within the data set or external sources when the data does not allow. To address the endogeneity of the personality variables, Osborne developed exogenous instruments for adult personality, thereby avoiding the overestimation of the coefficient on personality which would otherwise arise from the effects of labor market success on the relevant personality variables. The first technique uses measures of personality prior to labor market experience as an exogenous instrument for adult personality. The second technique creates an instrument for adult personality that is independent of wages yet highly correlated with adult personality measures. This instrument for adult personality is used with the NLSYW data only, and is formed by purging the adult Rotter score of the estimated influence of past wages. For the NLSYW data set the two methods yield very similar results.

Osborne found that individual differences in personality account for substantial differences in earnings and personality determinants of earnings differ by sex and position in the occupational hierarchy.

Differences in measured personality traits have statistically significant influences on women's wages. Using the NLSYW data and regressing wages on education, measured IQ, work experience, number of children, and socioeconomic status, a measure of fatalism (the Rotter score) has a negative influence on wages, with a one standard deviation increase in fatalism estimated to decrease wages by 6.7 percent. The NCDS data allows for the estimation of a wage equation incorporating two independent personality traits. Controlling for educational attainment, measured IQ, the number of Ordinary-level exams completed (a measure of both school quality and individual cognitive skills) and socioeconomic status, both Aggression and Withdrawal are found to have negative influences on wages. A one standard deviation increase in Aggression or Withdrawal is associated with a 7.6 percent and a 3.3 percent decrease in wages, respectively. All of these estimates

		<b>Predicted Job</b>	
		<b>High Status</b>	<b>Low Status</b>
<b>women</b>	Aggression	−.072	Aggression −.052
	Withdrawal	+.060	Withdrawal −.056
<b>men</b>	Aggression	+.145	Aggression −.090
	Withdrawal	−.167	Withdrawal −.149

**Table 1:** Returns to Distinct Personality Factors, Aggression and Withdrawal, by Sex and Predicted Occupational Status. Entries are the percentage change in wages associated with a one standard deviation difference in the independent variable.

Note: source NCDS sample described in text. All estimates are statistically significant at conventional levels except those for low status women.

are statistically significant at conventional levels.

We also find that the influence of personality on wages differs by sex and occupation. To explore this question we first truncated the NCDS data by sex and an exogenous prediction of occupational status, then partitioning the respondents into four classes: men and women whose parental background and other exogenous characteristics predict entry into high status and low status jobs. We find that in high status jobs women confront significantly greater penalties than men for having aggressive personalities. While a one standard deviation increase in aggression is associated with a 7.2 percent *penalty* for women's wages in high status occupations, the equivalent increase in aggression is associated with a 14.5 percent *increase* in men's wages within identical occupations (see Table 1). This pattern is reversed for withdrawal, women in high status occupations being rewarded for withdrawal, while men are heavily penalized. Across social strata, differences in the returns to personality also exist. For example, we find that for men Aggression is highly rewarded in high and strongly penalized in low status occupations.

We conclude that while the study of behavioral and personality traits as earnings determinants is in its infancy, there is some evidence that they are predictors of higher pay.

## 4 Conclusion

Conclusions are premature in what has recently become a lively research. we think enough is known, though, to support four statements.

First, measures of cognitive performance are not sufficient indicator of the

effectiveness of schools in promoting student labor market success. We need broader indicators of school success, including measures based on the contribution of schooling to the behavioral and personality traits which we have termed incentive enhancing preferences.

Second, incentive enhancing preferences are irreducibly heterogeneous. We are not likely to find a noncognitive behavioral or personality analogue to the cognitive measure IQ. If the importance of incentive enhancing preferences arises from the behavioral demands of the job, traits that count in some jobs might not count in others. Self direction may contribute to the earnings of someone fairly high up in the chain of command, for instance while penalizing someone at the bottom. Similarly, traits may count differently for men and women, or for different ethnic or language groups.

Third, the fact that labor market success may contribute to the development of incentive enhancing preferences reinforces the likelihood that poverty may persist over generations within families. A low sense of efficacy may contribute to low earnings which then reinforces, both in individual workers and in their offspring, a low sense of efficacy. Fong (2000), for example, shows that negative income shocks increase an individual's Rotter score, and Osborne (2000) found that parental socioeconomic status has a significant effect on adult Rotter score independently of schooling, childhood Rotter score and childhood IQ. The research of Goldsmith, Veum and Darity (1997) on self esteem and labor market success is consistent with similar conclusions. Labor market research along these lines might both illuminate and benefit from the well established literature on cultural poverty traps in sociology.

Finally, while improving earnings-enhancing cognitive skills are probably unambiguously welfare increasing for students, the same cannot be said of incentive enhancing preferences. While many such traits, including a sense of personal efficacy and a low rate of time discount, seem uncontroversially welfare enhancing, the belief that it is shameful to be without a job, or to receive unemployment insurance benefits—both of which, as we have seen, count as incentive enhancing preferences—are much more controversial. Even more so is “Machiavellianism” (measured by the extent of agreement with statements from Nicolo Machiavelli's *The Prince*), which has been shown to increase earnings but many would consider a character flaw.

## REFERENCES

- Blau, Peter, *Exchange and Power in Social Life* (New York: John Wiley, 1964).
- Bowles, Samuel and Herbert Gintis, *Schooling in Capitalist America: Educational Reform and the Contradictions of Economic Life* (New York: Basic Books, 1976).
- , —, and Melissa Osborne, “The Determinants of Individual Earnings: Skills, Preferences, and Schooling,” 2000. University of Massachusetts.
- Duncan, Greg J. and Rachel Dunifon, “Long-Run Effects of Motivation on Labor-Market Success,” *Social Psychology Quarterly* 61,1 (1998):33–48.
- Edwards, Richard C., “Personal Traits and ‘Success’ in Schooling and Work,” *Educational and Psychological Measurement* 37 (1976):125–138.
- Glaeser, Edward L. and DiPasquale, “Incentives and Social Capital: Are Homeowners Better Citizens?,” *Journal of Urban Economics* 45,2 (1999):354–384.
- Goldsmith, Arthur, Jonathan Veum, and William Darity, “The Impact of Psychological and Human Capital on Wages,” *Economic Inquiry* 35 (October 1997):815–829.
- Heckman, James, “Policies to Foster Human Capital,” 2000. Department of Economics, University of Chicago.
- Heckman, Jingjing Hsee, and Yona Rubinstein, “The GED as a Mixed Signal,” 1999. University of Chicago.
- Jencks, Christopher, *Who Gets Ahead?* (New York: Basic Books, 1979).
- Osborne, Melissa, “The Power of Personality: Labor Market Rewards and the Transmission of Earnings,” 2000. University of Massachusetts.
- Schultz, T. W., “The Value of the Ability to Deal with Disequilibria,” *Journal of Economic Literature* 13 (1975):872–876.