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Incentive Pay, Information, and Earnings: Evidence from the National Longitudinal Survey of Youth

Stephen G. Bronars
Carol Moore

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Incentive Pay, Information, and Earnings: Evidence from the National Longitudinal Survey of Youth

Stephen G. Bonars
Carol Moore
University of Texas

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Abstract

This report studies the incidence of incentive pay and selection of workers into incentive pay jobs, measures and compares the wage-tenure profiles of incentive pay and time-rate workers, and tests for labor market discrimination in incentive pay jobs relative to time-rate jobs using the National Longitudinal Survey of Youth (NLSY). Workers in this study are classified as incentive pay earners if they receive either piece rates, bonuses, commissions or tips. Each of these methods of pay are based on individual performance and may supplement a worker's typical salary or wage.

A primary hypothesis underlying this study is that monitoring costs are relatively low in jobs that use incentive pay and base a worker's compensation, at least in part, on individual performance. Monitoring and information costs have been used to rationalize a number of empirical findings, from the employer size wage premium to positive returns to tenure in wage regressions. Monitoring cost explanations of empirical phenomena are typically unsatisfying, however, because these costs are unobservable to the researcher. The incentive pay data in the NLSY provides the best opportunity to evaluate a number of these information cost models, by comparing wage-tenure profiles, turnover, and employer size wage premia (for workers with similar observable characteristics) across jobs with relatively high and low monitoring costs.

The first section of our study describes incentive pay earners and their jobs. We are able to provide a more complete picture of incentive pay workers than studies based on establishment data, such as the Industry Wage Surveys. We find substantial differences across categories of incentive pay. Commission and bonus earners tend to be well educated, male, have high test scores, and hold jobs that require substantial investments in education and training. Piece rate and tip workers, however, receive less education, have lower test scores, and are concentrated in jobs that require fewer investments in training.

The second section of our study tests the monitoring cost explanation of positively sloped wage-tenure profiles, by comparing the wage-tenure profiles of incentive pay and time-rate workers. This hypothesis has been advanced by Lazear, who suggests that deferred compensation is a substitute for incentive pay and more direct contemporaneous monitoring of individual worker performance. We find little evidence to support the notion that incentive pay jobs rely less on deferred compensation and tilted wage profiles. We find that wage-tenure profiles are steeper in jobs that require more skills: bonus and commission jobs tend to have the steepest wage profiles. Even after controlling for these job characteristics, incentive pay jobs do not have flatter wage profiles.

The final section of our study examines racial and gender differences in the incidence and amount of incentive pay. Our results provide mixed evidence in favor of models of both employer and customer discrimination. Blacks are more likely to earn incentive pay in operator, fabricator, and laborer jobs than are whites. Hispanics and women are less likely to earn incentive pay in sales occupations, and blacks are less likely to earn incentive pay in customer-oriented service jobs. In contrast, racial and gender wage gaps do not appear to differ substantially across incentive pay and time-rate jobs.

Section 1. Who Earns Incentive Pay?

I. Introduction

Employment relationships are marked by a wide variety of implicit and explicit contractual arrangements which regulate effort and allocate workers across jobs and employers. In most jobs, wages are expressed in terms of time spent on the job. In contrast, incentive pay contracts--piece rates, bonuses, commissions, and tips--base an employee's pay explicitly on his or her productivity. For this reason, incentive pay has attracted the attention of many economists interested in studying the relationship between wages and productivity. Empirical work based on establishment-level data sets like the BLS Industry Wage Surveys (IWS), has provided a picture of the manufacturing production workers who earn incentive pay. We examine incentive pay workers and their jobs using data from the National Longitudinal Survey of Youth (NLSY).

The NLSY is a panel data set consisting of 12,686 individuals aged 14-21 in 1979. Minorities and persons from low income backgrounds are over sampled. The 1988, 1989, and 1990 NLSY surveys asked respondents whether their pay was based, fully or in part, on their "job performance" in their current or most recent job. In each of these years about 20-25% of the valid responses were positive, a ratio consistent with that found in establishment data (e.g., Seiler, 1984). Respondents also identified which of the following types of pay they received: piece rates, commissions, bonuses, tips, stock options, or some "other" form of pay.

This report is divided into three sections. This section, "Who Earns Incentive Pay", describes incentive pay earners and their jobs and compares them to time rate workers and their jobs. Our goal is to form a more complete picture of incentive pay workers than has tended to be possible using the IWS and other establishment-level data

sets, first, by using NLSY data on workers' human capital, demographic, and job characteristics; and second, by examining incentive pay workers in all industries and in service, sales, and other non-production occupations. The NLSY includes data on workers under distinct pay systems: piece rates, commissions, bonuses and tips. We examine each of these, and find substantial differences in workers across the different types of incentive pay.[1]

Section 2 of this report, "Do Monitoring Costs Explain Positive returns to Tenure?", compares the wage-tenure profiles of incentive pay and time rate earners in order to test a monitoring costs explanation for positive returns to tenure. Incentive pay is often viewed as a substitute for deferred forms of compensation such as positive wage tenure profiles (Lazear, 1979; Lazear, 1981; Goldin, 1986). Incentive pay systems require firms to accurately measure the quantity, and often the quality, of individual workers' output. Time rate wage or salary systems require employers to measure the time workers have spent on the job. All else equal, incentive pay systems such as piece rates, bonuses, and commissions are unlikely to exist where the employer's monitoring costs are high (Stiglitz, 1975; Lazear, 1986). Tips are a possible exception: while they link pay explicitly to performance, the monitoring costs are borne by the customer rather than by the employer.[2]

In Section 3 of this report, "Incentive Pay and Labor Market Discrimination," we document race and gender differences in the incidence of incentive pay and in incentive

[1]For analytical purposes, research has emphasized similarities between incentive pay systems while underplaying the differences. For example, Lazear first observes that "The important feature which distinguishes a piece rate from a salary is that, with a piece rate, the worker's payment in a given period is related to output in that period," and writes, "Salesmen who are paid on a strict commission basis are piece rate workers. Many managers in major corporations..may often receive a bonus, the size of which is geared directly toward this period's output. The bonus component is synchronized to output, is flexible, and is essentially a piece rate," [Lazear, 1986, p. 407].

[2]Participation in piece rate or commission systems imply that the employer can measure each unit of an individual's output. Under bonus systems, employers may simply monitor performance up to a threshold level, monitoring output either below or above that point less closely.

pay wages, and consider our results in light of customer, employer, and statistical discrimination. Where monitoring costs are relatively low, employers can base compensation on objective measures of a worker's output, rather than a supervisor's subjective assessment of worker performance and a worker's time input. Therefore, we expect employer and statistical discrimination to be less prevalent in incentive pay jobs relative to high monitoring cost time rate jobs. This implies that minorities should be more likely to sort into incentive pay jobs and that racial and gender wage gaps should be lower among incentive pay earners than among time rate earners. Customer discrimination, however, implies that race and gender differences in pay should also vary with the amount of customer contact typical of the job.

Monitoring costs are a consistent theme of this research, but their effects on wages and wage growth is easily confounded with those of human capital. Low monitoring costs may be associated with more clearly defined tasks and performance standards. Incentive pay jobs, particularly piece rate jobs, may require fewer skills, permit less scope for employee discretion, and entail fewer investments in general or firm-specific human capital than do similar time rate jobs. Differences in wage-tenure profiles across incentive pay and time rate workers could simply reflect variation in productivity growth, human capital, and on-the-job training. Similarly, differences in training and skill are central to differences in wages between minorities and whites or men and women. The empirical relationship between skill and training on one hand and incentive pay on the other is ambiguous, however, because both the costs and benefits of worker monitoring are likely to be high in jobs requiring more skills.[3] Using matched IWS and *The Dictionary of Occupational Titles* data on production workers, Brown (1990) found that the probability

[3]Brown (1990, p. 171-S) notes that "high-skill jobs are jobs in which worker output is sensitive to differences in worker quality. Thus, high-skill jobs should have greater benefit from precise monitoring, and greater use of piece rates..." On the other hand, "when accuracy and quality of work are important—characteristics that are often but not necessarily associated with skill level, (monitoring costs) are likely to be high and the use of piece rates less common."

of receiving incentive pay is inversely related to the degree to which job tasks involve diversified duties and a need to "generalize, evaluate, and decide;" and positively related to precision of standards. This evidence supports the view that incentive pay jobs are relatively less skilled.

In our research we use NLSY data on the self-reported training and experience requirements for respondents' jobs. The 1989 and 1990 waves include respondent's assessments of the duration and type of training--education, previous experience, and current on-the-job training--needed to fully master and qualify for their jobs. Later in this section we show that these training experience requirements differ substantially by method of pay: commission and bonus jobs are likely to be more skilled than piece rate or tip jobs. In Sections 2 and 3 of this report, we condition our earnings equations on training requirements.

II. Characteristics of Incentive Pay Workers and Jobs

Who Earns Incentive Pay?

In this section, we describe the personal characteristics, schooling, training, earnings, and jobs of incentive pay earners. The sample, like all of those used in this report, excludes respondents who were self-employed or working in the agricultural sector in their current/most recent (CPS) job. The sample also omits workers reporting nominal hourly wages exceeding $100 per hour or less than $1 per hour in their primary job; workers reporting wage changes larger than $50 per hour in absolute value over adjacent years; and workers who reported earning "other" forms of incentive pay than commissions, piece rates, bonuses, and tips. Because our focus is on workers paid by individual, as opposed to group incentive pay plans, workers who reported earning stock options were classified as time rate workers.

Table 1.1 presents sample means and standard deviations for the 1988 sample, for which there were 5567 valid observations. Respondents were classified according to their method of pay status in 1988 (differences in the 1988 cross sections and those of 1989 or 1990 were negligible). Workers who reported earning piece rates, commissions, bonuses, tips, or multiple forms of incentive pay may have been collecting part of their wage in the form of time rates, working under a system in which part of their wage was based on time input and another part based on the value of their output. The NSLY data do not distinguish between time and incentive pay earnings.[4] The fifth column of Table 1.1 shows descriptive data for workers under multiple incentive pay systems. Multiple incentive pay earners closely resemble bonus earners because most workers in this group reported earning bonuses along with other forms of incentive pay.

Previous research has uncovered some common characteristics of incentive pay earners and their employers. Brown (1990) and Goldin (1986) found that women are more likely to participate in incentive pay systems or earn piece rates than are men. Goldin argues that if women have shorter expected job tenures than men, employers should assign women to monitorable jobs and offer incentive pay in lieu of deferred compensation. Table 1.1 indicates that women account for 42% of incentive pay earners and 48% of time rate earners. However, women dominate the piece rate and tip

[4]Our measure of earnings is an NLSY-created variable, "hourly rate of pay." That no distinction is made between time rate and IP earnings led us to suspect that IP earners might systematically understate their earnings because (i) IP earnings may fluctuate more than base time rate earnings and not be easily remembered, and (ii) some forms of IP, such as bonuses, may be disbursed at irregular intervals and not considered by the respondent to be a basic part of compensation and (iii) tip earnings are in cash and may simply be underreported. To check for this possibility, we computed an alternative measure of average hourly earnings from an NLSY question in which respondents were asked to report total annual wage and salary income *including* earnings from commissions, tips, and presumably, other forms of IP. This figure was divided by the number of hours worked in the relevant calendar year. The result (WAGEINC) was compared to the NLSY hourly rate of pay (HRP) for each respondent. In 1989, the mean of WAGEINC - HRP was 31.7 cents for all IP earners and 47.3 cents for time rate earners, suggesting that IP earners do not have a systematic tendency to understate their earnings relative to time rate earners. In fact, for tip and piece rate workers, HRP consistently exceeded WAGEINC on average. This pattern emerges whether or not the sample is restricted to those holding only one job in the relevant calendar year.

categories. Piece rate earners have the longest tenures on average: 3.28 years, compared to 2.99 years for time earners and 1.97 years for tip earners.

Establishment size has been central to numerous labor contract models based on monitoring costs; large employers face relatively high costs of monitoring the output of individuals (Calvo and Wellisz, 1978; Oi, 1983; Garen, 1985; Bulow and Summers, 1986; Stigler, 1962).. The data in Table 1.1 show that incentive pay is concentrated in small to medium sized establishments--those employing fewer than 50 people. In contrast, time rates are skewed toward relatively large establishments. Piece rate earners, 44% of whom work in establishments employing 200 or more people, are an exception to this pattern. That piece rates should be more common among large employers, who presumably have a comparative disadvantage in monitoring the output of individuals, is initially surprising. However, Brown has proposed that establishment size should be positively correlated with the use of incentive pay because large plants have lower average costs of administering expensive payment systems. This effect, Brown argues, outweighs the greater difficulty of monitoring individual performance in large establishments. In his tests using the IWS data for selected manufacturing industries, Brown found a positive correlation between *ln*(Employment) and the incidence of incentive pay in both union and nonunion plants.

Blacks account for roughly equal percentages of incentive pay and time rate earners, but notable racial differences exist by type of incentive pay: only 16% of commission workers, 19% of tip earners, and 29% of piece rate workers are black. These unconditional means are consistent with the view that black workers can seek out incentive pay to circumvent employer or statistical discrimination, but nevertheless face customer discrimination in commission or tip earning jobs.

We expect workers whose wages are governed by collective bargaining agreements to be less likely to earn incentive pay than are nonunion workers. Unions have

traditionally opposed the use of piece rates (Mitchell, Lewin and Lawler, 1990). Incentive pay systems based on individual performance can undermine solidarity and negotiated work rules may create undesired variation in workers' incomes. Brown finds that union coverage or membership is associated with a greater tendency to use seniority-based pay systems. However, unionization bore an insignificant relationship to IP in all of Brown's tests. Table 1.1 shows the highest unionization rates in piece rate jobs, but lower union coverage in all other incentive pay jobs relative to time rate jobs.

Residence in an SMSA is expected to raise the probability of earning tips or commissions because these systems depend on the potential to contact a large number of spending customers. For the same reason, higher local unemployment rates should reduce the attractiveness of tip or commission jobs. Low local unemployment rates may also raise the probability of earning bonuses if bonuses represent a form of profit sharing during good times. Alternatively, firms may offer bonuses, instead of or along with, fixed wage increases in order attract employees.[5] In Table 1.1, 85-86% of tip or commission workers reside in SMSA's compared to 78% of time rate workers and only 68% of piece rate workers.

Ability and education are likely to be important to workers' choice of pay system. Lazear (1986) showed that high-ability workers will gravitate toward "piece rate" systems, while those of low or average ability prefer time rates. Workers who are exceptionally productive within their occupations can raise their earnings working under pay systems which base compensation on current-period productivity rather than on time input or on the average productivity of a class of workers (e.g., with identical education or other observable traits). That incentive pay workers may be of higher ability is supported by the positive estimated incentive pay wage premia found in wage regressions which include

[5]Marshall (1987) and others have argued that bonus payments act as flexible components of wages in Japan's labor market, rising when the market is tight and falling during slack periods.

controls for occupation, industry, region, establishment size, and sex of workers (Seiler, 1984; Pencavel, 1977; Mitchell, Lewin and Lawler, 1990; Peterson, 1991). Table 1.2 gives mean raw AFQT scores, percentiles, and age-adjusted residuals[6] for the sample classified by method of pay in the current/most recent job in 1988. A standard measure of ability, the AFQT is a general educational aptitude test for screening potential military entrants (Berlin and Sum, 1988). The test was administered to the NLSY sample in 1980. Differences in measured ability shown in Table 1.2 are pronounced. Workers in commission, bonus, and multiple incentive pay jobs have notably higher AFQT scores than do time rate workers, but piece rate and tip workers tend to have lower scores. Commission, bonus and multiple incentive pay earners score in the 46th to 48th percentiles on average, while tip and piece rate earners score in the 40th percentile or lower. The average time rate earner scores in the 41st percentile. These unconditional mean AFQT scores suggest that high ability workers sort into commission and bonus systems, but shy away from piece rate and tip jobs. The observation that piece rate and tip workers appear less able than time rate workers contradicts some of the predictions of monitoring cost incentive pay models. It is likely, however, that differences in occupational skill requirements are responsible for the large differences in AFQT scores across method of pay.

Taken as a group, incentive pay earners are marginally better-educated than time workers, but mean educational attainment differs markedly by pay category: commission and bonus earners have over a year's more education, on average, than piece rate workers. While the educational attainment of tip earners does not differ from other workers', 11% were enrolled in college in 1988. In contrast, only 5.1% of all incentive pay workers and 7.9% of time workers were enrolled in college. The relatively large incidence of college

[6]Respondents were of different ages when they took the AFQT tests. To adjust for the effect of age on test scores, we regress raw AFQT score on age in 1980. The AFQT variable used throughout this report is the residual calculated from this regression.

enrollment among tip earners may explain why they work only 35 hours per week on average, approximately 5 hours less per week than the overall sample.

We estimated a multinomial logit (MNL) model to summarize the relationship between the incidence of incentive pay and worker and job characteristics. Results shown in Table 1.3 condition method of pay status on occupation, human capital, age-adjusted AFQT residuals, and establishment characteristics. Time rate earners formed the omitted group. Respondents who reported earning multiple forms of incentive pay were excluded. The model reported in Table 1.3 does not include controls for industry. Adding 2-digit industry dummies to the model has a negligible effect on the results.

Are higher ability workers more likely to sort into incentive pay jobs? We focus on AFQT residuals and education as measures of worker ability. Unlike the unconditional means, the MNL results indicate a significant *positive* correlation between tip earnings and AFQT. The AFQT scores of piece rate and commission workers are not significantly different from those of otherwise identical time rate workers. The AFQT residual exerts no independent influence on the incidence of commission work. However, educational attainment among commission earners is relatively high (13.4 years, vs. 12.9 years for time rate earners). Education is a significant determinant of commission earnings, but is insignificant in the other method of pay equations.[7] Bonus workers are no more educated than are other workers on average, and have less experience, but have significantly higher AFQT scores. Taken together, the estimates suggest that high ability workers tend to work under bonus, commission, or tip systems within their occupations. There is no

[7]Given that students are likely to have short ex ante expected job tenures and to desire flexible wage-hours contracts, we expected enrollment status to be a significant predictor of incentive pay. This turned out to be the case for tip earners. For other groups, combinations of enrollment dummies for high school graduate, high school enrollment, college graduate, and college enrollment were not significant predictors of incentive pay.

evidence that piece rate workers are of greater ability than time rate earners in the same broad occupation.[8]

Residence in an SMSA significantly raises the probability of earning commissions or tips, but has no significant effect on piece rates or bonuses. This is not surprising, given that the number of potential customers is likely to be larger in an SMSA than outside of one. The local unemployment rate is significant only in the bonus equation. Local unemployment rates of less than 3% are associated with greater incidence of bonuses.

Gender and race are consistently significant determinants of method of pay. Women dominate piece rates and tips; men, commissions and bonuses. That women are more likely than men with the same human capital, working in the same broad occupation, to earn piece rates is consistent with Goldin's model. However, this prediction should apply to any job in which monitoring costs are relatively high and consequently the use of deferred compensation is relatively low. Blacks are significantly more likely than non-blacks to earn bonuses, but less likely to earn tips or commissions.

The mapping between MNL estimates and predicted probabilities cannot be discerned by relying solely on the coefficient estimates. Table 1.4 gives the predicted probabilities of earning piece rates, bonuses, commissions, tips or time rates by race and gender, evaluated at the mean values of all other explanatory variables, using the MNL estimates in Table 1.3. Time rates are predicted for 79-82% of workers. Men are more likely than women to earn incentive pay of any type, especially bonuses and commissions. White women are predicted to have the greatest probability of earning piece rates--4.9%, over twice the predicted rate for white men. Black females have the lowest chance (Pr = .015), and white males the largest (Pr = .045) of earning commissions. Tips are relatively rare; only about 1-5% of the sample is predicted to earn tips. Tip-earning is

[8]This may be due to our use of broad 1-digit rather than narrow occupational dummies. In contrast, Peterson (1991) uses IWS pay system data encompassing 40 occupations in the nonferrous foundries industry.

overwhelmingly female. Women of any race are more than twice as likely as their male counterparts to earn tips.

The MNL estimates indicate that plant size and unionization are inversely related to the probability of earning commissions. The incidence of tips is also reduced as plant size rises. The likelihood of earning piece rates and bonuses is insignificantly related to plant size and unionization. It is possible that as establishment size increases, the rising costs of monitoring piece rate and bonus workers are offset by lower average fixed costs of administering the pay systems. Commission systems, however, are significantly more common in smaller establishments.

Table 1.5 shows the predicted probabilities of earning time rates, piece rates, commissions, bonuses, and tips by establishment size category and unionization, holding all other characteristics constant. Regardless of size or union status, workers are far more likely (Pr = . 78 to Pr = .85) to earn time rates than any other form of compensation. The probability of earning commissions, tips or bonuses peaks in nonunion establishments employing fewer than 10 employees (Pr = .045, Pr = .028, and Pr= .116, respectively). In contrast, the probability that an employee in a unionized plant employing 200 or more workers earns commissions is less than .01. The predicted probability of earning piece rates ranges from .024 to .029 and rises with establishment size and unionization.

Training and Incentive Pay

Wages and on-the-job wage growth are functions of workers' previous and current human capital investments, which, since often informal, are often difficult to measure. Incentive pay jobs may differ from time rate jobs with respect to skill level and type and duration of training needed. In particular, the low monitoring costs of incentive pay jobs suggest that tasks may be circumscribed by the employer, permitting less scope for employee discretion and decision-making. Many of the variables which play a significant

role in determining method of pay may by correlated with job skill, training, and experience requirements. This is almost certainly true of ability, and is likely to be true of gender as well. For example, Gronau (1988) documents women's' lower rates of participation in a variety of job training programs.[9]

Self-reported training and experience requirements for workers' current/most recent jobs are available in the 1989 NLSY.[10] Table 1.6 summarizes self-reported estimates of months of experience required to become "fully trained and qualified" for the current/most recent job. There is no overall tendency for incentive pay jobs to require less experience than time rates jobs. Commission and bonus workers require more experience, and piece rate and tip earners less experience than do time rate earners.

We examine the relationship between the skill requirements of a job, incentive pay, and worker characteristics by estimating OLS and censored regression model of these experience requirements. The results, reported in Table 1.7, reinforce many of the patterns emerging from Table 1.6. Controlling for occupation, sex, job tenure, measured ability, establishment size, and other factors which are likely to affect the skill intensity of jobs, bonus workers require more months of experience, and tip workers significantly less, than time rate workers.

Table 1.8 gives the percentage of workers indicating that particular types of training were required for their jobs by method of pay. Informal on-the-job training and company training programs with the present employer may represent either general or firm-specific training. The average piece rate or tip earner requires less training of any type than does the average time rate worker. In contrast, commission and bonus workers

[9]As Gronau shows, whether women's shorter job tenures and punctuated labor market spells are a cause or consequence of low training investment is far from obvious. We do not intend to address this "chicken and egg" problem.

[10]The NLSY also includes a yearly file on training program participation between interviews. We chose not to use these data because they emphasize formal training programs while neglecting informal, on-the-job training and previous experience. The shortcoming of the 1989 data we use is that it provides no way of measuring the duration of the training program, while the annual program data do.

required more training of any type (other than apprenticeships) in their jobs. These unadjusted means suggest that training requirements differ markedly by type of incentive pay, with piece rate and tip jobs requiring relatively little training, time rate jobs requiring moderate amounts of training, and commission and bonus jobs requiring substantial training and experience. Again, it is likely that these differences reflect the concentration of the various forms of incentive pay in occupations of varying skill.

Table 1.9 disaggregates the training data by 1-digit occupation and by incentive pay status. In all occupations but services, incentive pay workers are relatively more likely to indicate that formal company training was a job prerequisite. Incentive pay earners in sales and production, craft and repair occupations were more likely than their time-earning counterparts to report the need for on-job-training with the current employer. Incentive pay earners were also consistently more likely to indicate that experience with a previous employer or trade, technical, business, or vocational school was necessary to obtain their jobs. With few exceptions, incentive pay workers in any occupation are either more likely or just as likely as time rate earners to report that a given type of training was required. There is no tendency evident in Table 1.9 for incentive pay earners to be less extensively trained.

Probit estimates for selected self-reported training requirements are given in Table 1.10. In Column 1, we estimate the probability that special of experience of any type (including apprenticeships, armed forces training, trade school, formal company training, on the job training with a current employer, on the job training with a previous employer) is required on the job. Commission and bonus earners are significantly more likely than time rate earners to report that some form of special experience was required for their job. Piece rate and tip workers did not differ from time rate earners. However, these groups were significantly less likely, and commission and bonus workers were relatively more likely to report that participation in a company training program is necessary for their job

(Column 2). Piece rates and tips had no significant bearing on the probability that current or previous on-the-job training was required (columns 3 and 4). Note that much of the difference between the conditional and unconditional relationships between incentive pay and on-the-job training can be attributed to gender differences in both method of pay and training. Females are significantly more likely to earn piece rates and tips, and are much less likely to hold a job which requires on-the-job training.

III. Conclusion

The economics literature on monitoring costs and wage contracts has tended to emphasize a single underlying characteristic of incentive pay: incentive pay systems base compensation on the value of output produced, rather than on time input. Our results indicate that substantial differences exist across types of incentive pay as well as between incentive pay and time rates.

Relative to time earners, commission and bonus earners have higher test scores and are predominately male, well-educated, and likely to hold jobs that require substantial investments in education and training. These workers spend more time becoming trained for their jobs and are also more likely to report that training gained with either the current employer or elsewhere were required for their jobs. All else equal, commission jobs tend to require formal company training, while bonus workers report the need for current and previous on-the-job training as well.

Several key differences exist between bonus and commission workers, however. Being black reduces the likelihood of earning commissions. Commission workers are more likely than time earners to work in small, nonunion plants; and to reside in SMSAs; these patterns are absent among bonus earners.

The data paint a different picture of piece rate and tip workers. Piece rate workers tend to have somewhat lower test scores than time rate workers, to be less well-educated,

to hold jobs that involve relatively small amounts of training, and to be predominately female. Tip earners display similar job characteristics--otherwise identical time rate workers tend to invest more time in training than do piece rate and tip earners. However, tip earners are likely to be of higher-than-average ability within their occupations and to be enrolled in school.

Section 2

Do Monitoring Costs Explain Positive Returns to Tenure?

I. Introduction

That wages increase with job tenure in both cross-section and panel data sets is a well-established empirical fact (Borjas, 1981; Mincer and Jovanovic, 1981) subject to numerous competing interpretations. An important explanation for rising wage-tenure profiles centers on the costs of regulating and measuring employee performance: employers may use deferred compensation and promotion ladders to deter employee malfeasance given high monitoring costs and incomplete information. When monitoring costs are low, employers are likely to implement incentive pay (IP) systems -- piece rates, bonuses, commissions, and tips -- and base a worker's pay explicitly on individual performance and not merely on his or her time input. Because jobs that offer incentive pay (IP) are expected to have relatively low costs of monitoring worker performance, they provide a means of testing this incomplete information model of rising wage-tenure profiles. If monitoring costs account for some of the returns to seniority, earnings of incentive pay workers should grow more slowly on the job than time rate wages or salaries. This paper assesses the role of monitoring costs in internal labor markets by using data on method of pay available in the 1988-1990 National Longitudinal Survey of Youth.

Lazear (1979, 1981) showed that employers may combine positive wage-tenure profiles with the threat of dismissal in order to prevent employees from shirking on the job when monitoring costs are high. Given imperfect information about worker performance, wage growth may exceed productivity growth on the job. Employees post performance bonds at the beginning of a job, which can take the form of wage payments that are

initially below the worker's value of marginal product.[11] In later years, wages are paid in excess of the value of marginal product. Thus, a substantial fraction of a workers' return to effort may be deferred to future periods. Workers who shirk are dismissed and, consequently, forgo the expected present value of the excess of their wage over their marginal product. Performance bonds and "tilted" wage profiles can be designed such that only workers who place a considerable value on current-period leisure will shirk.

Workers agree to this contract because deferred payments deter shirking, raise the overall output of the enterprise, and in turn increase the value of payments that can be distributed among employees. Higher returns to effort are purchased at a cost, however: the deferred payment contract entails the risk of firm malfeasance. Since workers are eventually paid wages in excess of their marginal products, the employer has an incentive to violate the contract by laying off older workers or by permitting their working conditions to deteriorate. In Lazear's model, the optimal wage-tenure profile balances the risks borne by both parties, given expected retirement dates, exogenous preferences for leisure, exogenous business risks, and worker and firm rates of time preference.[12]

There are a number of alternative explanations for the observed positive relationship between wages and tenure. First, employees and employers may share investments in firm-specific human capital: wages rise with tenure because investment costs are shared during the training period and investment returns are shared subsequently. In contrast to the incomplete information model, wages are expected to grow more slowly than net productivity given shared specific investments; initial wages are likely to be higher than the "spot" value of marginal product so as to discourage quits (Becker, 1962). Wages may also rise with tenure because information about the quality of a job match is

[11] The incentive effects of bonding schemes were first explored by Becker and Stigler (1974).

[12] Lazear's is one of several models in which positive returns to tenure can arise from incomplete or asymmetric information. Rank order tournaments, in which employees reward individuals in terms of their performance relative to their peers', arise when employers cannot measure the output of individuals, but are able to rank their performances (see, e.g., Malcomson, 1984; pp. 499-500).

revealed slowly over time. Wages adjust to new information about match quality over time, and good matches persist while unproductive matches are terminated by either the employer or the worker (Jovanovic, 1979)[13].

While several competing theories can explain the stylized fact that wages grow with tenure, they are difficult to distinguish empirically (Hutchens, 1989; Garen, 1988). It has been difficult to assess the relative importance of human capital, matching, and asymmetric information in the generation of positive wage-seniority profiles because worker productivity, match quality, and firm-specific training-- which are central to these models -- are typically difficult to observe. Models of wage growth based on asymmetric information are especially elusive because data pertaining to the amount and effectiveness of supervisory inputs are not readily available in standard data sets. For most jobs, researchers know little about the quantity and quality of employers' information about worker performance.

The empirical tests in this paper are based on the hypothesis that problems of imperfect information about worker performance are less severe where incentive pay is offered. Wage-tenure profiles are more likely to track productivity-tenure growth in incentive pay jobs, and deferred compensation will be used more frequently with time rate wages and salaries. Therefore, a comparison of wage growth on the job across incentive pay and time rate workers measures the extent to which employers "tilt" the wage profile in time rate jobs.

The paper proceeds as follows. Section II briefly outlines the empirical predictions of monitoring cost models of wages and wage growth in IP and time rate jobs. Section III describes the data. In section IV, we describe some empirical issues associated with

[13] This "match quality" explanation suggests that observed cross-section returns to tenure should exceed wage growth on the job. Several researchers have asked whether the wage-tenure correlation is merely a statistical artifact which arises from turnover patterns attributable to unobservable differences in workers' abilities or job matches (see, e.g. Abraham and Farber 1987: and Altonji and Shakotko, 1987).

measuring incentive wage growth. Predictions of the monitoring cost interpretation of wage growth are tested in section V. Using 1984-1990 wage and tenure data, we track the earnings history of each worker's primary (current/most recent) job in 1989. The final section provides some brief conclusions and suggestions for future research.

II. Monitoring Costs and Wage Growth

Following Lazear, we hypothesize that deferred compensation (i.e. a steep wage-tenure profile) is a substitute for direct (but costly) monitoring of workers.[14] Incentive pay is unlikely to occur when the costs of measuring employee output are high (Stiglitz, 1975). In each of the IP systems analyzed in this paper, with the possible exception of bonuses and tips, workers are rewarded for individual rather than team output. The job performance of tip and commission workers is "monitored" by customers, and tip earners are actually rewarded by customers and not the firm.

Lazear (1979, 1981, 1986) defines piece rates as any payment scheme--tips, commissions, etc., in addition to formal piece rate schemes -- in which a worker is fully paid at the end of the period for work done that period.[15] Such a payment scheme, he argues, is a substitute for a back-loaded deferred payment contract and generates a distinct wage profile:

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[14]Firms may also pay an efficiency wage which offers the worker a wage above that which makes him indifferent between employment and unemployment each period, but which is independent of tenure (see, e.g., Shapiro and Stiglitz, 1984, pp. 441-442). Whether efficiency wages are more or less efficacious than deferred compensation is a subject of dispute. Proponents of the efficiency wage model argue that the use of deferred payment schemes is severely limited by worker liquidity constraints and by the scope for moral hazard on the part of the firm. Pure efficiency wages are likely to prevail even though they are more expensive to the firm than deferred payment systems (Dickens, et. al., 1989).

[15]Lazear carefully notes that "piece rates" are in fact hard to distinguish from time rates. That is, many jobs which appear to be time rates in our data may, in fact, reflect full payments for current productivity and be flexible in the sense that formal piece rate schemes are. In this case, deferred compensation does not occur. Because our purpose is, precisely, to evaluate the extent of the deferred payment schemes, this fact does not present an obstacle to our research.

"When piece rates are used, the resulting age-earnings profile is flat because piece rates are a substitute for upward-sloping age-earnings profiles. Thus, salesmen should have less steeply rising profiles than should management employees." (Lazear, 1981, pp. 618-619).

Deferred compensation and steep wage-tenure profiles are unattractive to firms (and to their employees) that face low costs of monitoring individual worker performance directly. These firms are likely to tie employee compensation more closely to their (more reliable) information about worker performance.[16] Firms that face relatively high monitoring costs obtain less (and less reliable) information about worker performance, and are more likely to use deferred compensation to ensure worker performance.

We interpret the presence of incentive pay as indications that the employer has accurate information about worker performance and uses IP to encourage the optimal employee effort and to efficiently penalize shirking. In a pure IP system, shirkers are not dismissed, but instead simply earn less. Thus, IP can produce a harmony of interests with respect to effort supply. Deferred payments arise when employers don't directly observe individual output, or, equivalently, the discrepancy between actual and optimal output:

Piece rate workers are, in a relevant sense, self-employed. If it were cheaper to observe that shirking is positive than it was to determine the precise amount of shirking, the contract which dismissed all workers would dominate (piece rates). The widespread existence of rules which require the dismissal of shirkers is testimony to measurement cost differences. (A worker caught sleeping on the job is usually dismissed rather than docked for the hours slept. Embezzlers find themselves without jobs when caught rather than with a smaller paycheck for the month.). (Lazear, 1981, pp. 614-615).

The deferred compensation model generates some refutable predictions for wages and wage growth. Moreover, incentive pay earners constitute an excellent control group with which to test these predictions. In this paper, we examine two of Lazear's (1981) empirical predictions: (i) the wages of IP earners grow more slowly and more variably

[16]However, Bishop (1987) reports evidence that supervisory evaluations are both highly subjective and inaccurate.

than do those of time rate earners, and (ii) establishment size-wage effects are lower for IP earners than for time rate earners.

We first compare the wage growth patterns of incentive pay earners, for whom we expect monitoring costs to be low, to the wage growth patterns of wage-salary earners, for whom monitoring costs are expected to be relatively high. The main prediction of Lazear's model would have empirical support if wage-tenure profiles are flatter for IP earners than for otherwise identical time rate earners.

In the first chapter of this report, training and experience requirements were shown to depend on method of pay: commission and bonus jobs are likely to be more skilled than time rate jobs, while piece rate or tip jobs (Tables 1.6-1.10) are less skilled. Because wage growth can reflect an employee's returns to a previous human capital investment, we condition on training and education requirements before comparing wage-tenure profiles across workers and jobs.

Comparisons of wage-tenure profiles across IP and time rate earners are subject to the caveat that differences in these pay systems can induce sorting of workers across jobs based on their preferences and opportunities. For example, IP contracts are likely to subject employees to greater income risk than are time rate wages and salaries (Seiler, 1984; Stiglitz, 1975). Thus, more risk averse workers are less likely to choose an IP job, and workers with greater financial wealth, who are more willing to accept risk in their labor earnings, would be more likely to accept an IP job.[17] Moreover, Nalebuff and Zeckhauser (1981) show that long-term implicit contracts which shield workers from income risk also generate wage-tenure profiles that are steeper than productivity-tenure

[17]Lazear's model generates no clear prediction about the distribution of risk preferences across wage structures. On one hand, Lazear's model predicts that IP is likely to be used when production involves a large "luck" component, suggesting that risk lovers choose IP jobs. On the other hand, deferred compensation entails the risk of firm default in later years, suggesting that risk lovers should prefer those jobs instead. For example, Lazear and Moore (1984) develop a model in which a self-employed agent is more risk averse than a salaried employee.

profiles. Thus, workers with relatively flat wage-tenure profiles may simply be less risk averse than other workers.

The second empirical prediction of the model we test concerns the relationship between establishment size and wage-tenure profiles in IP and time rate jobs. Hutchens (1989) and others have argued that large employers are more likely to offer deferred payment contracts. There are two major reasons for this prediction. First, deferred payment entails the risk of firm "default" in later years of workers' tenures. Large firms are better able to diversify against risk and are in a better position to honor long term contracts and insure employees than are smaller, more vulnerable employers. Second, the information imperfections which give rise to deferred payments may be more pronounced in large establishments (Stigler, 1962; Oi 1983; Bulow and Summers, 1986).[18] This suggests that returns to establishment size should be lower for IP workers than for time rate workers, conditional on tenure, and that the wage growth of IP workers should be insensitive to establishment size compared to time rate workers.

The tests of Lazear's model proposed here are among several which test models of asymmetric information in the labor market by identifying jobs in which monitoring costs are likely to be small. Lazear and Moore (1984) argue that because agency problems do not beset self-employment, the relationship between earnings and experience should be flatter among the self-employed than among employees. They find that earnings-experience profiles of the self-employed are flatter than those of wage and salary workers. Similarly, Hutchens (1987) finds that workers in repetitive jobs have lower returns to seniority and are less likely to have pensions than are those holding more complex, hard-to-monitor jobs. Goldin (1986) linked reductions in monitoring costs to the payment of piece rates and the growing feminization of certain occupations around 1900. Brown and

[18] That informational costs rise with establishment size is a standard assumption. However, computer innovations may confer economies of scale in information gathering and processing.

Medoff (1989) have used establishment data on individual performance-based pay to test the monitoring costs explanation for the establishment wage premium; contrary to the predictions of the monitoring costs argument, IP earnings were found to be even more sensitive to establishment size than were time rate wages. Finally, some support for the deferred compensation model has been provided by Medoff and Abraham (1981) who found that differences in the performance ratings of workers at a large firm explained salary differences less reliably than did seniority.

III. Data

We measure wage growth using 1984-1990 wage and tenure data for each worker's primary (current/most recent) job in 1989. The sample was confined to respondents who (i) were not self-employed in their current/most recent job, (ii) were employed in the non-agricultural sector, (iii) reported average hourly wages between $1 and $100 in their current/most recent job, (iv) reported hourly wage changes of less than $50 in absolute value in consecutive years, and (v) reported valid 1989 values for the variables listed in Table 1.1.

Because it contains large samples of incentive pay workers in conjunction with detailed data on their personal characteristics and work histories, the NLSY is well-suited to tests of the deferred compensation model of wage growth. However, the ideal data set for testing the model would consist of employees of all ages and a wide distribution of job tenures. Most empirical research on deferred compensation has relied on samples of older workers with relatively long tenures at their firms (Hutchens, 1986; Hutchens, 1987; Medoff and Abhraham, 1981). It may be argued that the high turnover typically found among young workers is inconsistent with the long term employment relations which Lazear's model predicts. However, there is no reason to believe that the underlying mechanisms by which these relationships are established are irrelevant to the early phases

of a worker's career or tenure. The main difference between this sample and samples of older workers is that the former are posting bonds with their employers while the latter are collecting returns to bonds posted earlier. Lazear's model predicts that older workers are paid above the value of their marginal product while younger workers are paid below it. Wage variation among workers of both age groups can potentially be explained in terms of this model. When young workers leave jobs, it need not imply that they did not participate in the type of wage-ladder schemes which distinguish the deferred compensation model. Rather, turnover can reflect a young worker's rejection of one employer's wage-tenure contract in favor of another's.

IV. Wage Growth Patterns

Measuring the wage growth of incentive pay earners is complicated by the observation (e.g., Seiler, 1984; Stiglitz, 1975; Lazear, 1981) that the earnings of incentive pay workers are subject to more variation over time than are time rate earnings. Because IP earners' output is subject to changes in luck, demand and productivity shocks, and other factors beyond workers' control, their earnings and earnings growth may display marked fluctuation over time.[19] In contrast, the time rate workers' pay may be insured against many of these fluctuations. Thus, measurement of relative wage growth over any short period of time may be unrepresentative of a worker's typical wage-tenure profile, depending on the years over which wage growth is measured.

[19]The high wage variance predicted for IP workers can be justified in two ways. First, the concept of time earnings suggests that "time workers' incomes are insensitive to the vagaries of the production process and short-run fluctuations in demand," (Seiler, 1984, pg. 364). Secondly, Lazear (1981, pg. 615) argues that piece rate schemes will be offered when output depends significantly on a random variable, "luck", which is indistinguishable from effort. The reason is that with deferred compensation, a worker who experiences a bad draw is fired, although it would be efficient to retain him. Lazear states, "...piece rates will be found not only in occupations where output is measured more cheaply, but also in occupations which have a large luck component associated with a given individual's variation in output over time."

Table 2.1 shows real wage growth on the 1989 current/most recent job over the years 1984-1990 by method of pay for selected calendar years. Respondents are classified according to their method of pay status in 1989. The number of workers represented in each cell differs because job start dates vary. It is evident that no 1-year growth period represents wage growth patterns fully. Measured over 1-year periods 1987-1990, the wage growth of piece rate workers varies by 11.9 percentage points and that of tip earners varies by 13 points. Piece rate and tip wage growth is occasionally negative. In contrast, time earners' wage growth varies by 4.5 points, ranging from 1.9% to 5.5%. Counter to intuition, however, commission and bonus wage growth is *less* sensitive to calendar year than is time rate growth. Ultimately, the question of which wages grow faster depend on the choice of calendar years over which to measure growth.

More representative measures of wage growth can be obtained by using longer periods of time over which to average wage growth. Unfortunately, this invites a trade-off between how representative the years of wage data are, and the sample selection of workers based on length of job tenure. Few workers in the sample have tenure in excess of six years, and hence computing average wage growth over six year intervals may also be problematic.

An alternative picture of wage growth patterns emerges by tracking the wages of each respondent over the years they held their (primary) 1989 job. Table 2.2 presents wage growth from 1984 to 1990 by method of pay and by years of tenure. Again, respondents are classified according to their method of pay for the 1989 job[20]. For these tables, "Year j" corresponds to the j-th year in which the respondent held his job, which may be a different calendar year for different workers. Time rate wage growth follows the

[20]We also classified workers into different IP categories depending on their responses to IP categories in 1988 and 1990, as well. For example, we considered a classification in which a 1989 job was considered a piece rate job, if the worker gave the piece rate response to the IP question in at least 2 of the 3 years in which the IP question was asked. We obtained similar results to those presented here using this more stringent IP classification.

positive (until year 7 on the job) and smoothly decreasing pattern typically found in cross-sectional and longitudinal data sets. In comparison, incentive pay wage growth fluctuates considerably. For example, commission wages grow by 1.9% from year 1 to 2, 12% from years 2 to 3, and 3.5% between years 3 and 4. For piece rate earners, wage growth falls by 4.5 points between Years 2-3 and 3-4, but rises by 10.9 points over Years 3-4 and 4-5. Changes in the direction of wage growth appear in the other IP categories as well.

The empirical results outlined in Table 2.2 provide little evidence that wage-tenure profiles are systematically steeper in time rate jobs. Of course, this empirical result is subject to the caveat that there may be unobserved heterogeneity across workers in wage levels, and that jobs differ in their skill and experience requirements. In the next section we use a regression model to account for some of these differences.

V. Regression Results

Wage-Tenure Profiles

In this section we present empirical tests of the hypothesis that time rate workers are more likely to receive deferred compensation and tilted wage profiles than incentive pay workers. We use a subsample of 5264 workers in their 1989 primary (CPS) jobs. For each worker, we track hourly earnings for their 1989 job from 1984 to 1990. (Our base sample of 1989 jobs includes 5656 workers, but we excluded 392 workers for whom we observed earnings for only a single wave of the NLSY). We observe each worker for at most six years, and at least two years over this time period. Our panel data set includes 20,974 worker-years.

We hypothesize that a worker's wage profile depends on a person-specific intercept, and wage growth parameters which are functions of method of pay, establishment size, training and job experience requirements, and union status. We therefore model worker i's hourly earnings in year t as:

(1) $\log(W_{it}) = f_i + X_{it}b + d_t + e_{it}$

where f_i is a person-specific fixed effect, d_t is a calendar year specific effect which we estimate with year dummy variables, and e_{it} is an error term. We propose several alternative specifications for the vector X_{it}. The first includes age, age squared, tenure and tenure squared, and interactions between the job tenure variables and: method of pay, establishment size, training and job experience requirements, and union status. In addition, we estimate (1) including interactions between both method of pay and establishment size and tenure and tenure squared.

The regression results of equation (1) are presented in columns one and two of Table 2.3. We first consider the specification in column one. Jobs which have greater training and experience requirements have steeper wage-tenure profiles. Evaluated at sample means, for each one year increase in the amount of time required to become fully trained for the job (the variable in Table 1.5), wage growth is higher by .0095 per hundred weeks on the job. On average, jobs which require special experience (the variable in row one of Table 1.6) have wage growth that is about 4.1 percent higher per 100 weeks of job tenure. Somewhat surprisingly, we find that establishment size is unrelated to the wage-tenure profile. Union workers have significantly flatter wage-tenure profiles, all else equal (based on an F-test of the union interactions with tenure and tenure squared).

Except for the interactions between piece rates and tenure and tenure squared, each of the interactions between method of incentive pay and tenure and tenure squared are jointly significant at the 5% level. Despite the fact that many of the differences in wage-tenure profiles by method-of-pay are statistically significant, there is no evidence that jobs using time rate pay rely more on deferred compensation than piece rate, bonus, or commission jobs. In contrast, the evidence suggests that these IP jobs have higher rates of wage growth on the job than time rate jobs. Only tip earners appear to have a flatter

wage-tenure profile than time rate wage and salary earners. There appears to be little, if any, support for Lazear's hypothesis that IP jobs have flatter wage-tenure profiles.

We now investigate the possibility that the shape of the wage-tenure profile in IP jobs differs systematically with establishment size. In column two of Table 2.3 we interact IP status with both establishment size and tenure and tenure squared. In this specification, we find statistically significant differences in wage-tenure profiles across time rate jobs and piece rate jobs, commission jobs, and tip jobs. Moreover, we find evidence that the relationship between the slope of wage-tenure profiles and establishment size differs across time rate jobs and these IP jobs. Bonus workers have wage-tenure profiles that are statistically significantly different from time rate workers at only the .10 level. We find that, after controlling for establishment size, union status, and job experience requirements, an additional 100 weeks of tenure yields the average worker wage growth of 8.34% in time rate jobs, 11.31% in piece rate jobs, 1.27% in tip jobs, 12.73% in bonus jobs, and 12.67% in commission jobs. The mean returns to (log) establishment size per 100 weeks of tenure are: -.24% for time rate jobs, 7.05% for tip jobs, -4.49% for piece rate jobs, .16% for bonus jobs, and 1.54% for commission jobs.

Again, despite the fact that many of the differences in wage-tenure profiles by method-of-pay are statistically significant, the overall evidence suggests that IP jobs, other than tips, have steeper-wage tenure profiles than time rate jobs. We do find strong evidence that establishment size effects on wage-tenure profiles are significantly lower in piece rate jobs, but higher in commission jobs relative to time rate jobs. This provides some mixed evidence in support of the monitoring costs explanation of wage-tenure profiles. In general, however, we reject this explanation of positive returns to tenure in our sample, because we fail to find empirical evidence that IP jobs have flatter wage-tenure profiles.

We estimated specifications of equation (1) which allowed for different controls for training and job experience requirements, with little effect on our overall results and conclusions. We also included interaction terms between union status, method of pay, and tenure and tenure squared. These interaction effects were typically insignificant from zero and did not affect our most important empirical results.

Person-Specific Fixed Effects

Using the regression model in column 2 of Table 2.3, we can recover point estimates of the person-specific fixed effect f_i. These fixed effects capture the impact of all non time-varying worker and job characteristics, such as race, sex, education, AFQT score, occupation, industry, union status, and IP status. Although Lazear's models generate predictions about wage-tenure profiles, and not differences in wage levels by IP status, it is still useful to examine the relationship between the level of wages and IP status, conditional on worker and job characteristics. We therefore estimated a second stage regression of f_i on the typical worker demographic characteristics used in cross section regressions and IP dummy variables. Columns one and two of Table 2.4 reports the IP coefficients from these cross-section regressions.

The first column of Table 2.4 indicates that after controlling for worker demographic characteristics, training requirements, AFQT scores, and dummy variables for region, industry, occupation, the average pay of piece rate workers was not significantly different from time rate workers, while bonus and commission workers earned significantly more on average, and tip workers earned significantly less, on average. The second column of Table 2.4 interacts these IP dummy variables with both establishment size and union status. The union status interactions are insignificantly different from zero, but the establishment size premia differ significantly across IP categories. Tip earners receive the highest wage establishment size premium, while piece

rate workers receive a negative wage premium for establishment size. The fact that the establishment size wage premium is negative for piece rate workers provides some support for models of wages and monitoring costs.

VI. Conclusions

The empirical results in this Section of the Report provide little, if any, empirical support for the hypothesis that incentive pay jobs rely less heavily on deferred compensation and tilted wage profiles than do time rate wage and salary jobs. In comparing wage-tenure profiles across jobs with different methods of pay, we found that it is important to control for differences in the amount of training and skill requirements across jobs. Wage-tenure profiles are steeper in jobs that require more skills and training, and skill requirements differ substantially across jobs by their method of pay. After conditioning on these training variables, we find that wage-tenure profiles are actually steeper in bonus, piece rate, and commission jobs than they are in time rate jobs. Wage-tenure profiles on tip jobs are quite flat, with little evidence of a positive return to tenure.

We found evidence that piece rate jobs have negative establishment size wage premia and that the wage-tenure profile for these jobs is the flattest in large establishments. These results may be interpreted as evidence in support of monitoring cost models of wage-tenure profiles. We do not, however, observe the same size effects for other categories of incentive pay.

What, if anything, do our results imply about agency models of wage-tenure profiles? The NLSY data set is unique in that it offers incentive pay variables together with detailed information about worker attributes and wage histories. An important advantage of our empirical work is that we utilized longitudinal data, and thus were able to compare realized wage-tenure profiles across jobs, rather than imputing wage growth from a cross-section of workers or establishments. Our results may be limited, however,

by the relatively young age of our sample members. The mean worker in our sample has about 180 weeks of tenure on the job. We find no evidence that time rate jobs have wage-tenure profiles that are tilted relative to IP workers over the first 5 to 10 years on the job. Employers may instead defer compensation much further into the future for time rate jobs to ensure workers' optimal effort. This empirical hypothesis may only be testable using either a much longer panel, or a data set which includes workers of quite different ages and job tenures. In contrast to the incentive pay dummies, the training variables are strong predictors of wage growth, suggesting that human capital investment dominates contract effects in explaining the wage growth of young workers.

Another explanation for the poor empirical performance of the deferred compensation model may arise from the concept of employee monitoring emphasized in this essay. It is assumed that the relevant monitoring task is the evaluation of employee output. Recently, Osterman (1994) has distinguished between two aspects of the monitoring problem: the degree to which the employee is supervised and the extent of control he has over work methods. Incentive pay workers may be closely supervised in the sense that their output is monitored but permitted varying degrees of discretion over how they do their jobs. While incentive pay is a good indicator of supervision over output monitoring, the extent to which it indicates employer control over work, and thus the actual scope for worker malfeasance, is questionable.

Section 3 Incentive Pay and Labor Market Discrimination

I. Introduction

Pervasive gender and racial wage differentials have been of interest to labor economists for several decades. Labor market discrimination models provide one set of explanations for persistent wage gaps and occupational segregation. The employer discrimination model holds that employers' attitudes toward white and black (or male and female) workers differ. Given his relative distaste for one group, the employer makes wage offers which are less than those for the other group. Statistical discrimination models hypothesize that minority workers receive lower pay because employers perceive greater noise in a minority worker's initial productivity signal (Aigner and Cain, 1977). Customer discrimination attributes wage gaps to tastes for discrimination among customers, whose reservation prices are higher when buying from blacks (or women) than from whites (or men).[21]

The primary purpose of this essay is to document racial and gender differences in the wages and jobs of incentive pay earners using data from the 1988 and 1989 waves of the National Longitudinal Survey of Youth (NLSY). We discuss our results in light of the customer, employer, and statistical discrimination models. Because incentive pay rewards workers explicitly for their productivity rather than on the basis of time input, we expect the scope for employer and statistical discrimination to be smaller for incentive pay than for time-rated wage and salary employees.[22] That incentive pay workers may enjoy a

[21] See Cain (1986) for a survey of the discrimination literature.

[22] Evidence that incentive pay more accurately reflects workers' true marginal products than time rates is, for the most part, anecdotal and intuitive rather than empirical. However, Seiler (1984) finds that the cross-sectional wage variance of incentive pay workers exceeds that of time rate workers, which is consistent with his hypothesis that incentive pay is more sensitive than time rate pay to differences in effort, product demand, and the productivity of capital. In the NLSY data, the wage growth of incentive pay earners is more variable over time than that of time rate earners (Table 2.1).

wage bargaining advantage relative to time rate workers is frequently recognized. Chen and Eden (1991) observe that "...under piece rate compensation, workers are paid for each unit of output produced. Subjective, possibly prejudicial evaluations by supervisors are less important in determining earnings for those workers relative to time wage workers."[23] Chen and Eden cite Slichter (1941), who explains that under piece rate systems,

> "The unusually fast and competent worker who knows that he is producing more than other employees and who knows that he is entitled to higher pay than he receives is not dependent upon the fairness or whim of the foreman for his reward." (Slichter, 1941, p. 288).

In a competitive labor market, workers can also mitigate the impact of statistical discrimination by selecting jobs in which the employer can assess worker productivity and job performance with relative ease. Blacks should derive especially large benefits from incentive pay, and racial and gender wage gaps should be lower among incentive pay workers than time rate workers. In addition, racial and gender differences in returns to skill or ability should be smaller under incentive pay systems than time rate systems.[24]

Unlike employer or statistical discrimination, customer discrimination implies that incentive pay will exacerbate differences in earnings among tip, commission, or bonus workers in occupations in which customer contact occurs regularly. We frame our empirical work in light of the customer discrimination model presented by Borjas and Bronars (1989). In this search model, there are two types of buyers and sellers: black and

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[23] Chen and Eden also identify several factors which cause male-female wage gaps to be large under piece rate systems than time rate systems: (i) gender differences in motivation, effort, and sense of entitlement to monetary reward; (ii) discrimination in job assignments, so that for example, male sales workers sell the expensive "big ticket" items, while female sales workers are confined to sales of inexpensive products. This may be a form of employer, rather than customer discrimination. However, customer discrimination may also compel employers to favor white men in jobs where customer interaction is particularly important, regardless of employers' own tastes for discrimination.

[24] Early statistical discrimination models, like that of Aigner and Cain, did not permit employers to improve their information about worker productivities over time. In contrast, Oettinger (1993) presents a statistical discrimination model in which the quality of job matches formed by black workers is revealed gradually over time. In contrast, the quality of matches formed between employers and white workers is known immediately.

white. Information regarding product price and/or the race of the seller is assumed costly. In equilibrium, the incidence of self-employment will be lower among blacks than whites and the earnings of self-employed blacks will be lower than the earnings of self-employed whites.[25] In addition, the most productive black sellers are harmed the most by customer discrimination. Consequently, the most able blacks are likely to select out of self-employment in the first place: the existence of customer discrimination raises the opportunity cost to highly able blacks of being self-employed. Highly able blacks sort into the wage-salary sector in order to evade customer discrimination.

The authors test the predictions of their model by comparing the incidence of self-employment across minority and white male workers, and by examining the relative earnings of self-employed men across racial and ethnic groups. An important limitation of their empirical work is that racial differences in self-employment may be due to differences in initial asset endowments and access to capital markets. Tests based on self-employed workers may reflect discrimination in credit markets rather than (or in addition to) customer labor market discrimination..

The Borjas and Bronars customer discrimination model is well-suited to examining race and gender differences in method of pay and earnings. Here, the decision to earn incentive pay over time rates is analogous to the decision to enter self-employment over wage and salary work. Thus, Borjas and Bronars' customer discrimination model predicts, first, that minority workers are less likely to choose occupations with substantial customer contact and more likely to sort into goods-producing jobs.[26] Secondly, minority workers

[25] In contrast, the standard customer discrimination model with perfect information predicts one outcome of discrimination--occupational segregation by race or sex--very well, but provides a poor explanation for race and gender wage differentials. With perfect information, workers sort into occupations until wage differentials are eliminated. For this reason, labor economists have tended to view the customer discrimination model with skepticism (Cain, 1986).

[26] Customer discrimination is likely to affect the occupational choices of women and minorities differently. While blacks may avoid contact with white customers altogether, women may select public occupations in which they are placed in stereotypical roles (e.g., variants of child-raising, food

are less likely to earn incentive pay within customer-oriented occupations. Third, the least able minority workers are the most likely to select occupations which involve customer contact. Finally, incentive pay wage premia should be smaller for minority workers than for white workers in customer-oriented occupations.

The first prediction is straightforward. In both the standard model of customer discrimination and Borjas and Bronars' extension, discrimination leads to complete segregation of blacks into jobs in which they do not meet the public. However, it is commonplace for minority workers to hold jobs which involve extensive contact with white consumers, and for women to hold "men's" jobs. Customer discrimination might instead appear as a tendency for women and minorities to choose time rates in occupations which require frequent dealings with the public. Alternatively, employers may assign minority or female workers to jobs in which revenues are relatively insenstive to their dealings with customers. Incentive pay is most likely to appear when the share of worker effort in total output is large (Stiglitz, 1975). Minorities or women may be placed in jobs in which brand names or advertising sell the product or in which the price elasticity of demand is low.

The predictions regarding ability-based sorting depend on assumptions specific to the Borjas-Bronars model. The model predicts, for example, that the least able minority workers will select sales jobs. However, it is possible that expected customer resistance to female, black, or Hispanic sales workers will lead only the exceptionally able into these jobs. The direction of ability-based sorting depends on patterns of comparative and absolute advantage found in the labor force. Minority workers who have a comparative advantage in, say, sales as opposed to goods production, may select sales jobs despite the existence of discrimination. On the other hand, minority workers who are highly able in all

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preparation, and housekeeping). For example, customers may favor women in waitressing jobs but be skeptical of women who sell cars.

occupations are more likely to select goods-producing jobs in which they are more productive. Unfortunately, our measure of ability, the AFQT score, is a uni-dimensional measure of ability and does not capture relative abilities or specific skills.

This paper proceeds as follows. Section II documents the role of race and gender in the choice of occupation and method of pay. We emphasize specific occupations in which incentive pay is common: sales, customer-oriented service, and operator, fabricator, and laborer occupations. We chose to focus on this set of occupations because two involve extensive customer contact, while one involves minimal customer contact. In section IV we present wage equation estimates of racial and gender differences in incentive pay wage premia and differences in returns to skill by race and method of pay status.

II. The Choice of Occupation and Method of Pay

Gender and race are consistently significant determinants of method of pay within all occupations. In Part I of this report, we found that, conditioning on occupation and other worker and job attributes, women are significantly more likely than men to earn piece rates or tips, and are significantly less likely to earn bonuses or commissions. We also found that blacks are significantly more likely than non-blacks to earn bonuses, but less likely to earn tips or commissions (Tables 1.3 and 1.4).

The possibility of discrimination is expected to affect the choice of method of pay differently for different occupations. Customer discrimination may appear as a tendency for women and minorities to choose time rates in occupations which require frequent dealings with the public. In occupations in which interactions with employers, rather than customers, predominate, employer and statistical discrimination are relevant. Members of minority groups might prefer incentive pay to time rates in these occupations.

We examine race and gender differences in incentive pay in sales, services, and operator, fabricator, and laborer occupations. Sales and services occupations involve a

high degree of customer contact and may expose workers to customer discrimination. In contrast, operators, fabricators, and laborers are almost exclusively in jobs for which customer contact may be assumed to be minimal. Workers in all three occupational groups have a high frequency of incentive pay (Table 1.3). In addition to these basic categories, we define customer-oriented services to include the sub-group personal services (1980 Census Codes 456-469), which includes, for example, barbers, ushers, guides, and baggage handlers; and food service workers except for cooks and other kitchen staff. Customer-oriented services also includes two occupations from the motor vehicle operator sub-group of operators, fabricators, and laborers: taxi cab drivers and driver-sales workers. These occupations are in turn omitted from the operator, fabricator and laborer group. Other service occupations, which may require varying degrees of customer contact, include protective, health, domestic, food preparation, and cleaning/building services. Finally, we isolate sales clerks and cashiers (1980 Census Codes 275-276) from the rest of the sales group. While the degree of public exposure in these jobs is high, they do not typically require persuasive salesmanship compared to other sales jobs. Thus, both time rate and incentive pay earnings should be less sensitive to dealings with customers in clerk and cashier than in other sales jobs.

Table 3.1 illustrates the extent of racial and gender segregation across occupations.[27] Within each racial/ethnic group, women are more likely than men to be employed as sales clerks or cashiers or in customer-oriented services, while men dominate operator, fabricator, and laborer jobs. White men make up 6.7 % of sales clerks and cashiers, far less than their overall representation in the sample, but account for 39.9% of other sales workers. Black and Hispanic men account for only 6.6% and 9.4%, respectively, of sales workers.

[27]The hypothesis of no race/gender differences in occupation is readily rejected (F=35.49).

These patterns are reinforced in the multinomial logit model for choice of occupation shown in Table 3.2. Managerial, professional and technical workers formed the omitted occupational group.[28] Predicted probabilities of choosing selected occupations, based on the MNL coefficient estimates, are presented in Table 3.3. Women are more likely than men to be employed as sales clerks, cashiers, or customer-oriented services workers. Blacks are more likely than whites to work in services and operator, fabricator, and laborer occupations.[29] No significant differential effects exist for black or Hispanic females. However, ability-based sorting into occupations is pronounced for these and other groups. The MNL results indicate negative ablity-based selection of black men into clerk/cashier, cutomer-oriented services, and other services. Black men working as operators, fabricators, or laborers tend to be no less able than whites in those jobs. Thus, customer discrimination may deter highly able black men from entering public jobs but not "behind the scenes" jobs. The results indicate positive ability-based sorting of black women into these occupations and of black and Hispanic women into operator, fabricator, and laborer jobs.

Race and gender differences in occupation are marked and consistent with a customer discrimination model in which segregation occurs. For example, women are more likely than men to be employed in customer-oriented services, and as clerks and cashiers, than are men. Discrimination may lead women and minorities into "passive" sales jobs as opposed to those in which initiating contact with potential customers and/or persuading customers to buy are important. As the standard customer discrimination model predicts, black workers are less likely than whites to be employed in customer-oriented services, but more likely to be employed as operators, fabricators, and laborers.

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[28] The MNL model also included equations for clerical/administrative and production, craft, and repair workers, but for the sake of brevity results are not shown.

[29] When the sample is confined to respondents who hold services jobs, blacks are significantly less likely than are whites to be employed in a customer-oriented service.

However, some of the results are anomalous to the customer discrimination model: blacks and Hispanics are no less likely to be employed as sales workers than are whites, and Hispanics do not differ from whites in any of the MNL equations.

Table 3.4 shows the percentage of workers earning incentive pay by occupation, race and sex. In most occupations, one or two types of incentive pay predominate. For this reason, we do not disaggregate method of pay. No significant differences exist in the tendency of demographic groups to earn incentive pay across all occupations (F=1.10). Within occupations, race and gender differences in the incidence of incentive pay are significant for all occupations but Other Services. Generally speaking, whites are more likely than blacks or Hispanics to earn incentive pay in occupations that require dealings with customers; however, the reverse is true in the operator, fabricator, and laborer jobs, where customer discrimination is unlikely to be relevant. Although men are less likely than are women to be employed as sales clerks or cashiers, they are more likely to earn incentive pay in those occupations and in other sales jobs. In contrast, while relatively few women are employed as operators, fabricators, or laborers, they are more likely than men to earn incentive pay in those jobs then are men. White women are more likely than any other group, including white men, to earn incentive pay in customer-oriented services occupations (62.2%). Among blacks and Hispanics, however, men are at least as likely as women to earn incentive pay in these jobs.

Table 3.5 presents the results of probit estimation for incentive pay among sales workers. Column 1 shows the basic model; in column 2, we present a model which includes interaction terms between race and sex on one hand and AFQT, Log Establishment Size, and SMSA on the other hand. In both specifications, the dependent variable takes on the value of 1 if the respondent earned some form of incentive pay (sales workers in the sample reported earning tips and piece rates as well as the more common bonuses and commissions). Dummy variables for the type of sales job held are included;

the omitted occupational group was Other Sales, a category consisting of auctioneers, demonstrators, newspaper vendors, and other miscellaneous sales jobs.[30] As expected, clerks and cashiers are no more likely than workers in the omitted group to earn incentive pay; incentive pay is relatively common in sales of business goods and services and personal products. In both specifications, female sales workers are significantly less likely than men to earn incentive pay. Note that this is the case after adjusting for the tendency of female sales workers to hold jobs as clerks or cashiers. Blacks and Hispanic sales workers are no more or less likely than whites to earn incentive pay.

Results of the full model are presented in column 2 of Table 3.5. Here, blacks are significantly more likely than whites to earn incentive pay. However, this probability is diminished for blacks who reside in SMSAs. This result is striking because with the exception of clerk and cashier positions, sales jobs tend to be concentrated in SMSAs; in addition, the returns to incentive pay in sales jobs are likely to be augmented in SMSA's. To the extent that location in an SMSA confers a superior base of potential contacts, black sales workers may be at a disadvantage. Similarly, the incidence of incentive pay decreases with establishment size for blacks. Again, this may limit the number of customer contacts for black sales workers in large establishments which typically have large customer bases. Establishment size and SMSA effects are significant for women as well as for blacks. In contrast to blacks, however, the probability that a female sales worker earns incentive pay *rises* with both the log of establishment size and residence in an SMSA. The probability that a male sales worker earns incentive pay is higher among workers who report that some special experience is required for their jobs, suggesting that incentive pay jobs may be more highly skilled than time rate sales jobs. For women, however, this effect is diminished if not offset completely. Finally, there appears to be

[30] We estimated an identical model in which sales occupations were disaggregated to the fullest possible extent. Dummies were created for each of the occupations within personal product sales, business sales, etc. Inclusion of these dummies did not alter the results reported here.

positive ability-based selection into incentive pay. However, Hispanics or women who sort into incentive pay are relatively less able than white male sales workers.

Table 3.6 presents probit estimates for incentive pay for workers in service and in operator, fabricator, and laborer occupations. Both equations include occupational dummies. Among operators, fabricators, and laborers, textile workers and drivers are significantly more likely to earn incentive pay than are laborers (the reference occupation group). Aside from these occupational dummies, the only significant determinant of incentive pay probabilities is race. Blacks in the operator, fabricator, or laborer occupations are significantly more likely to earn incentive pay than are white workers in these occupations.

Column 1 of Table 3.6 presents results for service workers. Occupational variables include a dummy for a customer-oriented service job and its interactions with Female, Black, and Hispanic. Compared to employees in the omitted occupation group, Private Household Services, customer-oriented service workers are significantly more likely to earn incentive pay, particularly tips. However, black customer-oriented service workers are significantly less likely than whites in that occupation to earn incentive pay. The results in Table 3.6 are consistent with the view that while customer discrimination might deter blacks from earning incentive pay in public occupations: i.e. blacks select incentive pay jobs which involve minimal customer contact. Interactions between AFQT, race, and sex were not significant determiniants of incentive pay for either service workers or operators, fabricators, and laborers.

Our results indicate substantial differences in both the choice of occupation and the choice of method of pay by race and sex. Women are more likely to work in sales occupations than are men, but female sales workers are less likely to earn incentive pay than are male sales workers. This is partially, but not entirely, attributable to women's relative dominance in clerk and cashier jobs, in which incentive pay is relatively rare.

Female and Hispanic sales workers that do earn incentive pay tend to be less measurably able than white men who do, which suggests customer discrmination. Blacks are less likely than whites to work in customer-oriented service jobs, and those that do are less likely to earn incentive pay. The opposite is true for operators, fabricators, and laborers: blacks are more likely to work in these occupations, and also more likely to earn incentive pay within them, than are whites.

There do not appear, however, to be many significant differences between occupation and incentive pay choices of whites and Hispanics. This fact is anomalous to customer discrimination explanations of the patterns found in this section. Also problematic is the finding that blacks sales workers are no less likely to earn incentive pay than are white sales workers; controlling for the tendency of black sales workers to be reside outside of SMSA's, blacks are significantly *more* likely than whites to earn incentive pay. Finally, with two exceptions we find no evidence of ability-based sorting into either occupations or pay systems.

III. Incentive Pay and Wages

In this section, we document race and gender differences in the wages of incentive pay workers. Of special interest is the extent to which (a) racial and gender wage gaps typical of time rate workers are smaller under incentive pay, and (b) these wage gaps vary with the customer-orientedness presumed to characterize workers' occupations. Where employer or statistical discrimination occur, we would expect race and gender wage gaps to be smaller under incentive pay, regardless of occupation. Customer discrimination implies that these gaps should vary with occupation.

Table 3.7 presents mean log wages by race, sex and method of pay in selected occupations: sales workers, service workers, and operators, fabricators, and laborers. These unconditional means suggest that minority wage differentials are somewhat larger

among sales workers who receive incentive pay. The unconditional white male-black male wage gap is is 28% for time-rate sales workers and 38% for incentive pay-earning sales workers. The corresponding figures for the Hispanic-white wage gap are 12% and 35% respectively. Similarly, male-female wage gaps are somewhat larger under incentive pay than time rates for black and Hispanic sales workers. In operator, fabricator, and laborer occupations, the reverse is true: the black-wage wage gap is narrower under incentive pay than time rates. Hispanic men in these occupations who receive incentive pay earn 22% more per hour than do their white counterparts.

Table 3.7 makes no attempt to control for other factors which might influence wages. Table 3.8 presents OLS log wage estimates of incentive pay wage premia by race and sex, controlling for AFQT score, human capital and other standard variables. Dummy variables for each of the 388 occupations represented in the sample were included, as were dummies for job training requirements (formal company training, on-the job training with a previous employer, on-the-job training with a current employer, apprenticeship, trade or technical school, and armed forces training), which proxy for job skill. Taken together, the results do not conform to the predictions of employer/statistical discrimination models. Race and gender wage gaps are no different among bonus earners than among time rate earners.[31] Female piece rate workers earn less than men. One result does suggest employer/statistical discrimination: Hispanic piece rate workers earn significantly more than do their white counterparts. Table 3.8 offers mixed evidence of customer discrimination: female tip workers earn signficantly more, and female commission workers less (p-value=.103), than men. In addition, black and Hispanic commission workers earn less than whites (but the former coefficient is not significant). Finally, black tip workers earn significantly less than white tip workers.

[31]This result should be regarded with caution, since it is not clear from the data the extent to which bonus earners are part of group or individual systems.

In Table 3.9, we estimate separate log wage equations for blacks, blacks or Hispanics, and whites. In this table we focus on differences in returns to ability by method of pay and race. Education and AFQT score are used as proxies for worker ability. Taken together, the results provide no consistent support for either of the three types of discrimination. Counter to the intuition of the statistical or employer discrimination models, blacks or Hispanics who earn bonuses enjoy lower returns to AFQT score than time rate earners of the same race/ethnic group. Tips and piece rates do not augment returns to ability, as measured by the AFQT score, for black, Hispanic, or white workers. Table 3.10 also indicates that white commission workers derive particularly high returns to education, as do black and Hispanic bonus workers. While these last two results are consistent with customer discrimination, we also find, unexpectedly, that black commission workers get greater "returns" to AFQT score than do blacks who earn time rates.

Table 3.10 presents results from regressions similar to 3.9, where we instead estimate separate equations for men and women. Although gender wage differentials are found to vary by method of pay, there is little evidence that returns to skill for women differ by method of pay. There is some weak evidence that female commission workers have higher returns to education, and lower returns to test scores, all else equal.

Finally, Table 3.11 presents OLS earnings estimates of racial and gender wage gaps by method of pay and by occupation. The equation included interactions between race, sex, a dummy indicating whether the respondent earned any type of incentive pay, and the following occupations: operator, fabricator, laborer; sales, not including sales clerks and cashiers; sales clerks and cashiers; customer-oriented services; and other services. Racial and gender differences by method of pay in clerk, cashier, and other services occupations were generally insignificant, and the results are not shown to save space.

As expected, incentive pay workers earn significantly more than time workers on average--7.2%. This incentive pay wage premium does not vary with race, but is reduced to 1.6%, on average, for women. It increases by 12 percentage points in sales occupations, and is actually negative in operator, fabricator, and laborer occupations.

Three results are consistent with customer discrimination. First, black customer-oriented service workers who earn incentive pay earn about 25% less per hour than do blacks in the same occupation who do not earn incentive pay. Note that black customer-oriented services workers who earn time rates do no worse, relative to whites, than blacks in the reference occupation. Secondly, Hispanic sales workers who receive incentive pay earn about 29% less than their counterparts who earn time rates.[32] Finally, female incentive pay workers who are in customer oriented services earn significantly more than time rate earners, and the IP wage premium is larger for women than for men in this occupation. Other results, however, are difficult to interpret in light of the customer discrimination model. For example, women and blacks are disadvantaged neither by being sales workers, nor by choosing incentive pay in sales occupations. It is possible that customer discrimination against women is reflected in occupational segregation and preferences for time rates as opposed to incentive pay.

Hypotheses based on employer and statistical discrimination do not fare as well. In Table 3.11, women and blacks in operator, fabricator, and laborer occupations earn significantly less than do white men, but incentive pay does not appear to overcome the gender wage gap in this occupation. With one exception (women in customer oriented services), incentive pay does not narrow gender and racial wage gaps within occupations. If anything, these gaps are smaller under time rates.

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[32] In this regression, 387 occupational dummies were included, representing the greatest extent of occupational disaggregation possible with the data. When broad occupational dummies are used instead, Hispanic sales workers earn significantly more than whites and Hispanics in the reference occupation. As a result, the time rate-incentive pay wage gap is even larger than in Table 3.11.

IV. Conclusion

Our empirical work uncovers numerous racial and gender differences in both the incidence of incentive pay and incentive pay wages. Differences in the method of pay are shown to depend significantly on race and sex after controlling for 3-digit occupation, training requirements, AFQT score, and standard earnings equation variables. Racial and gender wage gaps differ by method of pay as well. Some of these patterns are explainable in terms of employer, statistical, or customer discrimination, but results are mixed. We find, for example, that blacks are more likely to earn incentive pay in operator, fabricator, and laborer jobs than are whites. At the same time, the black-white wage gap under incentive pay is no smaller than it is under time rates. However, blacks who earn bonuses seem to get higher returns to education than blacks who don't. The same is not found to be the case for whites. Generally speaking, the results for occupational choice and method of pay are more readily interperable in terms of the three discrimination models than are the wage results. Of the three discrimination models, employer and statistical discrimination are the least able to explain the results. That incentive pay does not appear to reduce these gaps suggests that they are attributable to unobservable productivity differences rather than employer tastes or imperfect information. Customer discrimination models fare slightly better. We find consistent evidence of customer discimination against Hispanics and women in sales occupations, and against blacks in customer-oriented services.

Table 1.1 Sample means and standard deviations

	Time Rate[a]	Piece Rate	Commis-sion	Bonus	Tips	Multiple IP	All IP
Hourly Wage	8.28 3.96	7.73 3.50	10.12 6.60	9.23 4.40	7.36 4.53	9.49 5.17	9.01 4.89
Log Hourly Wage	2.01 .41	1.95 .41	2.15 .56	2.12 .45	1.81 .61	2.12 .50	2.07 .50
Hours per Week	40.34 8.78	42.15 7.53	43.30 11.46	43.19 8.24	35.39 11.25	44.19 9.64	42.36 9.62
Years of Education	12.89 2.26	11.86 1.68	13.44 2.35	13.27 2.23	12.24 2.00	13.19 2.11	13.00 2.21
Not Enrolled in School	.92 .27	.98 .14	.95 .22	.95 .21	.87 .33	.95 .22	.95 .33
Not Enrolled, College Degree	.15 .36	.04 .20	.27 .44	.23 .43	.06 .24	.20 .39	.19 .39
Enrolled in College	.08 .27	.02 .14	.05 .22	.04 .19	.11 .32	.05 .22	.05 .22
Years of Experience[b]	8.16 3.06	9.55 2.60	7.75 3.03	7.59 2.97	8.74 3.05	7.68 2.92	7.98 3.01
Married	.53 .49	.55 .49	.51 .50	.53 .49	.47 .50	.48 .50	.51 .49
Female	.48 .49	.46 .50	.31 .46	.40 .49	.68 .46	.36 .48	.42 .49
Black	.26 .442	.29 .45	.16 .37	.26 .43	.19 .39	.21 .409	.23 .42
Hispanic	.16 .367	.09 .28	.16 .37	.15 .36	.17 .38	.15 .36	.15 .35
Age	27.06 2.23	27.41 2.16	27.19 2.41	26.86 2.28	26.98 2.23	26.88 2.25	26.98 2.28
N	4405	144	172	581	143	212	1252

(continued on next page)

Table 1.1 Sample means and standard deviations
(continued)

	Time Rate	Piece Rate	Commis-sion	Bonus	Tips	Multiple IP	All IP
Years of	2.99	3.28	2.21	3.01	1.97	2.95	2.80
Tenure	2.81	3.11	2.30	2.73	2.10	2.82	2.70
Plant Size	533	307.76	299.25	533.70	87.68	232.89	373.62
	2134.26	576	3047	2039	259	918.88	1846.97
Small	.19	.18	.32	.21	.20	.30	.24
(1-10 workers)	.39	.39	.46	.40	.40	.46	.43
Medium	.27	.17	.32	.29	.50	.29	.30
(11-49)	.44	.38	.46	.45	.50	.45	.45
Large	.21	.19	.19	.23	.21	.21	.21
(50-199)	.41	.39	.39	.41	.40	.40	.41
Very	.31	.44	.10	.28	.08	.18	.23
large(200 +)	.46	.49	.30	.44	.27	.39	.42
Government	.14	.02	.01	.07	.01	0	.04
	.35	.16	.07	.26	.08	0	.19
Union	.20	.24	.04	.16	.09	.10	.13
Coverage	.40	.43	.21	.36	.28	.30	.34
SMSA	.78	.68	.86	.81	.85	.86	.81
	.41	.46	.34	.39	.36	.34	.38
N	4405	144	172	581	143	212	1252

Data are from the 1988 NLSY. Respondents are classified according to method of pay in their current/most recent job in the 1988 survey. The sample excludes those who were either self-employed or employed in the agricultural sector in their current/most recent job; who had missing values for most of the variables shown above, for region of residence, or for unemployment rate; whose nominal hourly wage was less than $1 or greater than $100; who reported wage changes of more than $50 in absolute value 1988-1989; and who reported earning a form of incentive pay "other" than bonuses, commissions, tips, or piece rates.

[a] Includes workers who earn stock options

[b] Experience is defined as Age-Education-6.

Table 1.2 Mean Armed Forces Qualification Test Scores by Method of Pay, 1988
(standard deviations in parentheses)

	Time Rate	Piece Rate	Commission	Bonus	Tip	Multiple IP
AFQT:						
Raw Score	66.01	59.45	70.24	69.29	64.84	71.28
	21.38	19.07	19.76	20.70	20.21	19.44
Percentile	41.61	31.5	47.59	46.67	39.16	48.60
	28.41	23.74	27.69	29.15	26.46	27.34
AFQT	-.475	-7.59	3.57	3.17	-1.57	5.04
Residual	21.07	18.65	19.05	20.24	20.18	18.64
N	4256	138	164	557	139	205

The AFQT score is derived from results of the Armed Services Vocational Aptitude Battery (ASVAB), an aptitude test given to potential military entrants. The ASVAB was administered to NLSY respondents in 1980. The AFQT raw score is calculated as a weighted average of the raw ASVAB scores for arithmetic reasoning, paragraph comprehension, word knowledge, and numerical operations. Percentile scores are based on 1989 Department of Defense formulae. NLSY respondents were of different ages when the ASVAB was administered in 1980. To account for the effect of age on scores, we compute the residual from a regression of the raw AFTQ score on age in 1980. This is AFQT Residual, shown above. Unless otherwise indicated, we use the AFQT Residual in our empirical work.

Table 1.3 Multinomial Logit Estimates of Method of Pay Categories
(Z-statistics below coefficient estimates)
Log L = -3203; R-Squared = .14; N = 5259

	Piece Rate	Commission	Bonus	Tips
Education	.0251	.195	-.0157	-.0597
	0.356	3.230	-0.469	-0.819
Tenure	.012	-.087	.015	-.098
	0.397	-2.360	0.905	-2.19
Female	1.121	-.832	-.4003	.662
	5.444	-4.219	-3.898	3.120
Black	-.220	-.648	.264	-.485
	-0.888	-2.399	2.045	-1.728
Hispanic	-.629	-.170	.094	.180
	-1.810	-0.671	0.658	0.640
Log Plant Size	.026	-.170	-.029	-.112
	0.516	-3.403	-1.263	-2.036
Union	.033	-.995	-.120	-.358
	0.149	-2.465	-0.907	-1.102
SMSA	.010	.674	.035	.712
	0.051	2.727	0.295	2.753
Unemployment Rate<3%	-.231	.578	.456	-1.68
	-0.379	1.599	2.197	-1.634
AFQT Residual	.001	-.0048	.0062	.0205
	0.253	-0.792	1.940	3.136
Managerial, Professional, Technical	-.702	1.04	.208	1.58
	-1.132	2.265	1.514	1.442
Sales	.394	3.23	.308	2.93
	0.634	7.429	1.699	2.734
Services	.717	.771	-.373	5.40
	1.443	1.426	-2.010	5.349
Production, Craft, and Repair	2.76	1.26	-.153	1.57
	6.488	2.556	-0.838	1.271
Operators, Fabricators, Laborers	2.68	1.08	-.217	3.33
	6.656	2.198	-1.294	3.184

Data are from the 1988 NLSY. Respondents are classified according to method of pay reported in the 1988 survey. Those earning multiple forms of incentive pay were omitted from the sample. Estimates for marital status, experience, government employment, and region of residence not shown.

Table 1.4 Predicted method of pay probabilities by race and sex (%).

	Black Male	Black Female	White Male	White Female	Hispanic Male	Hispanic Female
Time rate	80.5	82.2	79.6	80.2	79.8	81.3
Piece rate	1.8	.80	2.3	4.9	1.2	2.7
Commission	3.0	1.5	4.5	2.2	4.2	2.1
Bonus	13.7	10	11.6	8.4	12.3	9.1
Tips	.09	2.3	1.9	4.2	2.2	4.7

Predicted probabilities are based on multinomial logit estimation of method of pay equations and evaluated at sample mean.

Table 1.5 Predicted Method of Pay Probabilities by Establishment Size and Union Coverage (%)

	Time Rate	Piece Rate	Commission	Bonus	Tip
Union					
Small	81.6	2.5	2.3	11.1	2.4
Medium	82.7	2.6	1.8	10.5	2.3
Large	83.5	2.7	1.4	10.0	2.1
Extra-large	84.6	2.9	.9	9.4	2.0
Nonunion					
Small	78.5	2.4	4.5	11.6	2.8
Medium	80.0	2.5	3.5	11.2	2.7
Large	81.1	2.6	2.8	10.7	2.6
Extra-large	82.6	2.8	2.0	10.1	2.4

Predicted probabilities are based on multinomial logit estimation of method of pay equations, 1988 data. Size category effects were calculated by setting the log establishment size variables equal to the mean log size within the relevant size category: small=1.42, medium=3.03, large=4.43, extra-large=6.55.

Table 1.6 Months of Experience Required For Job by Method of Pay
(Percentages by pay category)

Months	Time Rate	Piece Rate	Commission	Bonus	Tip	Multiple IP
< 1	22.9	26.2	12.5	13.0	62.6	13.7
1 - 3	22.3	40.6	26.0	23.2	21.8	14.2
4 - 6	13.9	10.1	20.0	13.8	5.6	12.2
7 - 12	15.2	5.9	15.5	16.1	6.3	20.9
13 +	24.6	15.9	25.5	33.5	3.5	37.6
Total %	100	100	100	100	100	100
Mean	13.5	8.4	13.6	16.9	3.6	19.8
Median	6	2	6	6	.5	12
N	4318	116	197	554	142	191

Responses to the 1989 NLSY question, "Excluding any regular schooling you may have received, how long would it take the average new person to become fully trained and qualified to do a job like (this/that)?" Those answering that they were "never fully trainined," (NLSY code = 996) were dropped from the calculations. Respondents are classified according to their method of pay status in 1989.

Table 1.7 Months Required to Become Fully Trained
(t-statistics below estimates)

	OLS [a]	Censored Normal [b]
Piece Rate	.257	1.86
	0.151	0.888
Bonus	2.219	3.423
	2.748	3.539
Commission	-.266	1.72
	-0.213	1.151
Tips	-2.258	-5.96
	-1.420	-2.823
Education	1.228	1.598
	6.415	6.861
Experience	.560	.748
	4.576	5.008
Tenure	.537	.806
	5.756	7.135
AFQT Residual	.048	.079
	3.639	4.827
Log (Plant Size)	.088	.0344
	0.601	0.193
Female	-6.422	-8.406
	-10.399	-11.042
Black	-3.592	-5.18
	-4.982	-5.798
Hispanic	-1.716	-1.674
	-2.084	-1.676
Married	1.82	2.11
	3.298	3.132
F	32.36	-
LLF	-	-20300

The dependent variable is given by respondents' answer to the 1989 NLSY question, "Excluding any regular schooling you may have received, how long would it take the average new person to become fully trained and qualified to do a job like (this/that)?" Responses are recorded in months. However, the NLSY codes answers of less than one month as 995, so that the data are left-censored. We omitted observations for which respondents answered that they were "never fully trained" (NLSY code = 996). Estimates for industry, occupation, region, SMSA, union coverage, and government employment not shown.

[a] Censored observations were assigned an experience requirement value of .5 months.

[b] Censored observations were assigned an experience requirement value of .99.

Table 1.8 Average Experience/Training Requirements by Method of Pay
(% of workers; standard deviation below mean)

	Time Rate	Piece Rate	Commission	Bonus	Tips	Multiple IP
Some Special Experience[a]	57.2 .49	44.9 .50	68.0 .46	66.6 .47	42.9 .49	66.3 .47
Trade or Technical School	14.1 .34	6.7 .25	18.5 .38	16.3 .369	.028 .16	19.8 .40
Apprentice-ship	4.6 .21	2.5 .15	.6 .23	4.3 .20	3.5 .184	4.5 .20
Formal Company Training	8.5 .27	3.3 .18	12.0 .32	14.3 .35	4.2 .20	18.8 .39
OJT-Current Employer	30.2 .45	22.8 .42	32.5 .46	37.2 .48	22.5 .41	37.7 .48
OJT-Previous Employer	29.5 .45	16.1 .36	35.5 .47	38.8 .48	23.2 .42	37.7 .48
Armed Forces and Other Training	4.3 .20	.8 .092	7.0 .25	5.7 .23	0 0	5.1 .22
N	4441	118	200	558	142	196

Table 1.9 Average Within-Occupation Experience Requirements By Method of Pay--1989
(% of workers)

	Managers, Professions, Technicians		Sales		Clerical and Admin. Support		Production, Craft and Repair		Services		Operators, Fabricators, Laborers	
	Time	IP	Time	IP	Time	IP	Time	IP	Time	IP	Time	IP
Trade or Technical School	12.9	14.2	8.0	6.1	17.6 21.6		23.8	30.1	12.8	20.1	9.0	6.0
Apprentice-ship	5.4	6.2	2.8	1.7	1.0	.6	13.6	13.5	3.0	4.7	3.7	1.7
Formal Company Training	9.8	13.2	11.0	20.4	7.8	15.2	7.8	13.5	10.4	3.7	5.6	8.1
OJT--Current Employer	35.0	37.3	28.9	43.4	31.9 28.6		35.4	42.8	24.3	25.9	24.0	22.8
OJT--Previous Employer	36.7	46.5	30.3	38.6	35.1 40.1		32.0	33.1	20.7	25.9	19.6	18.1
Armed Forces and Other Training	8.4	8.0	2.3	4.8	2.3	4.4	3.6	5.2	4.6	2.1	2.2	2.5
N	1086	273	336	230	894 157		559	133	623	189	944	232

Data are from the 1989 NLSY questions, "(Do) you have to have some work experience or special training to get (the) job?" and "...what kind of experience or special training (is that)...?" Respondents are classified according to their method of pay status and occupation in 1989.

Table 1.10 Training and Experience Requirements
(Probit estimates; Z-statistics in parentheses)

	Any Special Experience	Formal Company Training	OJT--Current Employer	OJT --Previous Employer
Piece Rate	-.107	-.385	-.169	-.195
	-0.979	-1.879	-1.422	-1.528
Commission	.264	.225	.020	.077
	3.146	2.223	0.250	0.934
Bonus	.168	.278	.130	.217
	3.129	4.227	2.449	4.032
Tip	-.083	-.329	-.030	-.090
	-0.817	-1.925	-0.275	-0.808
Female	-.075	-.106	-.095	-.042
	-1.869	-1.898	-2.296	-0.999
Education	.053	.015	.010	.059
	4.264	0.854	0.775	4.530
Experience	.046	.003	.015	.048
	5.806	0.332	1.829	5.720
Tenure	-.027	.009	.037	-.085
	-4.566	1.171	5.994	-12.436
Ln (Plant Size)	-.004	.068	.032	-.008
	-0.506	5.165	3.313	-0.835
AFQT Residual	.002	.001	.002	.003
	2.943	1.253	2.325	3.454
R2	.05	.06	.03	.06
LLF	-3585	-1607	-3330	-3187
N	5562	5529	5562	5562

Data are from the 1989 NLSY. Estimates for marital status, industry, occupation, union coverage, government employment, black, Hispanic, SMSA and region not shown. Occupations included in the regression are managerial, professional, and technical, service, sales, production, craft and repair, and operator, fabricator, and laborer. The omitted occupational dummy was clerical and administrative support. Respondents are classified according to their method of pay status in their 1989 current/most recent job.

Table 2.1. Mean Real Average Annual Wage Growth by Method of Pay, Selected Calendar Years

(Mean, s, *N*)

Time Span:	Time Rate	Piece Rate	Commission	Bonus	Tips	All IP
1 Year						
1987-1988	.055	.036	.020	.067	.080	.060
	.27	.25	.38	.24	.44	.30
	2063	65	74	298	43	580
1988-1989	.019	.080	.042	.032	-.050	.023
	.25	.24	.44	.24	.49	.34
	3179	86	118	430	83	855
1989-1990	.010	-.039	.009	.029	-.023	.013
	.24	.25	.40	.24	.55	.34
	3962	104	181	527	105	1097
Range	.045	.119	.033	.039	.13	.047
2-Year						
1986-1988	.055	.055	.066	.063	.067	.066
	.14	.14	.24	.11	.22	.16
	1512	1512	55	216	27	417
1987-1989	.034	.047	.029	.055	-.032	.043
	.14	.14	.12	.14	.25	.15
	2064	65	74	298	43	580
1988-1990	.016	-.004	.058	.033	-.043	.022
	.13	.13	.26	.13	.25	.17
	2912	76	109	412	62	786
Range	.039	.059	.037	.030	.11	.044
3-Year						
1985-1988	.051	.021	.045	.066	.065	.061
	.09	.09	.18	.11	.11	.12
	1106	41	39	161	19	308
1986-1989	.04	.044	.058	.055	-.009	.053
	.09	.09	.10	.08	.18	.10
	1513	48	55	216	27	417
1987-1990	.026	.002	.023	.046	-.027	.032
	.09	.10	.10	.09	.21	.11
	1941	60	71	289	36	549
Range	.025	.042	.029	.02	.092	.029
6-Year						
1984-1990	.033	.017	.042	.049	.025	.044
	.051	.05	.067	.05	.053	.059
	824	32	26	111	10	216

Wage growth data were obtained by tracking wages of the 1989 current/most recent job over the 1984-1990 surveys. Workers were classified according to method of pay in 1989. Columns 2-5 omit multiple incentive pay earners. Multiple IP earners are, however, included in the last cateogry, "All IP."

Table 2.2. Average Real Wage Growth Over Adjacent Years On the Job 1984-1990,
(Mean, s, and *N*)

	Time Rate	Piece Rate	Commission	Bonus	Tips	All IP
	.046	.077	.019	.065	.0001	.050
Year 1-2	.25	.276	.41	.27	.46	.35
	3486	93	162	442	115	978
	.045	.021	.120	.051	.002	.053
Year 2-3	.26	.19	.45	.23	.41	.32
	2299	60	84	317	58	628
	.033	-.026	.035	.071	-.120	.038
Year 3-4	.29	.27	.22	.19	.63	.32
	1375	43	49	203	33	403
	.026	.083	.063	.052	-.036	.062
Year 4-5	.27	.25	.25	.274	.56	.32
	879	28	35	128	18	255
	.004	.029	.034	.010	-.037	.0004
Year 5-6	.22	.27	.20	.28	.43	.29
	501	20	20	73	11	152
	-.007	-.032	-.096	.042	.064	-.0009
Year 6-7	.20	.15	.45	.13	.09	.23
	264	13	9	26	3	69

Data are from the 1984-1990 NLSY. Wage growth data apply to the 1989 current/most recent job. Respondents were classified according to method of pay status in 1989. Year 1 is the first survey year in which the job was reported. For example, if the earliest survey in which the 1989 job was found was 1986, then Year 1=1986, Year 2=1987, etc. Respondents who reported that their tenure as of Year 1 exceeded 1.5 years were excluded, as were those who were not interviewed in at least one year between the identified starting year and 1989.

Table 2.3 Wage-Tenure Profiles with Person-Specific Fixed Effects
(absolute value of t-statistics below estimates)

	(1)	(2)
Age	.0374	.0386
	2.77	2.85
Age Squared	-.0010	-.0011
	4.53	4.62
Tenure	.0912	.0944
(in hundreds of weeks)	8.04	7.94
Tenure Squared	-.0059	-.0064
	3.21	3.29
Tips*Tenure	-.1281	-.2698
	5.41	4.55
Tips*Tenure Squared	.0137	.0144
	3.29	1.43
Bonus*Tenure	.0518	.0401
	4.82	1.60
Bonus*Tenure Squared	-.0048	-.0032
	2.58	.706
Commission*Tenure	.0324	-.0250
	1.81	0.66
Commission*	-.0020	.0143
Tenure Squared	0.59	1.95
Piece Rates*Tenure	.0211	.1724
	0.98	2.50
Piece Rates*	-.0060	-.0231
Tenure Squared	1.62	1.59
Previous Training*	.0263	.0240
Tenure	3.40	3.11
Previous Training*	-.0021	-.0017
Tenure Squared	1.57	1.28
Months Experience	.0004	.0004
Required*Tenure	2.27	2.21
Months Experience	.00003	.00003
Required*Tenure	1.00	0.90
Squared		
N	20,974	20,974

(continued on next page)

Table 2.3 Wage-Tenure Profiles with Person-Specific Fixed Effects
(continued)

	(1)	(2)
Log Establishment Size*Tenure	-.0010 0.52	-.0015 0.73
Log Establishment Size*Tenure Squared	-.00002 0.06	.00009 0.24
Union*Tenure	-.0031 0.34	-.0029 0.31
Union*Tenure Squared	-.0019 1.21	-.0020 1.28
Tip*Log Size*Tenure	-	.0413 2.78
Tip*Log Size*Tenure Squared	-	-.0005 0.21
Bonus*Log Size*Tenure	-	.0031 0.61
Bonus*Log Size*Tenure Squared	-	-.0005 0.55
Commission*Log Size* Tenure	-	.0199 1.85
Commission*Log Size* Tenure Squared	-	-.0055 2.52
Piece Rate*Log Size* Tenure	-	-.0295 2.40
Piece Rate*Log Size* Tenure Squared	-	.0033 1.34
R-Squared	.211	.213
N	20,974	20,974

The data set consists of 5624 workers observed for up to 7 years 1984-1990 on their 1989 job. Respondents are classified according to method of pay status in 1989. Year dummies included but not shown.

Table 2.4 Second Stage Person-Specific Fixed Effect Wage Regressions (absolute value of t-statistics below estimates)

	(1)	(2)
Tips	-.1173	-.2488
	15.81	14.48
Bonus	.0692	.0611
	18.90	6.77
Commission	.0217	.0013
	3.80	0.12
Piece Rate	.0063	.1285
	.82	6.77
Tips*Union		.0202
		0.94
Bonus*Union		-.0136
		1.34
Commission*Union		-.0073
		0.35
Piece Rate*Union		.0239
		1.40
Union	.0025	.0029
	.75	0.79
Tips*Log Size		.0384
		8.07
Bonus*Log Size		.0024
		1.43
Commission*Log Size		.0083
		2.49
Piece Rate*Log Size		-.0274
		7.20
Log Establishment Size	.0034	.0027
	5.10	3.73
N	5264	5264

Table 3.1. Race and Gender Composition of Selected Occupations

	White Male	White Female	Black Male	Black Female	Hispanic Male	Hispanic Female	*N*
Sales Clerks and Cashiers	6.7	37.5	6.0	31.5	6.0	12.0	133
Sales, exc. Clerks and Cashiers	39.9	30.0	6.6	8.0	9.4	5.7	433
Customer-Oriented Services[a]	16.6	42.0	9.2	15.8	5.5	10.7	271
Other Services	24.5	19.2	20.8	21.5	8.7	4.9	561
Operators, Fabricators, Laborers[b]	37.2	14.9	24.6	7.8	12.1	3.0	1156
All Occupations	31.3	27.5	13.2	12.4	8.7	6.5	5656

Data are from the 1989 NLSY. 1980 Census occupational codes are used. Rows give the percentage of the occupation represented by each race/gender category.

[a] Includes respondents employed in personal services (1980 Census Codes 456-469) and as wait persons, bartenders, restaurant supervisors, and hosts (433-435, 438, 443-444). In addition, this category includes operators, fabricators and laborers in public occupations: taxi-cab drivers and driver-sales workers. Other service occupations, not included in customer oriented services, are protective, health, private household, and other food services.

[b] The following motor vehicle operators were removed from this category and placed in customer-oriented services: taxi cab drivers and driver-sales workers.

Table 3.2. Multinomial Logit Estimates for Occupation
(Z-statistics below coefficients)
N=5481; LLF=-8439.62

	Clerk or Cashier	Sales, exc. Clerk or Cashier	Customer-Oriented Services	Other Services	Operators, Fabricators, and Laborers
Female	1.74	-.418	.725	-.465	-1.194
	3.647	-2.103	3.190	-2.516	-7.281
Black	.963	-.200	.138	.720	.675
	1.235	-0.743	0.344	2.955	3.263
Hispanic	.806	-.238	-.376	-.206	-.210
	1.206	-0.906	-0.968	-0.797	-0.980
Black*Female	-.306	-.003	-.351	-.185	-.350
	-0.370	-0.009	-0.729	-0.558	-1.144
Hispanic* Female	-.806	.188	.344	.2977	-.626
	-1.050	0.494	0.731	0.804	-1.491
AFQT	.0006	-.001	-.016	-.031	-.031
	0.028	-0.212	-1.691	-4.654	-5.388
AFQT*Female	-.044	-.004	-.010	-.019	-.009
	-1.775	-0.417	-0.838	-1.986	-1.098
AFQT*Black	-.056	-.009	-.035	-.020	-.011
	-1.723	-0.662	-2.057	-1.789	-1.094
AFQT* Hispanic	-.027	.020	-.006	.001	-.003
	-0.85	1.498	-0.339	0.083	-0.364
AFQT* Hispanic* Female	.014	-.043	.010	.030	.037
	0.387	-1.993	0.402	1.417	2.404
AFQT*Black* Female	.098	.020	.052	.033	.037
	2.728	1.058	2.402	2.063	2.404
Education	-.750	-.352	-.618	-.629	-.774
	-9.729	-8.718	-11.414	-14.478	-20.077
Experience	-.166	-.024	-.032	-.090	-.040
	-3.562	-0.915	-0.986	-3.425	-1.760
SMSA	-.710	.031	.162	-.544	-.919
	-3.070	0.191	0.801	-3.719	-7.228

Data are from the 1989 NLSY. The model also includes variables for region, marital status, and number of children in the household. In addition to the occupations shown above, the multinomial logit model included clerical (CLERICAL) , managerial, professional and technical (MPT), and production, craft and repair workers (PCR). Managerial, professional and technical workers (MPT) comprised the omitted occupation.

Table 3.3. Predicted Probability of Employment in Selected Occupations by Race and Gender
(Per cent)

	White Male	White Female	Black Male	Black Female	Hispanic Male	Hispanic Female
Sales Clerks and Cashiers	.42	3.8	.75	5.4	1.2	3.7
Other Sales	9.0	7.7	5.5	4.8	8.4	6.6
Customer-Oriented Services	2.9	9.0	2.3	5.4	2.5	8.1
Other Services	8.9	9.0	12.2	11.2	9.1	9.3
Operators, Fabricators, Laborers	24.6	13.4	31.6	13.4	25.4	5.8

Predicted values were calculated using the MNL estimates shown in Table 3.4, and capture the marginal effects of the following variables: Female, Black, Hispanic, Black*Female, and Hispanic*Female. AFQT score and its interactions are assumed fixed.

Table 3.4. Percentage of Workers Earning Incentive Pay Within Selected Occupations, by Race and Gender

Occupation	White Male	White Female	Black Male	Black Female	Hispanic Male	Hispanic Female	F^c
Sales Clerks and Cashiers	11.1	4.0	37.5	14.2	37.5	18.7	3.54
Other Sales	61.8	35.3	51.7	40.0	48.7	40.0	5.32
Customer-Oriented Services[a]	51.1	62.2	40.0	27.9	46.6	44.8	4.17
Other Services	9.4	9.2	11.1	15.7	8.1	3.5	.95
Operators, Fabricators, Laborers [b]	14.3	26.0	22.4	28.5	14.8	20	4.19
All Occupations	23.0	21.1	21.6	19.8	20.7	18.6	1.10

Data are from the 1989 NLSY. 1980 Census Occupation codes are used. Cells give the percentage of workers in a given race/gender group and occupation who earn incentive pay.

[a] Includes respondents employed in personal services (1980 Census Codes 456-469) and as wait persons, bartenders, restaurant supervisors, and hosts (433-435, 438, 443-444). In addition, this category includes operators, fabricators and laborers in public occupations: taxi-cab drivers and driver-sales workers. Other service occupations, not included in customer oriented services, are protective, health, private household, and other food services.

[b] The following motor vehicle operators were removed from this category and placed in customer-oriented services: taxi cab drivers and driver-sales workers.

[c] Tests the hypothesis that no within-occupation differences in the incidence of incentive pay exist.

Table 3.5. Probit Estimates for Incentive Pay--Sales Workers
(Z statistics below coefficient estimates)

	(1)	(2)
Female	-.577	-1.10
	-4.318	-2.659
Black	.177	1.89
	0.935	2.987
Hispanic	.131	.217
	0.716	0.370
AFQT	.006	.021
	1.491	2.997
AFQT*Female	-	-.013
		-1.820
AFQT*Black	-	-.007
		-0.662
AFQT*Hispanic	-	-.017
		-1.661
Log Establishment Size	-.026	-.101
	-0.665	-1.506
Log Establishment Size*Female	-	.151
		1.816
Log Establishment Size*Black	-	-.266
		-2.251
Log Establishment Size*Hispanic	-	.091
		0.795

Data are from the 1989 NLSY. The dependent variable takes on the value of 1 of the respondent earns some form of incentive pay, 0 otherwise. The sample consists of workers who reported working in a sales occupation in their 1989 current/most recent job. Models 1 and 2 each include variables for industry, union coverage, government employment,

(continued on next page)

Table 3.5 Probit Estimates for Incentive Pay--Sales workers
(continued)

	(1)	(2)
Special Experience [a]	.175	.504
	1.325	2.364
Special Experience*Female	-	-.671
		-2.464
Special Experience*Black	-	.344
		1.010
Special Experience*Hispanic	-	-.088
		-0.245
SMSA	-.022	-.144
	.039	-0.530
SMSA*Female	-	.679
		1.927
SMSA*Black	-	-1.066
		-2.268
SMSA*Hispanic	-	-.236
		-0.486
Education	.073	.085
	1.608	1.787
Clerk or Cashier	.216	.208
	0.328	0.311
Business Sales	1.489	1.746
	2.148	2.475
Personal Sales	1.125	1.303
	1.749	1.997
Mining, Manufacturing, &	.906	1.126
Wholesale Sales	1.331	1.630
Sales Supervisor or Sales	.639	.777
Engineer	1.000	1.199
LLF	-296.83	-282.57
N	539	539

region of residence, experience, job tenure, marital status, and number of children in the household, which are not shown.

[a] Answer to the question, "(Do) you have to have some work experience or special training to get (the) job?"

Table 3.6. Probit Estimates for Incentive Pay—Service Workers and Operators, Fabricators, and Laborers
(Z-statistics below coefficient estimates)

	Service Workers	Operators, Fabricators, and Laborers
Female	.223	-.140
	1.052	-0.994
Black	.319	.304
	1.483	1.992
Hispanic	-.002	.078
	-0.008	0.399
AFQT	.0147	-.001
	2.381	-0.370
Special Experience Required	.337	-.041
	2.681	-0.426
Customer-Oriented Services	2.54	
	3.971	

Data are from the 1989 NLSY. In each case, the dependent variable takes on a value of 1 if the respondent reports earning some form of incentive pay in his 1989 current/most recent job, and 0 otherwise. Variables included but not shown are interactions of AFQT with the race and sex dummies, marital status, education, establishment size, government, union coverage, industry, region, SMSA, and number of children in the household. In addition, several occupation dummies from the operator, fabricator, and laborer groups were included but not are not reported. The omitted occupation in column 1 is Private Household Services and the omitted occupation in column 2 is laborer.

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Table 3.6 Probit Estimates for Incentive Pay--Service Workers and Operators, Fabricators, and Laborers
(Z-statistics below coefficient estimates)

(continued)

	Service Workers	Operators, Fabricators, and Laborers
Female*Customer-Oriented Services	-.035 -0.125	-
Black*Customer-Oriented Services	-.958 -3.359	-
Hispanic*Customer-Oriented Services	-.268 -0.700	-
Janitorial/Building Services	1.257 2.058	-
Health Services	1.565 2.526	-
Protective Services	1.476 2.223	-
Cooks	.971 1.585	
Truck, Bus and Other Drivers	-	.801 3.004
Textile, Apparel, and Furnishings Operators	-	1.491 6.911
LLF	-282.21	-483.58
N	767	1074

Table 3.7. Mean Log Wages by Race, Sex, and Method of Pay, Selected Occupations
(*N*, Mean, s)

	Operators, Fabricators, and Laborers		Services Workers		Sales Workers	
	Incentive Pay	Time Rate	Incentive Pay	Time Rate	Incentive Pay	Time Rate
White Male	62	369	36	147	108	74
	2.03	2.08	2.01	1.95	2.43	2.12
	.39	.38	.49	.47	.51	.48
White Female	45	128	81	141	48	132
	1.79	1.81	1.78	1.67	2.10	1.77
	.35	.35	.45	.46	.57	.43
Black Male	64	221	23	119	18	19
	1.98	1.95	1.86	1.86	2.05	1.84
	.44	.43	.57	.37	.47	.48
Black Female	26	65	31	133	20	57
	1.85	1.81	1.66	1.65	1.80	1.61
	.35	.37	.35	.435	.31	.33
Hispanic Male	21	120	11	53	23	26
	2.25	2.05	2.05	2.00	2.08	2.00
	.36	.44	.58	.46	.61	.47
Hispanic Female	7	28	14	43	13	28
	1.86	1.72	1.95	1.83	1.82	1.86
	.24	.38	.54	.46	.33	.56

Data are form the 1989 cross section of the NLSY. 1980 Census Occupational codes are used. Respondents are classified according to their 1989 methods of pay and occupations.

Table 3.8. Incentive Pay Wage Premia by Race and Sex
OLS Coefficient Estimates--Dependent Variable: Log Wage
(t-statistics below coefficient estimates)

Piece Rate	.081	Bonus*Female	.003
	1.698		0.124
Bonus	.053	Bonus*Black	.012
	2.542		0.383
Commission	.146	Bonus*Hispanic	.010
	4.699		0.262
Tips	-.076	Tips*Female	.101
	-1.509		1.885
Female	-.109	Tips*Black	-.126
	-8.456		-2.073
Black	-.026	Tips*Hispanic	-.009
	-1.909		-0.140
Hispanic	.042	Commission*Female	-.072
	2.686		-1.628
Piece Rate*Female	-.104	Commission*Black	-.070
	-1.748		-1.353
Piece Rate*Black	.031	Commission*Hispanic	-.171
	0.517		-2.830
Piece Rate*Hispanic	.219	AFQT	.003
	2.135		9.967
		Education	.044
			12.741
F			15.16
N			5473

Variables included in the model but not reported are industry, 387 3-digit occupational dummies, marital status, experience, experience squared, education, tenure, tenure squared, union coverage, log establishment size, dummies indicating training requirements, number of children in the household, region, SMSA, government employment, region of residence, the AFQT residual, and local unemployment rate.

Table 3.9. Incentive Pay Wages by Race. OLS Estimates
Dependent Variable: Log Wage
(t-statistics below coefficient estimates)

	Black or Hispanic	Black Only	Non-Black, Non-Hispanic
Piece Rate	.292	.303	.072
	0.720	0.671	0.224
Commission	.097	.728	-.641
	0.323	1.932	-3.565
Bonus	-.357	-.350	-.135
	-2.205	-1.719	-1.056
Tip	.184	.189	.156
	0.572	0.470	0.673
AFQT	.005	.004	.004
	10.162	6.727	8.113
Education	.036	.043	.042
	6.237	5.529	8.742
AFQT*Piece Rate	-.002	-.002	.003
	-0.862	-0.743	1.190
AFQT*Commission	-.00006	.005	-.003
	-0.034	1.848	-1.756
AFQT*Bonus	-.002	-.003	.0008
	-2.052	-2.236	0.621
AFQT*Tip	.0001	.0007	.001
	0.060	0.287	0.522
Education*Piece Rate	-.018	-.023	-.005
	-0.587	-0.660	-0.204
Education*Commission	-.002	-.041	.059
	-0.095	-1.533	4.315
Education*Bonus	.032	.029	.012
	2.694	2.018	1.295
Education*Tips	-.024	-.026	-.0143
	-0.943	-0.796	-0.769
F	42.00	29.07	56.17
N	2248	1418	3225

Data are from the 1989 NLSY. Variables for occupation, industry, unemployment rate, SMSA, job training requirements, tenure, tenure squared, sex, marital status, experience, experience squared, number of children in the household, region, union coverage, establishment size, and government are included but not shown. The variable AFQT is the residual of a regression of raw AFQT score on age in 1980.

Table 3.10. Incentive Pay Wages by Sex--OLS Estimates
Dependent Variable: Log Wage
(t-statistics below coefficient estimates)

	Men	Women
Piece Rate	.511	-.327
	1.310	-1.133
Commission	-.485	-.295
	-2.577	-1.170
Bonus	-.362	.022
	-2.877	0.149
Tip	-.076	.306
	-0.234	1.331
AFQT	.003	.003
	8.305	7.034
Education	.038	.044
	7.612	8.276
AFQT*Piece Rate	.0005	-.002
	0.255	-0.996
AFQT*Commissions	-.0004	-.003
	-0.325	-1.548
AFQT*Bonus	-.0018	.0008
	-1.748	0.666
AFQT*Tips	.002	.001
	1.224	0.710
Education*Piece Rate	-.032	.025
	-1.018	1.073
Education*Commission	.045	.029
	3.195	1.571
Education*Bonus	.033	.002
	3.486	0.253
Education*Tips	.0013	-.017
	0.053	-0.967
F	47.52	39.88
N	2900	2573

Data are from the 1989 NLSY. Variables for occupation, industry, unemployment rate, SMSA, job training requirements, tenure, tenure squared, black, Hispanic, marital status, experience, experience squared, number of children in the household, region, union coverage, establishment size, and government are included but not shown. The variable AFQT is the residual of a regression of AFQT score, in percentile units, on age in 1980.

Table 3.11 Wage Gaps by Method of Pay and Occupation--OLS Estimates. Dependent Variable: Log Wage
(t-statistics below coefficients)

IP	.072	Customer-Oriented	-.012
	2.892	Services*IP	-0.136
Female	-.080	Female*Customer-	-.095
	-4.559	Oriented Services	-1.330
Black	-.037	Female*IP*Customer-	.189
	-1.980	Oriented Services	1.930
Hispanic	.019	Black*Customer-	.064
	0.988	Oriented Services	0.913
Female*IP	-.056	Black*IP*Customer-	-.252
	-1.775	Oriented Services	-2.255
Black*IP	.030	Hispanic*Customer-	.201
	0.772	Oriented Services	2.292
Hispanic*IP	.052	Hispanic*IP*	-.136
	1.163	Customer-Oriented Services	-1.066
OFL*IP	-.113	Sales*IP	.126
	-2.387		2.237
Female*OFL	-.068	Female*Sales	-.058
	-2.005		-1.176
Female*IP*OFL	.037	Female*IP*Sales	-.008
	0.569		0.111
Black*OFL	.001	Black*Sales	-.048
	.033		-0.762
Black*IP*OFL	.028	Black*IP*Sales	-.052
	0.423		-0.525
Hispanic*OFL	.019	Hispanic*Sales	.006
	0.506		0.104
Hispanic*IP*OFL	.078	Hispanic*IP*Sales	-.287
	0.875		-2.823
F			14.48
N			5473

The dummy IP = 1 if the respondent reported earning some form of incentive pay in his primary job. Variables included but not reported are industry, 387 3-digit occupational dummies, marital status, experience, experience squared, education, tenure, tenure squared, union coverage, log establishment size, dummies indicating training requirements, number of children in the household, region, SMSA, government employment, AFQT, and local unemployment rate. In addition, interactions between IP, occupation, and race or sex were included for clerks and other services, but are not shown to save space.

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