

IZA DP No. 1352

**Fairness and Freight-Handlers:
Local Labor-Market Conditions and
Wage-Fairness Perceptions in a Trucking Firm**

Eric Verhoogen
Stephen V. Burks
Jeffrey P. Carpenter

October 2004

Fairness and Freight-Handlers: Local Labor-Market Conditions and Wage-Fairness Perceptions in a Trucking Firm

Eric Verhoogen

Columbia University and IZA Bonn

Stephen V. Burks

University of Minnesota, Morris

Jeffrey P. Carpenter

Middlebury College and IZA Bonn

Discussion Paper No. 1352
October 2004

IZA

P.O. Box 7240
53072 Bonn
Germany

Phone: +49-228-3894-0
Fax: +49-228-3894-180
Email: iza@iza.org

Any opinions expressed here are those of the author(s) and not those of the institute. Research disseminated by IZA may include views on policy, but the institute itself takes no institutional policy positions.

The Institute for the Study of Labor (IZA) in Bonn is a local and virtual international research center and a place of communication between science, politics and business. IZA is an independent nonprofit company supported by Deutsche Post World Net. The center is associated with the University of Bonn and offers a stimulating research environment through its research networks, research support, and visitors and doctoral programs. IZA engages in (i) original and internationally competitive research in all fields of labor economics, (ii) development of policy concepts, and (iii) dissemination of research results and concepts to the interested public.

IZA Discussion Papers often represent preliminary work and are circulated to encourage discussion. Citation of such a paper should account for its provisional character. A revised version may be available directly from the author.

ABSTRACT

Fairness and Freight-Handlers: Local Labor-Market Conditions and Wage-Fairness Perceptions in a Trucking Firm*

This paper draws on evidence from an internal attitude survey in the freight-handling terminals of a unionized trucking firm to investigate the effect of local labor market conditions on employee wage-fairness perceptions. The key element of our research design is that local managers have no discretion to vary wage rates in response to local labor market conditions; local economic shocks thus generate exogenous variation in the attractiveness of the wage paid by the firm relative to employees' options in the outside labor market. We find robust associations between two indicators of local conditions – the rate of unemployment and the wages of similar workers in the outside market – and the wage-fairness perceptions of employees in the firm, which we argue reflects a causal relationship. As an extension, we relate the changes in local conditions and fairness perceptions to changes in employee performance, as measured by the rate of disciplinary dismissals. We find suggestive evidence that increased local unemployment leads to improved employee performance, and, conditional on a particular assumption about the mechanism through which local conditions affect performance, that increases in wage-fairness perceptions lead employees to supply more effort.

JEL Classification: J41, Z13, D23

Keywords: fairness, gift exchange, reference point, efficiency wage

Corresponding author:

Eric Verhoogen
School of International and Public Affairs
Columbia University
IAB, Room 1022
420 W. 118th St.
New York, NY 10027
USA
Email: ev2124@columbia.edu

* We would like to thank the firm we study for sharing data with us; Michael Belzer of the University of Michigan Trucking Industry Program (UMTIP) and an UMTIP project funded by the Sloan Foundation for facilitating data access; Michael Conyngham, Director of Research, International Brotherhood of Teamsters, for help in gathering contract wage data; Ken Chay, Damon Clark, Gabriel Demombynes, John DiNardo, Herb Gintis, Larry Katz, David Lee, David Levine, Peter Matthews, Justin McCrary, Matthew Rabin, Jesse Rothstein, Stan Sedo, Pete Swan, seminar participants at UC Berkeley and the Santa Fe Institute, and especially George Akerlof and David Card for helpful comments and discussions; and the McArthur Research Network on Norms and Preferences for funding. Carpenter would like to thank the National Science Foundation (SES-CAREER 0092953) and Verhoogen the McArthur Foundation Research Network on the Costs of Inequality for additional funding. We are of course responsible for any mistakes.

1 Introduction

What makes a wage fair? Identifying the determinants of employee wage-fairness perceptions is an important first step in giving empirical content to the gift-exchange view of efficiency wages (Akerlof, 1982, Akerlof and Yellen, 1990), which is based on the notion that employees will reciprocate a wage perceived as fair with hard work. The gift-exchange approach has gained increasing attention in recent years, in part because it is consistent with evidence from surveys of managers, who typically report that they believe employee behavior is influenced by fairness perceptions and that they take those perceptions into account in their wage and employment decisions,¹ and in part because a growing number of laboratory experiments have shown that subjects consistently reward behavior perceived as fair and punish behavior perceived as unfair, even at a cost to themselves in one-shot interactions.² The determinants of fairness perceptions are also central to an older industrial-relations literature on “orbits of coercive comparison” which considers the influence of fairness attitudes of rank-and-file union members on the bargaining behavior of union leaders (Ross, 1948).

Despite the attention that the role of fairness attitudes has received, we can still say little with confidence about the factors that shape employees’ wage-fairness perceptions in real workplaces. One conclusion that emerges from the experimental and quasi-experimental literature is that people tend to form fairness judgments in reference to an alternative transaction or aspect of behavior that has come to be seen as fair, often referred to as a *reference point* (Kahneman, Knetsch and Thaler, 1986). A second conclusion is that the process by which an alternative transaction comes to be seen as fair can be sensitive to apparently incidental details of the framing of an experiment or hypothetical situation. As a consequence, the experimental results are not a robust indicator of which reference points – the salaries of other employees in the same workplace, the profits of the firm, conditions in the outside labor market, or some other point of comparison – are salient for employees in real workplaces.

A number of empirical studies have documented correlations between employee attitudes and the wage differential between employees in the firm and workers in the outside labor market (Akerlof, Rose and Yellen, 1988; Cappelli and Sherer, 1988, 1990; Levine, 1993a; Lincoln and Kalleberg, 1988, 1990, 1996). This correlation is consistent with a variety of causal mechanisms, however, and studies in this literature have not been able to identify the effect of relative wages on attitudes separately from either the effect of selection of workers with management-friendly

¹ Agell and Lundborg, 1995; Bewley, 1999; Blinder and Choi, 1990; Campbell and Kamlani, 1997; Levine, 1993b. Bewley (2002) and Rotemberg (2002) provide useful surveys.

² For surveys, see Fehr and Gächter (2000), Gächter and Fehr (2002) and Rabin (1998).

attitudes into high-wage workplaces or the effect of unobserved heterogeneity across workplaces – for instance in the characteristics of managers – on both wages and attitudes. Indeed, manager surveys have suggested that managers do not believe outside labor market conditions have an important effect on employee morale.³

This paper investigates the influence of local labor market conditions on employee wage-fairness perceptions in a large, unionized U.S. trucking firm. We draw on employee-level responses to an internal attitude survey at 29 geographically dispersed freight-handling terminals in the firm, yearly over the period 1996-2000. The key element of our research design is that wages at each terminal are determined in collective bargaining at a national and regional level, and local managers have no discretion to vary wage rates in response to local labor market conditions. As a result, economic shocks in the local area surrounding each terminal generate exogenous variation in the attractiveness of the wage paid by the firm relative to employees' options in the outside labor market.⁴ We relate this variation to variation in employee attitudes, and argue that the relationship can be given a causal interpretation. As we will see below, our results differ sharply from those of the manager surveys.

As an extension, we examine the effect of local labor market conditions and employee fairness perceptions on employee performance, as measured by the rate of disciplinary dismissals. Our approach builds on the work of Cappelli and Chauvin (1991), who also relate outside labor market conditions to the dismissal rate in different establishments of a single, multi-establishment, unionized firm. The advantage of our study is that we observe each terminal over five years, and can control for time-invariant terminal-specific effects. A benefit of having shown local labor market conditions to be exogenous determinants of wage-fairness perceptions is that we may be able to use them as instruments in estimating the causal effect of fairness perceptions on employee performance, and we present these instrumental-variables estimates. In order for the local unemployment rate and the outside wage to be valid instruments for fairness perceptions, however,

³ Summarizing his findings from conversations with managers, Bewley (2002, p. 9) writes: “[E]mployees usually have little notion of a fair or market value for their services and quickly come to believe they are entitled to their existing pay, no matter how high it may be. Workers do not use pay rates at other firms as reference wages, for they know too little about them.” He acknowledges that unionized workers may be an exception to this rule. Levine (1993b, p. 1249), summarizing managers' responses to a series of hypothetical wage-setting scenarios, writes: “The interviews strongly supported the hypothesis that unemployment rates are not important determinants of pay changes in large organizations, since the respondents neither formally nor informally considered unemployment rates when determining pay adjustments.”

⁴ The institutional characteristics of the firm limit variation in internal wage structure and prevent us from evaluating the role of intra-firm wage differentials between different groups of employees. Also, because terminal managers are legally obligated to pay the wage specified in the union contract, we are not able to examine the role of intentions in the formation of fairness judgments, as emphasized by Rabin (1993). We test instead the original formulation of Akerlof (1982), in which the effect of relative wage premia on fairness perceptions does not depend on how the premia are brought about. The fact that wage premia in the firm we study are not a consequence of the intentional behavior of local managers should make it more difficult for us to find effects of local conditions on fairness perceptions.

it must be the case that they affect employee performance only through their effect on employee fairness perceptions. For this reason, our instrumental-variables results should be interpreted with caution.

2 The Firm

The firm we study is a large, national carrier in the less-than-truckload segment of the U.S. for-hire freight-hauling industry. The term less-than-truckload, as opposed to truckload, refers to companies that mainly move freight smaller than the capacity of a standard tractor-trailer.⁵ Unlike truckload companies, which require no special coordinating mechanism to ship freight between two points, virtually all successful less-than-truckload companies maintain a network of distribution terminals to collect freight from surrounding catchment areas and consolidate it into tractor-trailer-size loads for shipment to other terminals. Many of the larger firms in the industry organize such local terminals into hub-and-spoke networks, with a second level of consolidation taking place at hubs. Prior to the deregulation of the trucking industry in 1980, most firms provided both truckload and less-than-truckload services. Following deregulation, the industry divided sharply, with most firms specializing in one or the other segment. The less-than-truckload segment, with higher barriers to entry in the form of costs of establishing and maintaining a distribution network, has remained more oligopolistic than the truckload segment, although industry analysts agree that price mark-ups over costs are low (Nebesky et al, 1995) and in recent years smaller regional carriers have made inroads into the national market. The labor market in the industry has segmented in parallel with the product market, with wages and union coverage declining sharply in the truckload segment, but only slowly in the less-than-truckload segment (Burks, 2002; Belzer, 1994, 1995, 2000).

The hubs in the hub-and-spoke terminal networks are referred to in the industry as breakbulk terminals. The breakbulk terminals in the firm we study are evenly dispersed across the continental United States. In June, July or August of each year from 1996 to 2000, the firm paid an outside consultant to conduct an anonymous survey of attitudes of its employees. We have individual-level responses to the survey for 29 breakbulks.⁶ This paper focuses on the attitudes of dockworkers, the employees who load and unload freight. These workers are not drivers; they are stationed permanently on a loading dock in a particular terminal. The work they do is semi-skilled, requiring

⁵ The capacity of an entire tractor-trailer is about 45,000-50,000 lbs. A typical shipment in the less-than-truckload segment is 1,000 lbs.

⁶ The firm operates more terminals than we have data for. The exact number of terminals is not reported in order to preserve the confidentiality of the firm.

agile use of a forklift and some ingenuity to move and stack freight of varying size, weight, shape and fragility compactly and with a minimum of damage. We have data only on regular, full-time employees, not on contingent (“casual”) employees. The attitude survey consisted of a series of statements – 20 in 1996-1998, 40 in 1999-2000 – to which respondents were asked to agree or disagree. The statements addressed various aspects of social relations within each terminal, including communication between employees and managers, the quality of working conditions, and work rules and procedures. We focus on the statement regarding wage fairness: “I feel I am paid fairly for the kind of work I do.” Respondents filled in a bubble for one of three possible responses, “agree” “disagree” or “?”.⁷ In 1996, 1997, and 1998, respondents were also asked to report their age, education, race, sex, and tenure in the firm. In 1999 and 2000, partly in response to employee complaints, the demographic questions were dropped, but the tenure question remained. The average response rate to the attitude survey was 71.5% and varied little across breakbulks.

The results in this paper are based on two different samples: the “short” sample, which includes information on demographics as well as tenure and attitudes but only covers the years 1996-1998; or the “long” sample, which includes information on tenure and attitudes but not demographics and covers the years 1996-2000. Within each sample, observations with incomplete information have been discarded. Summary statistics on the short sample appear in the first panel of Table 1. The dockworkers in the firm are almost entirely male and approximately three-quarters white, with a higher-than-proportionate number of non-whites concentrated in a few terminals in the South. The modal worker is 31-40 years of age, with a high school diploma, although over 40% are older than 40, and over 40% have some college experience or a college degree. Roughly 35% of workers in the firm have more than 10 years of tenure, and roughly 70% consider themselves to be paid fairly. Summary statistics on tenure and fairness responses for the long sample appear in the second panel of Table 1, and are similar to those for the short sample.

Workers in the firm are unionized, and represented by the International Brotherhood of Teamsters. Two characteristics of the collective bargaining process are especially relevant. The first is that the pattern of changes in wages and working conditions are determined at a national and regional level by negotiations between the Teamsters union and a consortium of national trucking firms. The national negotiations, codified in the National Master Freight Agreement, set the pattern of wage increases over the life of the contract. Relatively small adjustments can then be made at a regional level in supplements to the national agreement, again as the result of negotiations between the union and the consortium of firms. The second noteworthy characteristic of

⁷ One unfortunate characteristic of the attitude data is that missing values were given the same code as “?” responses, and are indistinguishable from those responses. In unreported results, we estimated models treating the “?” as missing, as “agree” responses, and as “disagree” responses. The results are similar to those reported here.

the collective bargaining process is that in the days of James R. Hoffa in the 1960s, the Teamsters union successfully bargained for a nationally uniform wage for each category of employees, to prevent employers from shifting work geographically to reduce wages (Levinson, 1981). This wage structure persists, and still specifies nearly identical wages for workers doing similar jobs across the country, despite large variations in regional labor market conditions.

As a consequence of this institutional priority of the union, wages in the firm vary little across breakbulk terminals.⁸ The average real base wage over the period is \$17.80/hour in 1996 dollars, and the standard deviation within a given year is never more than \$.08. Wage increases each year were roughly constant across terminals. New (non-casual) hires receive 75% of the base wage initially, 80% after 1 year, 90% after 18 months, and 100% after 2 years, after which they receive the base wage for the remainder of their tenure in the firm. Because newly hired workers can expect to rise up the wage ladder so quickly, we assume that new hires take the full base wage to be the relevant wage in forming fairness judgments; the results are not affected if we assume instead that they focus on the actual new-hire wage.

The crucial aspect of this wage-setting process for our study is that local managers have no discretion to adjust wage rates at the terminal level. Variation in local labor market conditions thus generates exogenous variation in the attractiveness of the wage paid by the firm relative to employees' outside options. In addition, the fact that all terminals are part of the same firm and report to the same corporate managers guarantees a certain degree of homogeneity across terminals in workplace practices. There are differences in management styles and in the history of labor-management relations across terminals, however, and local managers have discretion over how many overtime hours are offered to regular, full-time employees. We return to these points below.

The firm provided us with data on the number of new hires and permanent separations in each terminal in each year. We also know the type of separation: dismissal, resignation in lieu of dismissal, quit, retirement or death. We take the rate of disciplinary dismissals – the number of dismissals and resignations in lieu of dismissal in a given calendar year as a fraction of total employment at the time of the attitude survey – as our measure of employee performance. This measure does not capture layoffs due to fluctuations of the freight flow in each terminal. Under the union contract, permanent (i.e. not “casual”) workers who are laid off retain indefinitely the right to be recalled; the firm does not count such layoffs as dismissals. The dismissal rate is a measure of serious behavioral infractions. The union grievance procedure makes it costly for the firm to fire employees without strong contractual grounds, and although it would be possible for

⁸ A complete table of base wage rates at each terminal in each year is available from the authors.

the firm to build a case against an employee who had low productivity, typically dismissals are the result of a clear pattern of violations of contractually sanctioned disciplinary rules, such as those against stealing, coming to work drunk, excessive tardiness, or unexcused absences. While the dismissal rate does not correspond exactly to the effort variable in many efficiency-wage models, namely the fraction of time spent working, it does provide a measure of employees' dedication to the job, or effort broadly construed.

The firm also made available the measure it uses internally to track the workload in each terminal. The firm's industrial engineers have calculated how long each task involved in loading or unloading a truck (e.g. "push empty cart into trailer," "carefully read freight label," "walk laden to cart unobstructed") should take to complete. On the basis of these measurements, they calculate the length of time the bundle of tasks that each freight load represents should take to complete. We refer to the predicted time required for all freight passing through a terminal in a given year as the terminal's "projected work-time." Note that the composition of freight is determined by factors outside of each breakbulk, and can be taken to be exogenous to employee attitudes and performance within the terminal. Summary statistics on the terminal-level variables (as well as unemployment and the outside wage terms, which are explained below) appear in Table 2.

3 Indicators of Local Labor Market Conditions

This paper focuses on two indicators of local labor market conditions: the local unemployment rate and the wage received by similar workers in the outside labor market. The definition of local labor markets is explained in detail in the data appendix; as a general rule, the local labor market is taken to be the Metropolitan Statistical Area (MSA) in which a given terminal is located. The measure of local unemployment is the average yearly unemployment from the Local Area Unemployment Statistics published by the Bureau of Labor Statistics (BLS).

Our measures of the wages of similar workers in the outside labor market are constructed as follows. We estimate a wage equation on pooled 12-month samples of full-time male workers from the Merged Outgoing Rotation Groups (MORGs) of the Current Population Survey (CPS), regressed separately for each local labor market in each year. (Details on selection of the sample appear in the data appendix.) There are a number of ways that one might specify the wage equations. If we think that workers in the firm compare their wage to the wage that they themselves would receive if they lost their jobs, then we should regress wages only on demographic characteristics and perhaps occupation. If, on the other hand, we think that workers compare themselves to

workers in similar jobs in the outside market, then we should include an indicator of union status as well. The theoretical and experimental literatures on fairness do not provide much guidance in making this decision. We prefer the latter specification, because our sense is that workers have better information about the wages of workers in similar jobs than about the wage they themselves would receive if they lost their job. The former specification is also plausible, however, and we report results using both approaches.

Using our preferred specification, we estimate the following equation, separately for each local labor market in each year:

$$w_{kjt} = \pi_{0,jt} + D'_{1,kjt}\pi_{1,jt} + D'_{2,kjt}\pi_{2,jt} + D'_{3,kjt}\pi_{3,jt} + D'_{4,kjt}\pi_{4,jt} + D'_{5,kjt}\pi_{5,jt} + \varepsilon_{kjt} \quad (1)$$

where k indexes individuals within a local-labor-market-year in the CPS; j indexes local labor markets; t indexes years; w represents the log real hourly wage, deflated by a regional price index (see the data appendix for details); D_1 , D_2 , and D_3 are vectors of dummy variables for age, education and race, defined according to the demographic categories in the firm's attitude survey; D_4 is a dummy variable indicating blue-collar or white-collar occupation; and D_5 is a dummy variable indicating union status. It is not possible to estimate a more general model with detailed occupation indicators or interactions of the various demographic indicators because of insufficient numbers of observations for each MSA-year in the CPS.

On the basis of these regressions, we construct two different outside wage measures. For the first measure, which we refer to as the *individual-specific outside wage*, each individual in the firm is assigned the predicted log real wage for a blue-collar, unionized full-time male worker with identical age, race and schooling characteristics in the CPS regression. This method has the advantage that it takes the human capital and other individual characteristics of workers into account in calculating the relevant outside wage, but the shortcoming that it can calculate the outside wage only for the three years for which we have complete demographic data in the attitude survey. For the second measure, which we refer to as the *weighted-average outside wage*, the proportions of employees in the firm in each age-education-race group in each terminal in 1996 are used as weights in an average of the outside wages for each age-education-race group in the CPS. This is our preferred measure, because it allows us to construct an outside wage for all five years for which we have attitude data. Taking the estimated coefficients from the CPS wage regressions, the two outside log-wage terms, the individual-specific outside wage, ow , and the weighted-average outside wage, \overline{ow} , are calculated as follows:

$$ow_{ijt} \equiv \widehat{\pi}_{0,jt} + D'_{1,kjt}\widehat{\pi}_{1,jt} + D'_{2,kjt}\widehat{\pi}_{2,jt} + D'_{3,kjt}\widehat{\pi}_{3,jt} + D'_{4,kjt}\widehat{\pi}_{4,jt} + D'_{5,kjt}\widehat{\pi}_{5,jt} \quad (2)$$

$$\overline{ow}_{jt} \equiv \sum_g \lambda_{gj,1996} [ow_{gjt}] \quad (3)$$

where i indexes individuals in the firm, j indexes terminals, t indexes years, D_1 , D_2 , D_3 , D_4 , and D_5 are defined as above, g indexes all possible age-education-race combinations, and $\lambda_{gj,1996}$ is the proportion of dockworkers in terminal j in year 1996 corresponding to age-education-race combination g . Table 2 contains summary statistics for the local unemployment rate and the outside wage terms.

4 Local Labor Market Conditions and Fairness Perceptions

4.1 Econometric Model

One consequence of the near-uniformity of wage structure across the terminals is that the gap between the wage employees receive in the firm and the outside wage varies significantly in the sample. The weighted-average outside wage (in dollar terms rather than the logarithm), varies from \$10.84 per hour to \$18.97 per hour. This cross-sectional variation in outside wages is negatively correlated with cross-sectional variation in fairness perceptions. The correlation, however, may not reflect a causal relationship. There may be unobserved heterogeneity across terminals correlated both with the wage gap and employee attitudes, for instance, if employees are inherently less likely to think of their wage as fair in regions of the country with histories of labor-management conflict (i.e. the industrial Midwest and Northeast), which also happen to be the places where the outside wage is high. A stricter test of the relationship between local conditions and fairness perceptions would control for time-invariant influences such as regional cultural differences. For this reason, we include terminal fixed effects in our baseline estimates.

The period of this study, 1996 to 2000, saw a steady expansion of the national economy and a steady tightening of labor markets. The indicators of labor market conditions display a common national trend in the direction of lower unemployment over time. If attitudes display a trend for reasons unrelated to local labor market conditions, then a regression of attitudes on external conditions may generate a spurious positive association. To control for this possibility, as well as for region-invariant factors such as the negotiation of a new collective bargaining contract in 1998 and company-wide changes in management practices, we also include year effects in some estimations.

We would expect workers' wage-fairness perceptions to depend in part on the real purchasing power of their wage. Nominal wages were nearly the same across terminals in the period of our study, but the prices of consumer goods differed. Time-invariant regional differences in price levels

are captured by the terminal fixed effects and region-invariant inflation is captured by the year effects, but different regions experienced different rates of inflation over time. For this reason, the regressions include the log of the base wage deflated by our region-specific price index.

It may be that workers with certain observable characteristics are inherently more likely to think their wage is fair or unfair. For regressions using the weighted-average outside wage and all five years of data, indicators for tenure category are included. For regressions using the individual-specific predicted wage and limit the estimation to the years 1996-1998, a full set of indicator variables for age, education, race, sex and tenure categories are included. We might also expect the nature of the freight flow to affect workers' fairness perceptions; the more onerous the task of unloading or loading, the less fair we would expect a worker to consider his wage. The firm's projected work-time measure has been designed to capture differences in the amount of time required to move particular loads of freight, and we take it as an indicator of the onerousness of the work.

We rank the responses to the fairness question in the order "disagree", "?", "agree", and estimate the model as an ordered logit. Expressed as a latent-variable model, the model is the following:

$$f_{ijt}^* = \theta_0 + U_{jt}\theta_1 + (ow)\theta_2 + w_{jt}\theta_3 + y'_{ijt}\theta_4 + s'_{jt}\theta_5 + \phi_j + \mu_t + v_{ijt} \quad (4)$$

$$f_{ijt} = -1 + \sum_{r=1}^2 1(f_{ijt}^* \geq c_r) \quad (5)$$

where i indexes individuals within a terminal-year, j indexes terminals, and t indexes years; U is the local unemployment rate; ow is one of the predicted outside wage terms, \overline{ow}_{jt} or ow_{ijt} ; w is the logarithm of the real base wage; y is a vector of indicators variables for individual characteristics, the dimension of which will vary according to which sample is used; s is the logarithm of projected work-time; ϕ is a terminal fixed effect; μ is a year effect; f^* is the latent fairness response, f is the observed fairness response (coded $-1, 0, 1$); the c_r (for $r = 1, 2$) are cut-points; and $1(\)$ is an indicator function, taking the value 1 if the enclosed expression is true, 0 otherwise. The distribution of the error term, v , is assumed to be logistic. The standard errors reported in all tables have been corrected to account for noise in measurement of the outside wage term (Murphy and Topel, 1985). Because the unemployment variable varies only at the terminal-year level, we cluster errors by terminal-year.

4.2 Results

Figures 1-4 present a simple graphical depiction of the main results on the determinants of fairness perceptions. Figures 1 and 2 present raw cross-sectional scatterplots of fairness perceptions in each terminal against the local unemployment rate and the weighted-average outside wage, with each variable averaged over the 5-year period 1996-2000.⁹ Figures 3 and 4 present scatterplots of the terminal-year average fairness perception against unemployment and the outside wage, each variable deviated from the 5-year terminal means. The regression lines are weighted by the number of respondents in each terminal. The most remarkable pattern in the data is evident in Figures 1 and 3: unemployment bears essentially no relationship to fairness perceptions in cross-section, but a strong and readily apparent positive relationship once terminal fixed effects are removed. Figures 2 and 4 suggest that the outside wage is negatively related to fairness perceptions both without and with terminal fixed effects, although the relationship is weaker than for the unemployment rate once terminal effects are included.

Table 3 presents the baseline estimates of the effect of local labor market conditions on wage-fairness perceptions, using the weighted-average outside wage and the long sample. There is no significant relationship between the local unemployment rate and wage-fairness perceptions without terminal fixed effects in column (1). Once fixed effects are included in column (2), however, the positive relationship between unemployment and fairness perceptions shows up strongly, with a t-statistic of 4.98. Deviations of the local unemployment rate from average levels, in other words, appear to be more salient for fairness judgments than the average levels themselves. Once year effects are included in column (3), the magnitude of the unemployment coefficient drops by more than 50%, but remains significant.¹⁰ We conclude that variation in the unemployment rate within a local labor market is a quite robust predictor of within-terminal variation in wage-fairness perceptions. The negative association between our preferred outside wage measure and fairness perceptions is also robust. The coefficient on the outside wage term is significant and of the expected sign without terminal fixed effects. The coefficient is marginally significant when terminal fixed effects are included, and again significant at the 95% level when both terminal and year effects are included.¹¹

Tenure is also a strong predictor of employee wage-fairness perceptions. Employees are decreas-

⁹ In calculating the average fairness perceptions, “agree” responses were assigned the value 1, “?” the value 0, and “disagree” the value -1.

¹⁰ This may be because much of the decrease in unemployment was common across regions and the year effects absorb much of the signal in the unemployment measure. A lower signal-to-noise ratio in the deviations from the national trend would exacerbate attenuation bias in the unemployment coefficient in these estimates.

¹¹ Note that attenuation bias due to measurement error in the outside wage term – which is constructed from the (noisy) coefficients from a CPS wage regression – may make it less likely for us to find a statistically significant relationship than in the case of unemployment.

ingly likely to consider their wage fair as their tenure increases. There are at least two possible explanations. One is that the tenure profile in the firm reaches the maximum wage quickly: workers with 25 or 30 years of seniority are paid the same wage as those with 2 years. While this reflects the bargaining priorities of the Teamsters union as a whole, it may not reflect the fairness notions of all individual employees. Another possible explanation is a change in overtime-allocation rules in the 1994-1998 National Master Freight Agreement. Prior to 1994, terminal managers were not allowed to hire temporary, “casual” dockworkers until all of the regular dockworkers had worked all the overtime hours they wished to work. Beginning with the 1994-1998 contract, terminal managers were allowed to hire casual dockworkers as soon as all regular dockworkers have worked 40 hours in a given week. Because the wage rate for casuals was significantly lower than the overtime rate for regular dockworkers, they tended to do so. The result was a significant decline in overtime earnings for regular dockworkers since 1994. At the same time, a large category of hourly employees with whom dockworkers interact frequently, pick-up and delivery drivers, saw no such change in overtime earnings. Dockworkers who were employed before 1994 may resent the change in overtime policy more than low-tenure workers. Unfortunately, because the attitude data only cover the period 1996-2000, it is not possible to differentiate between these two explanations.

The log of the real wage in each terminal enters as we would expect in columns (1) and (2): as the real value of the wage rises, employees are more likely to consider it fair. Once year effects are included in column (3), the sign flips and the standard error rises. The reason is that the terminal fixed effects and the year effects capture almost all of the variation in wages at the terminal level, and the real wage term in column (3) is identified on the basis of a small number of terminals with atypical wage changes over the period – in particular, one large terminal in which a wage increase relative to other terminals in 1998 was accompanied by an unrelated deterioration in wage-fairness attitudes.

Table 4 presents results using alternative specifications of the outside wage term. Columns (1)-(2) report estimates of the basic model using the individual-specific outside wage and the short sample, taking full advantage of the individual-level demographic information available in the attitude survey. Schooling is not a good predictor of fairness perceptions; nor is sex, although there are very few women in the sample against which to identify the male coefficient. Controlling for tenure, workers older than 50 are more likely to consider their wage fair than younger workers; in other words, the workers with the most positive attitude toward their wage are recently hired older workers. Non-white workers are less likely to consider their wage fair than white workers. The coefficient on race is only marginally significant, but is relatively constant across specifications. The important message of columns (1)-(2), however, is that the outside wage term remains

significant, even after controlling in more detail for the demographics of employees and focusing the outside comparison on workers with identical characteristics. The coefficient estimates are statistically distinguishable from zero, but not from the estimates using the long sample and the weighted-average outside wage in columns (2)-(3) of Table 3. The coefficient on the unemployment term is no longer significant when year effects are included. This can be attributed to the fact that to carry out the estimations in columns (1)-(2) approximately 40% of the data has been discarded. The smaller sample size naturally lowers significance levels. Note that the point estimates for the unemployment coefficient in the long sample are not greatly affected by varying the definition of the outside wage term.

Columns (3)-(4) and (5)-(6) of Table 4 present results for the weighted-average outside wage term, but using two alternative specifications of the underlying CPS wage equation. Alternative 1 includes demographic indicators and a blue-collar indicator but not a union indicator. Alternative 2 includes demographic indicators but neither a blue-collar indicator nor a union indicator. The coefficients on the outside wage terms are no longer significant with terminal fixed effects. The differences between these results and those using the preferred measure are largely attributable to differences in the patterns of union wage premia between the North and the South, which have been noted by Lewis (1986). Although we believe that the comparison with unionized, blue-collar workers with similar demographic characteristics in the outside labor market is the most salient comparison for wage-fairness judgments, the fact that plausible alternative comparisons do not yield statistically significant results suggests some caution is warranted in interpreting the results on the effect of outside wages.

To facilitate interpretation of the size of the coefficients, Table 5 presents the marginal effects corresponding to the coefficient estimates in columns (2)-(3) in Table 3. The effects in columns (1)-(3) of Table 5, corresponding to the model including terminal fixed effects but not year effects, indicate that an increase of 1% (slightly less than one standard deviation) in the local unemployment rate is associated with a 6.2% increase in the probability that the average employee in the firm will consider his wage fair, and a 4.8% decrease in the probability that he will consider it unfair. A one-standard-deviation increase in the outside wage term will decrease the probability of a fair response by approximately 1.7%, and increase the likelihood of an unfair response by 1.3%. The corresponding numbers for the model including both terminal and year effects are 3.0% and 2.4% for unemployment, and 1.9% and 1.5% for the outside wage.

Do these estimates reflect a causal effect of local conditions on fairness perceptions? Here we consider two plausible counter-arguments: that the association is due to heterogeneity across terminals in the provision of overtime work and that it is due to the selection of workers with

management-friendly attitudes into workplaces with high relative wages.¹²

While individual terminal managers in the firm do not have discretion over base wage rates, they do have discretion over the amount of overtime work offered to employees. If it were the case that terminal managers increased the amount of overtime offered when local labor markets were slack, then we would expect to observe a positive correlation between unemployment and earnings in the terminal and hence a positive correlation between unemployment and wage-fairness perceptions. The correlation between overtime hours as a percentage of total hours and unemployment, however, is negative.¹³ A similar result holds for the outside wage term. Managers were more likely to offer overtime when labor markets were tight and replacement workers were hard to find, and heterogeneity in the provision of overtime work cannot explain the observed correlations of local conditions and fairness perceptions.

In periods of high unemployment in the local labor market, the firm may be able to hire better-quality workers for a given wage. If these better-quality workers are inherently more likely to have a positive attitude regarding the fairness of their wage, then we might observe a positive correlation between unemployment and fairness perceptions due solely to this selection effect. Since it is not possible to follow individual employees over time, we cannot control for such selection directly. Our primary strategy in addressing this issue is to examine the sensitivity of different tenure groups to local conditions.¹⁴ If terminals were actively selecting new employees on the basis of worker quality, then we would expect the wage-fairness perceptions of newly hired workers to be more responsive to slack in the local labor market than those of workers with more tenure, since the total effect of local conditions on the wage-fairness perceptions of newly hired workers would be the sum of two effects: the direct effect of local conditions on wage-fairness perceptions, and the effect of hiring more management-friendly new employees.¹⁵ Table 6 presents estimates of the basic model with unemployment and the outside wage interacted with the dummy variables for the four tenure categories; columns (1) and (2) interact only unemployment with tenure, columns (3) and (4) interact only the outside wage term with tenure, and columns (5) and (6)

¹² We also examined the relationship between response rates and local labor market conditions and found no correlation.

¹³ When we regress overtime hours as a percentage of total hours on unemployment and terminal fixed effects, weighted by the number of respondents, the coefficient on unemployment is -.30, with a robust standard error of .38.

¹⁴ In unreported results, we use each new hire's predicted rank in the CPS wage distribution as an index of the desirability of his or her observable characteristics, and find that new hires do not have significantly more desirable observable characteristics in periods of low unemployment than in periods of high unemployment. Using an additional question from the attitude survey, we also find that the responsiveness of employee attitudes to external conditions is limited to wage-fairness perceptions, rather than perceptions of the fairness of management more generally. Both results also argue against the selection interpretation.

¹⁵ Theories of internal labor markets, such as that of Doeringer and Piore (1971), suggest that low-tenure workers may be less insulated than high-tenure workers from conditions in outside labor markets. This would lead us to expect that low-tenure workers would be even more responsive to outside unemployment.

interact both unemployment and the outside wage with tenure. In all specifications involving the unemployment interactions, the slope of the fairness-unemployment relationship is steeper for the tenure categories 1-5 years, 6-10 years and greater than 10 years than for the omitted <1 category. We can reject the hypothesis that the slope on the unemployment term is greater for the new hires than for the 1-5 years and 6-10 years tenure groups at the 95% significance level in columns (1), (2), (5) and (6). We cannot reject the hypothesis that the coefficient on the outside wage term is of greater magnitude for workers with less than one year of tenure than for the other tenure groups, but the point estimates in columns (5) and (6) suggest that higher-tenure groups are, if anything, more responsive to changes in outside wages than new hires. In sum, it does not appear to be the case that the fairness perceptions of new hires are more sensitive to local conditions than those of higher-tenure workers.

In addition, if terminal managers were actively selecting higher-quality workers with more positive attitudes in periods of slack labor markets, then we would expect to see them firing more workers in such periods to take advantage of the presumably higher-quality pool of applicants. Section 5 will present evidence that terminals fire *fewer* workers in periods of high unemployment, controlling for terminal fixed effects.

Although we cannot definitively rule out the selection hypothesis, the available evidence suggests that selection effects are unlikely to be the most important explanation for the positive correlation between unemployment and wage-fairness perceptions. We therefore feel confident that the unemployment-wage fairness relationship can be interpreted as a causal effect: an increase in the local unemployment rate leads employees to consider that they are being paid more fairly, and a decrease has the opposite effect. The analogous relationship between the outside wage and wage-fairness perceptions also appears to be causal, subject to the caveat that plausible alternative methods of constructing the outside wage term yield less robust estimates.

5 Extension: Local Labor Market Conditions, Fairness Perceptions and Employee Performance

A key advantage of having identified the impact of local labor market conditions on wage-fairness perceptions is that we may be able to use those conditions as instruments for fairness perceptions to estimate the effect of fairness perceptions on employee performance. This section presents the results of such an instrumental-variables procedure, using the rate of disciplinary dismissals as our

measure of employee performance.¹⁶

To facilitate the interpretation of the results, we adopt a linear model for the first-stage regression of fairness perceptions on local labor market conditions.¹⁷ The first-stage equation is a linearized version of equation (4) above, with the fairness responses coded -1, 0, 1:

$$f_{ijt} = \theta_0 + U_{jt}\theta_1 + (ow)\theta_2 + w_{jt}\theta_3 + y'_{ijt}\theta_4 + s'_{jt}\theta_5 + \phi_j + \mu_t + v_{ijt} \quad (6)$$

with variables defined as in equation (4).

Because the rate of disciplinary dismissals is observed only at the terminal level, we use terminal-level averages of the predicted fairness responses and the first-stage covariates in the second stage equation. The second stage model is:

$$R_{jt} = \alpha_0 + \widehat{f}_{jt}\alpha_1 + w_{jt}\alpha_2 + \overline{y}'_{jt}\alpha_3 + s'_{jt}\alpha_4 + \phi_j + \mu_t + \eta_{jt} \quad (7)$$

where j and t index terminals and years as above, R is the dismissal rate; \widehat{f} and \overline{y} are terminal-year averages of \widehat{f} , the predicted values from the first stage, and y as defined above; w is the log of the real base wage; s is the logarithm of projected work-time, and ϕ and μ are terminal and year effects, as above; and η is a disturbance. Standard errors in the second-stage equation are adjusted to account for the noise in the terminal-year-average fairness term, \widehat{f} , arising both from the noise in the outside wage term and from the estimation of the coefficients in the first-stage equation. We have one observation per terminal-year, with one terminal missing attitude data in one year: 144 observations total. The estimates are weighted by the number of respondents to the attitude survey in each terminal-year.

The local unemployment rate and the outside wage term are valid instruments for wage-fairness perceptions under two assumptions: first, that they are uncorrelated with the disturbance term in the employee-performance equation in the second stage; and second, that they influence employee performance only through their effect on wage-fairness perceptions. The second assumption, the exclusion restriction, is particularly open to doubt. It is plausible that local labor market conditions influence employee performance through an alternative channel, by affecting the cost

¹⁶ The firm also made available its measure of the actual work-time taken to unload freight, normalized by the project work-time measure described in Section 2, which it uses internally to track terminal productivity. We did not find a significant association of actual work-time with local conditions once we controlled for terminal fixed effects. We believe that this is because actual work-time depends on a variety of factors outside of dockworkers' control – the availability of forklifts, the timing of arrivals of trucks (which may determine whether they can be unloaded at the most convenient dock) etc. – and does not respond as directly to employee behavior as the dismissal rate.

¹⁷ We also conducted the analysis using a binary logit (treating “?” responses as missing) in the first stage, and found results similar to those reported here.

of job loss and hence the expected payoff to shirking, as in the labor-discipline models of Bowles (1985) and Shapiro and Stiglitz (1984). It is not possible for us to distinguish these two channels in our data, and for this reason the IV results we present in this section should be viewed as valid only conditionally: if local conditions affect the dismissal rate only through fairness perceptions, then our results estimate the causal effect of fairness perceptions on the dismissal rate. Note that this concern does not apply to our reduced-form estimates of the effect of local conditions on employee performance, since these do not require us to take a position on the mechanism through which local conditions exercise their influence.

The results from estimation of this modified two-stage least squares model are presented in Table 7. The first-stage results presented in columns (1)-(2) are consistent with the ordered-logit results presented in Table 3. The reduced-form results presented in columns (3)-(4) are closely related to the specification of Cappelli and Chauvin (1991).¹⁸ The advantage of our study is that we have data on a panel of workplaces, rather than a cross-section, and can control for terminal fixed effects. Despite the relatively small number of observations, we find a statistically significant negative relationship between the local unemployment rate and the rate of disciplinary dismissals when we include terminal effects, consistent with the predictions of both gift-exchange and labor-discipline models. The effect appears to be economically significant: the point estimate indicates that a 1% increase in the local unemployment rate is associated with a .75% decrease in the dismissal rate – approximately one third of the mean dismissal rate in the sample (or .4 standard deviations). The unemployment coefficient drops in magnitude and is no longer statistically significant once year effects are included (column (4)). As mentioned above, however, it may be that the year effects are absorbing the effect of the national downward trend in unemployment, and that including the year effects is exacerbating attenuation bias due to measurement error in the unemployment term. The appropriate model may in fact be the fixed-effects specification of column (3).

Columns (5)-(6) report the second-stage estimates from our IV procedure. Under the assumption that local conditions affect the dismissal rate only through fairness perceptions, the estimates with terminal fixed effects (column (5)) provide evidence that an increase in fairness perceptions reduces the dismissal rate. The point estimates suggest an economically significant effect: a 1% increase in the local unemployment rate will lead to an increase of approximately .1 in the average wage-fairness perception (column (1)), which will in turn lead to a .6% decline in the dismissal rate (column (5)). The point estimate in column (5) is several times greater in magnitude than

¹⁸ Because the disciplinary dismissal rate was censored at zero in 22 of the 144 terminal-years in our data, we estimated a tobit model on the same equation. The results were similar to the linear model.

the corresponding (uninstrumented) ordinary least squares estimate (column (7)), which suggests that an omitted variable such as local management style, correlated positively with both fairness perceptions and the dismissal rate, may indeed be biasing the naive OLS procedure. It is important to note, however, that the coefficient estimate is on the margin of statistical significance in column (5) and much smaller in magnitude and statistically insignificant once year effects are included in column (6). These results on the link between fairness perceptions and dismissal rates should be considered suggestive rather than definitive.

6 Conclusion

This paper has presented robust evidence that the unemployment rate and the wage of similar workers in the external labor market are important reference points – or components of a composite reference point – for employee wage-fairness judgments in the firm we study. To our knowledge, ours is the first study based on observations of workers in real workplaces to identify the effect of credibly exogenous determinants of employee wage-fairness perceptions. Our results stand in contrast to findings from surveys of managers, which suggest that external labor market conditions are not important in determining employees’ wage-fairness perceptions (Bewley, 2002; Levine, 1993b).¹⁹ While our research design does not permit us to evaluate the relative importance of internal versus external reference points in the formation of wage-fairness judgments, the results do suggest that in the future formal models and empirical tests of the role of fairness perceptions should explicitly take external labor market conditions into account. An interesting question that remains unanswered is whether the unemployment rate and outside wage affect fairness judgments simply because they enter into an individual’s calculation of his expected payoff in the outside labor market or because they are in themselves salient points of comparison.

This paper has also presented weaker evidence on the effect of local labor market conditions and wage-fairness perceptions on employee performance. Although the results are not robust in the strictest specification, we find suggestive evidence that increases in unemployment in the local labor market reduce the within-terminal dismissal rate, and that increased wage-fairness perceptions have the same effect. In part, the non-robustness of the results for employee performance may be due to the fact that the dependent variable varies only at the terminal-year level. More compelling estimates of the effect of local conditions and fairness perceptions on employee performance may have to await a research design that combines exogenous variation in the determinants of fairness

¹⁹ Our finding that local labor market conditions matter also contrasts with the view of Arthur Ross (1948, p. 53) that “Locality ... is of limited relevance for wage determination.”

perceptions with data linking attitudes and productivity at the level of individual employees.

References

- Akerlof, George. 1982. "Labor Contracts as Partial Gift Exchange." *Quarterly Journal of Economics* 97, 4, 543-569.
- and J. Yellen. 1990. "The Fair Wage-Effort Hypothesis and Unemployment," *Quarterly Journal of Economics* 105, 255-283.
- , Andrew Rose and Janet Yellen. 1988. "Job Switching and Job Satisfaction in the U.S. Labor Market." *Brookings Papers on Economic Activity II*, 495-582.
- Belzer, Michael H. 1994. *Paying the Toll: Economic Deregulation of the Trucking Industry*. Washington, DC: Economic Policy Institute.
- . 1995. "Collective Bargaining after Deregulation: Do the Teamsters Still Count?" *Industrial and Labor Relations Review* 48, 636-655.
- . 2000. *Sweatshops on Wheels: Winners and Losers in Trucking Deregulation*. New York NY: Oxford University Press.
- Bewley, Truman. 1999. *Why Wages Don't Fall During a Recession*. Cambridge, MA: Harvard University Press.
- . 2002. "Fairness, Reciprocity and Wage Rigidity." Cowles Foundation Discussion Paper #1383, Yale University.
- Bowles, Samuel. 1985. "The Production Process in a Competitive Economy: Walrasian, Neo-Hobbesian and Marxian Models." *American Economic Review* 75, 1:16-36.
- Burks, Stephen V. 2002. "A Social Preferences Approach to Segmentation of the Labor and Product Markets in the U.S. Trucking Industry." Unpub. Paper, University of Minnesota, Morris.
- Campbell, Carl M. and Kunal Kamalini. 1997. "The Reasons for Wage Rigidity: Evidence from a Survey of Firms." *Quarterly Journal of Economics* 112, 759-89.
- Cappelli, Peter and Keith Chauvin. 1991. "An Interplant Test of the Efficiency Wage Hypothesis." *Quarterly Journal of Economics* 106, 769-787.
- Cappelli, Peter and Peter Sherer. 1988. "Satisfaction, Market Wages and Labor Relations: An Airline Study." *Industrial Relations* 27, 57-73.
- and ----- . 1990. "Assessing Worker Attitudes in a Two-Tier Wage Plan." *Industrial and Labor Relations Review* 43, 225-44.
- Doeringer, Peter and Michael Piore. 1971. *Internal Labor Markets and Manpower Analysis*. Lexington MA: D.C. Heath.
- Fehr, Ernst and Simon Gächter. 2000. "Fairness and Retaliation." *Journal of Economic Perspectives* 14, 3: 159-182.
- Gächter, Simon and Ernst Fehr. 2002 "Fairness in the Labor Market – A Survey of Experimental Results." In Friedel Bolle and Marco Lehmann-Waffenschmidt eds. *Surveys in Experimental Economics*. Physica Verlag.
- Hirsch, Barry and Edward Schumacher. Forthcoming. "Match Bias in Wage Gap Estimates Due to Earnings Imputation." *Journal of Labor Economics*.

- Kahneman, Daniel, Jack L. Knetsch, and Richard H. Thaler. 1986. "Entitlements in the Market: Fairness as a Constraint on Profit-seeking." *American Economic Review* 76, 728-741.
- Levine, David I. 1993a. "What Do Wages Buy?" *Administrative Science Quarterly* 38, 462-483.
- _____. 1993b. "Fairness, Markets and Ability to Pay: Evidence from Compensation Executives." *American Economic Review* 133, 1241-1259.
- Levinson, Harold M. 1981. "Trucking." In *Collective Bargaining: Contemporary American Experience*, Gerald Somers ed. Madison WI: Industrial Relations Research Association.
- Lewis, H. Gregg. 1986. *Union Relative Wage Effects: A Survey*. Chicago: University of Chicago Press.
- Lincoln, James R. and Arne Kalleberg. 1990. *Culture, Control and Commitment*. Cambridge U.K.: Cambridge University Press.
- _____. and _____. 1996. "Commitment, Quits, and Work Organization in Japanese and U.S. Plants." *Industrial and Labor Relations Review* 50, 39-59.
- Murphy, Kevin M. and Robert H. Topel. 1985. "Estimation and Inference in Two-Step Econometric Models." *Journal of Business and Economic Statistics* 3, 370-379.
- Nebesky, William, B. Starr McMullen and Man-Keung Lee. 1995. "Testing for Market Power in the U.S. Motor Carrier Industry." *Review of Industrial Organization* 10, 559-76.
- Rabin, Matthew. 1993. "Incorporating Fairness into Game Theory and Economics." *American Economic Review* 83, 1281-1302.
- _____. 1998. "Psychology and Economics." *Journal of Economic Literature* 36, 1, 11-46.
- Ross, Arthur. 1948. *Trade Union Wage Policy*. Berkeley: University of California Press.
- Rotemberg, Julio. 2002. "Altruism, Reciprocity and Cooperation in the Workplace." Unpub. Paper, Harvard University.
- Shapiro, Carl and Joseph Stiglitz. 1984. "Equilibrium Unemployment as a Worker Discipline Device." *American Economic Review* 74, 3 (June): 433-44.

A Data Appendix

A.1 Attitude Data

The possible responses to the demographic questions were the following:

Age: (1) 16-24, (2) 25-30, (3) 31-40, (4) 41-50 and (5) over 50.

Education: (1) Some high school, (2) High school degree, (3) Some college, and (4) College degree.

Race: (1) White, (2) Black, (3) Hispanic, (4) Asian/Pacific Islander, and (5) Native American.

Tenure: (1) <1 year, (2) 1-5 years, (3) 6-10 years, (4) >10 years.

For the race variable, there were few Hispanic, Asian/Pacific Islander or Native American respondents; categories (2)-(5) were consolidated in a single non-white category.

A.2 Definition of Local Labor Markets

Of the 29 breakbulk terminals, 25 are located within MSAs with a sufficient number of observations in the merged outgoing rotation groups of the CPS to estimate the wage equations (i.e. more than 30 full-time male workers with non-allocated earnings). One terminal is located within 5 miles of a sufficiently large MSA. In these cases, the MSA is taken as the local labor market. Two terminals, both in the South, are located well outside of the nearest MSA. In these cases, we take all non-MSA areas of the state in which the terminal is located as the local labor market. One terminal is located in an MSA that does not have a sufficient number of observations. In this case, we took the MSA plus all non-MSA areas of the state in which the terminal is located as the local labor market. In the case of unemployment, it would be possible to define local labor markets more narrowly, but the BLS warns that its estimates of unemployment below the MSA level may be subject to large and unquantifiable errors.

A.3 Regional Consumer Price Indices

We deflated both the hourly wage in the firm and the hourly wage we calculate from the CPS by a regional consumer price index (CPI), constructed as follows. For 12 of the 29 local labor markets, the BLS calculates a separate CPI for the corresponding MSA. For the remaining 17 local labor markets, we used the regional CPI calculated for the four Census regions, Northeast, Midwest, South and West. The series is the CPI for all urban wage earners and clerical workers, for all goods.

A.4 Local Unemployment Data

The primary basis for employment estimates at the MSA level in the BLS Local Area Unemployment Statistics are the joint federal-state Current Employment Statistics (CES) surveys, which gather information from worksites. The statistics are then converted to a place-of-residence basis using information from the Current Population Surveys (CPS) and the decennial censuses on commuting patterns. Estimates of employment and unemployment at the state level, used in the case of the three terminals for which we employ non-MSA data, are based entirely on the Current Population Survey (CPS). Average unemployment is calculated for the calendar year of the attitude survey. We experimented with an alternative specification of the unemployment rate, taking the average for June-August, the months in which the attitude surveys were carried out, but results were unchanged.

A.5 Constructing the Outside Wage Measures

We re-code the CPS variables for age, race and schooling to match the categories of the demographic questions on the attitude survey listed above. We define blue-collar workers as workers in occupations 403-469 or 503-889 of the CPS occupation codes. This definition includes service occupations (including private household and protective service occupations) and excludes farming, forestry and fishing occupations. We define a worker as full-time if either hours usually worked at main job are reported as greater than or equal to 35 hours, or hours usually worked are reported as variable and hours worked at the main job in the previous week are greater than 35 hours. Our wage measure from the collective bargaining contracts for the firm is the hourly non-overtime wage. We construct a similar measure from the CPS as follows. If respondents report their hourly wage (not including overtime, tips or commission) in their main job, we take that measure as their hourly wage. If they do not report their hourly wage, we calculate a non-overtime hourly wage: first, we calculate total weekly hours as a sum of hours usually worked at all jobs (if hours usually worked were reported as variable, we use hours worked at all jobs in the previous week); second, we calculate what an individual's total weekly earnings would have been had he not earned an overtime premium by subtracting one-third of usual weekly overtime earnings from usual weekly earnings; third, we divide this adjusted weekly earnings measure by total weekly hours. We deflate the hourly wage by the regional CPI, as described above. We limit the sample to individuals in the CPS who fit all of the following criteria: (1) Male. (As mentioned above, 99% of the employees in the firm are male.) (2) Civilian. (3) Full-time, as defined above. (4) Age 16-64. (5) Hourly wage (calculated as described above) greater than or equal to \$3 in constant 1996 dollars. (6) Weekly earnings less than \$1880.32 in constant 1996 dollars. This is the value in 1996 dollars of the 1997 top-code of \$1923 for weekly earnings. The top-code was raised in Jan. 1998, and the 1997 top-code is the lowest in real terms over the 1996-2000 period. (7) Non-allocated earnings. Neither region nor union status is an imputation match criterion in the CPS outgoing rotation groups, and including allocated wages can introduce important biases. For details, see Hirsch and Schumacher (forthcoming).

Fig. 1: fairness response vs. unemployment, 5-yr means

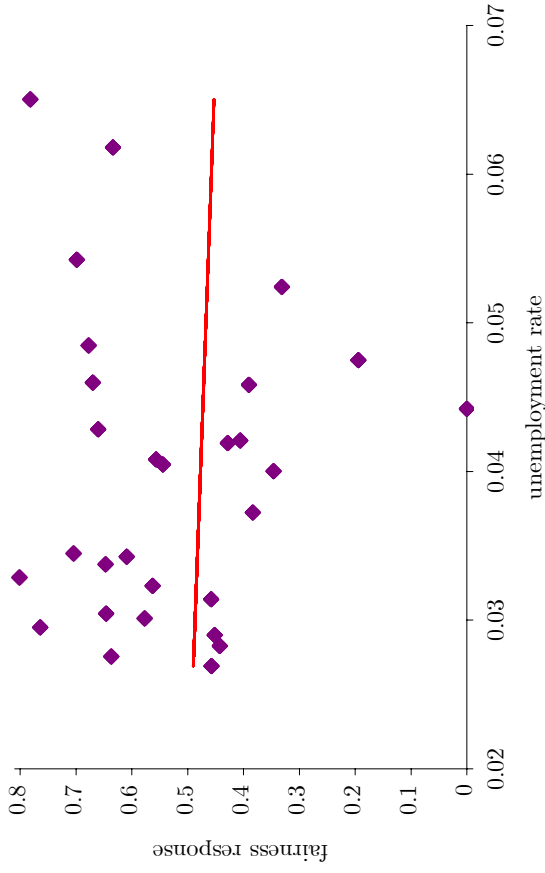


Fig. 2: fairness response vs. weighted-avg. outside wage, 5-yr means

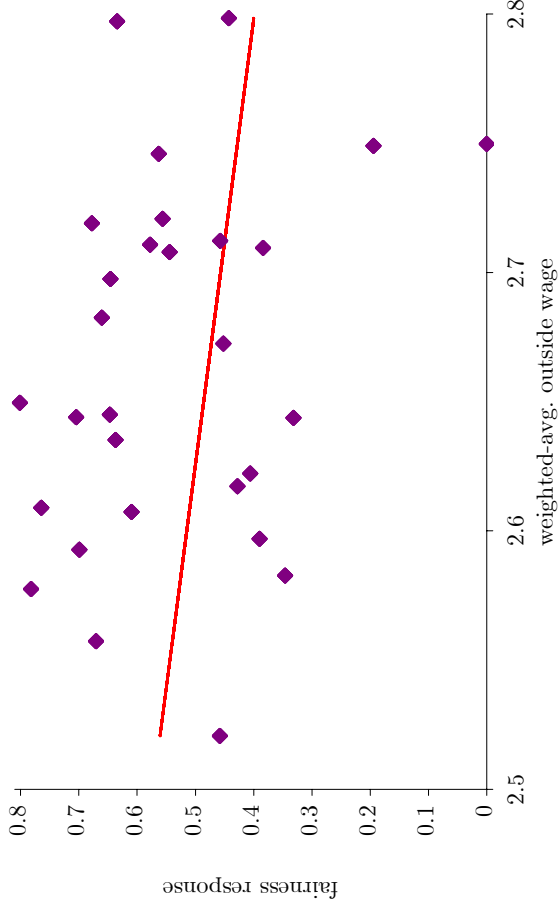


Fig. 3: fairness response vs. unemployment, deviations from 5-yr means

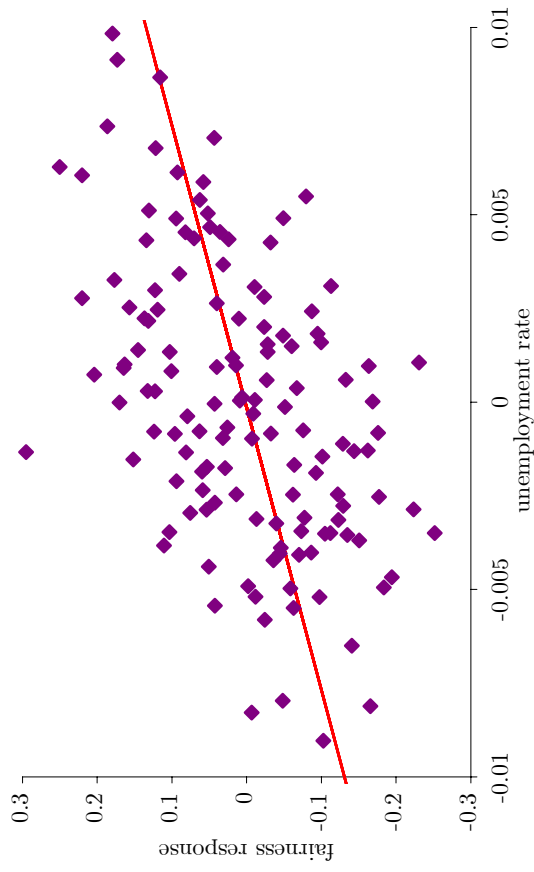


Fig. 4: fairness response vs. weighted-avg. outside wage, deviations from 5-yr means

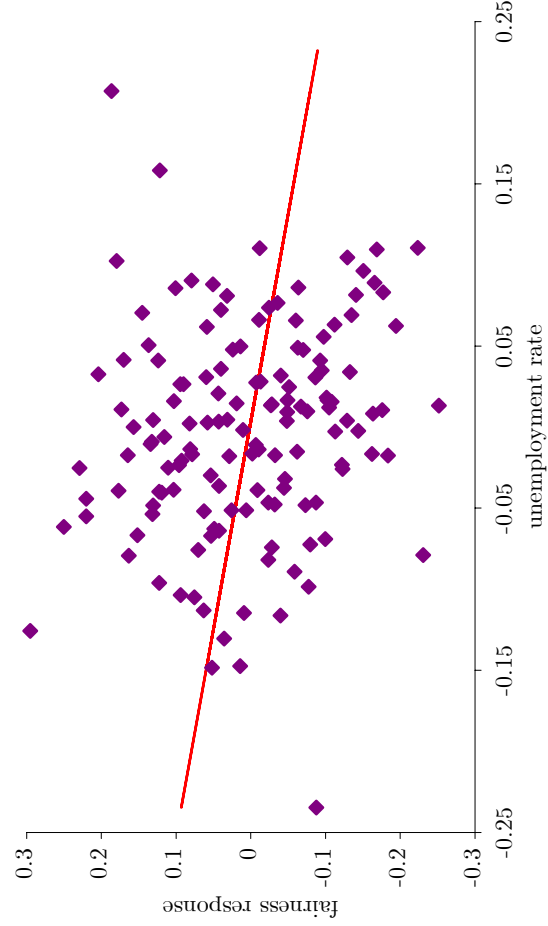


Table 1
Summary Statistics, Individual-level Variables

| Short sample, 1996-1998, Number of obs. = 9361 | | Percentage of total |
|--|----------------|---------------------|
| Sex | Male | 98.6 |
| | Female | 1.4 |
| Race | White | 79.7 |
| | Non-white | 20.3 |
| Age | 16-24 | 3.7 |
| | 25-30 | 15.5 |
| | 31-40 | 38.3 |
| | 41-50 | 26.3 |
| | >50 | 16.2 |
| Schooling | Some HS | 4.5 |
| | HS degree | 51.8 |
| | Some college | 35.6 |
| | College degree | 8.1 |
| Tenure | <1 yr. | 6.6 |
| | 1-5 yrs. | 26.1 |
| | 6-10 yrs. | 31.4 |
| | >10 yrs. | 35.9 |
| Fairness Question | Agree | 72.2 |
| | ? | 7.4 |
| | Disagree | 20.4 |
| Long sample, 1996-2000, Number of obs. = 15657 | | |
| Tenure | <1 yr. | 8.0 |
| | 1-5 yrs. | 26.3 |
| | 6-10 yrs. | 27.1 |
| | >10 yrs. | 38.6 |
| Fairness Question | Agree | 70.0 |
| | ? | 8.5 |
| | Disagree | 21.5 |

Notes: Samples include only observations with complete data (on sex, race, age, schooling, tenure and fairness response for the short sample, on tenure and fairness response for the long sample).

Table 2
Summary Statistics, Terminal-level Variables and Outside Wage Terms

| Variable | N | Mean | Std. Dev. | Min | Max |
|---|------|-------|-----------|--------|--------|
| log projected work-time | 144 | 0.478 | 0.521 | -0.417 | 1.823 |
| local unemployment rate | 144 | 0.040 | 0.011 | 0.023 | 0.077 |
| dismissal rate | 144 | 0.022 | 0.019 | 0.000 | 0.097 |
| separation rate | 144 | 0.063 | 0.039 | 0.000 | 0.269 |
| overtime share | 144 | 0.034 | 0.024 | 0.000 | 0.106 |
| base wage | 144 | 17.80 | 0.251 | 16.926 | 18.313 |
| log base wage | 144 | 2.879 | 0.014 | 2.829 | 2.908 |
| weighted-average log outside wage, long sample, 1996-2000 | 144 | 2.664 | 0.098 | 2.383 | 2.943 |
| individual-specific log outside wage, short sample, 1996-1998 | 9163 | 2.654 | 0.205 | 1.799 | 3.438 |

Notes: One terminal does not have attitude data in 1999. Projected work-time measured in 100,000s of hours. Dismissal rate is number of dismissals and resignations in lieu of dismissal in year as fraction of total employment at time of survey. Separation rate is total separations in year as fraction of total employment at time of survey. Overtime share is yearly overtime hours as a fraction of total hours worked. Wages in constant 1996 dollars.

Table 3
Ordered-logit Estimates with Weighted-average Outside Wage, Long Sample, 1996-2000

| Dependent Variable: response to wage-fairness question | (1) | (2) | (3) | (4) | (5) |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| local unemployment rate | -0.443 [8.441] | 30.396*** [6.105] | 14.905** [6.769] | 15.885*** [5.859] | |
| weighted-avg. outside wage | -1.835** [0.870] | -0.835* [0.454] | -0.946** [0.424] | | -0.983** [0.439] |
| log (real wage) | 13.768** [5.850] | 7.249*** [2.426] | -7.315 [8.093] | -5.306 [7.045] | -9.21 [8.182] |
| 1-5 yrs tenure | -0.255 [0.177] | -0.272** [0.133] | -0.261* [0.135] | -0.268** [0.130] | -0.250* [0.137] |
| 6-10 yrs tenure | -0.796*** [0.155] | -0.806*** [0.131] | -0.810*** [0.133] | -0.816*** [0.129] | -0.804*** [0.134] |
| >10 yrs tenure | -0.927*** [0.147] | -0.911*** [0.122] | -0.907*** [0.126] | -0.912*** [0.122] | -0.899*** [0.127] |
| log (projected work-time) | -0.531*** [0.169] | -0.573 [0.382] | -0.399 [0.368] | -0.201 [0.364] | -0.284 [0.370] |
| cut 1 | 32.336 [16.742] | 17.461 [6.951] | -25.568 [23.712] | -17.002 [20.443] | -31.74 [23.836] |
| cut 2 | 32.805 [16.743] | 17.944 [6.951] | -25.084 [23.712] | -16.519 [20.443] | -31.256 [23.834] |
| Terminal effects | No | Yes | Yes | Yes | Yes |
| Year effects | No | No | Yes | Yes | Yes |
| N | 15657 | 15657 | 15657 | 15657 | 15657 |
| Pseudo R-squared | .032 | .051 | .053 | .052 | .053 |

Notes: Robust standard errors in brackets. Errors clustered by terminal-year, adjusted for measurement error in outside wage term. Parameters cut 1 and cut 2 are ancillary cut-off parameters between responses estimated by the maximum-likelihood ordered-logit procedure. *** indicates significance at 1% level, ** at 5% level, * at 10% level.

Table 4
Ordered-logit Estimates with Alternative Specifications of Outside Wage

| Dependent Variable: response to wage-fairness question | short sample, 1996-1998 | | long sample, 1996-2000 | | | |
|--|----------------------------|------------------------|------------------------|-----------------------|-----------------------|-----------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| | ind.-specific outside wage | -0.572* [0.301] | -0.629** [0.304] | | | |
| weighted outside wage, alt. 1 | | | -0.342 [0.547] | -0.429 [0.461] | | |
| wieghted outside wage, alt. 2 | | | | | -0.748 [0.614] | -0.746 [0.546] |
| local unemployment rate | 46.658*** [11.511] | 14.439 [14.375] | 31.507*** [5.583] | 16.512*** [6.042] | 31.739*** [5.831] | 17.336*** [6.453] |
| log (real wage) | 11.041** [5.149] | -21.092*** [8.021] | 6.722*** [2.494] | -5.477 [7.053] | 6.184** [2.574] | -5.542 [7.110] |
| 1-5 yrs tenure | -0.196 [0.188] | -0.181 [0.188] | -0.276** [0.130] | -0.266** [0.131] | -0.276** [0.131] | -0.266** [0.131] |
| 6-10 yrs tenure | -0.777*** [0.193] | -0.775*** [0.194] | -0.81*** [0.128] | -0.814*** [0.130] | -0.810*** [0.129] | -0.813*** [0.130] |
| >10 yrs tenure | -0.988*** [0.189] | -0.979*** [0.191] | -0.915*** [0.120] | -0.911*** [0.122] | -0.914*** [0.121] | -0.910*** [0.123] |
| log (projected work-time) | -1.157*** [0.433] | -0.603 [0.494] | -0.502 [0.373] | -0.29 [0.346] | -0.556 [0.364] | -0.339 [0.340] |
| male | -0.207 [0.249] | -0.202 [0.249] | | | | |
| white | 0.189* [0.101] | 0.201* [0.103] | | | | |
| age 25-30 | -0.134 [0.194] | -0.115 [0.200] | | | | |
| age 31-40 | 0.027 [0.219] | 0.062 [0.224] | | | | |
| age 41-50 | 0.173 [0.232] | 0.209 [0.239] | | | | |
| age >50 | 0.582** [0.251] | 0.620** [0.259] | | | | |
| HS diploma | 0.173 [0.138] | 0.192 [0.137] | | | | |
| Some college | 0.159 [0.157] | 0.188 [0.159] | | | | |
| College degree | 0.328 [0.229] | 0.37 [0.231] | | | | |
| cut 1 | 29.406 [14.664] | -64.497 [23.267] | 17.396 [7.778] | -18.656 [20.548] | 14.72 [8.200] | -19.704 [20.650] |
| cut 2 | 29.848 [14.662] | -64.055 [23.266] | 17.879 [7.778] | -18.172 [20.548] | 15.203 [8.200] | -19.22 [20.650] |
| Terminal effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Year Effects | No | Yes | No | Yes | No | Yes |
| N | 9163 | 9163 | 15657 | 15657 | 15657 | 15657 |
| Pseudo R-squared | .061 | .062 | .051 | .052 | .051 | .052 |

Notes: Robust standard errors in brackets. Errors clustered by terminal-year, adjusted for measurement error in outside wage term. *** indicates significance at 1% level, ** at 5% level, * at 10% level.

Table 5
Marginal Effects for Ordered-logit Estimates, Table 3 Columns 2-3

| Model: | Table 3, column 2 | | Table 3, column 3 | | | |
|----------------------------|--------------------------------|----------------------|----------------------------------|--------------------------------|----------------------|----------------------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| | $d[\text{Pr}(\text{fair})]/dx$ | $d[\text{Pr}(?)]/dx$ | $d[\text{Pr}(\text{unfair})]/dx$ | $d[\text{Pr}(\text{fair})]/dx$ | $d[\text{Pr}(?)]/dx$ | $d[\text{Pr}(\text{unfair})]/dx$ |
| local unemployment rate | 6.180 | -1.380 | -4.800 | 3.028 | -0.678 | -2.350 |
| weighted-avg. outside wage | -0.170 | 0.038 | 0.132 | -0.192 | 0.043 | 0.149 |
| log (real wage) | 1.474 | -0.329 | -1.145 | -1.486 | 0.333 | 1.153 |
| 1-5 yrs tenure* | -0.057 | 0.012 | 0.045 | -0.054 | 0.012 | 0.043 |
| 6-10 yrs tenure* | -0.175 | 0.033 | 0.141 | -0.175 | 0.034 | 0.142 |
| >10 yrs tenure* | -0.191 | 0.039 | 0.153 | -0.190 | 0.039 | 0.152 |
| log (projected work-time) | -0.116 | 0.026 | 0.090 | -0.081 | 0.018 | 0.063 |

Note: Marginal effects evaluated at the means of the covariates. For dummy variables (indicated by *), table reports difference in $\text{Pr}(\text{fair})$ for values 0 and 1, holding other variables constant at means.

Table 6
Ordered-logit Estimates Interacting External Conditions and Tenure

| Dependent Variable: response to wage-fairness question | | | | | | |
|--|-----------------------|-----------------------|-----------------------|----------------------|----------------------|----------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| local unemployment rate | 12.668 [14.340] | -3.515 [13.152] | 30.081*** [6.251] | 14.431** [6.778] | 11.867 [13.927] | -4.605 [12.866] |
| weighted-avg. outside wage | -0.809* [0.448] | -0.928** [0.419] | -0.894 [1.073] | -0.98 [1.096] | -0.562 [1.030] | -0.64 [1.040] |
| log (real wage) | 7.421*** [2.470] | -7.744 [8.057] | 7.248*** [2.467] | -7.338 [8.167] | 7.377*** [2.394] | -7.787 [7.622] |
| 1-5 yrs tenure | -1.203*** [0.446] | -1.232*** [0.445] | 1.701 [2.747] | 1.88 [2.885] | 1.803 [2.592] | 1.996 [2.696] |
| 6-10 yrs tenure | -1.601*** [0.485] | -1.616*** [0.486] | -1.733 [2.913] | -1.752 [2.986] | -1.601 [2.700] | -1.604 [2.756] |
| >10 yrs tenure | -1.385*** [0.460] | -1.400*** [0.467] | -1.602 [2.658] | -1.528 [2.748] | -1.373 [2.547] | -1.291 [2.621] |
| log (projected work-time) | -0.561 [0.385] | -0.397 [0.368] | -0.561 [0.390] | -0.382 [0.374] | -0.543 [0.381] | -0.372 [0.358] |
| unemployment*(1-5 yrs tenure) | 24.180** [11.844] | 25.219** [11.884] | | | 25.710** [11.731] | 26.910** [11.597] |
| unemployment*(6-10 yrs tenure) | 20.650* [12.219] | 20.964* [12.288] | | | 21.069* [12.273] | 21.407* [12.212] |
| unemployment*(>10 yrs tenure) | 12.643 [11.710] | 13.153 [11.899] | | | 12.944 [11.790] | 13.522 [11.785] |
| weighted outside wage*(1-5 yrs tenure) | | | -0.736 [1.047] | -0.798 [1.100] | -1.145 [0.977] | -1.23 [1.010] |
| weighted outside wage*(6-10 yrs tenure) | | | 0.348 [1.094] | 0.354 [1.124] | -0.005 [1.026] | -0.01 [1.046] |
| weighted outside wage*(>10 yrs tenure) | | | 0.259 [1.005] | 0.233 [1.041] | -0.008 [0.978] | -0.045 [1.003] |
| cut 1 | 17.357 [6.951] | -27.47 [23.466] | 17.3 [6.958] | -25.729 [23.538] | 17.881 [6.628] | -26.843 [22.046] |
| cut 2 | 17.84 [6.951] | -26.986 [23.465] | 17.783 [6.959] | -25.245 [23.537] | 18.364 [6.628] | -26.359 [22.046] |
| Terminal effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Year effects | No | Yes | No | Yes | No | Yes |
| N | 15657 | 15657 | 15657 | 15657 | 15657 | 15657 |
| Pseudo R-squared | .052 | .053 | .052 | .053 | .052 | .054 |

Notes: Robust standard errors in brackets. Errors clustered by terminal-year, adjusted for measurement error in outside wage term. *** indicates significance at 1% level, ** at 5% level, * at 10% level.

Table 7
OLS and IV Estimates, Wage-fairness Perceptions and Dismissal Rate, Long Sample, 1996-2000

| Dependent Variable: | First stage | | | Reduced Form | | | Second Stage | | | OLS | |
|---------------------------------------|-------------------------------|-----------|----------|-----------------------|----------|----------|-----------------------|----------|-----------------------|----------|--|
| | wage-fairness response (1) | (2) | (3) | dismissal rate (4) | (5) | (6) | dismissal rate (7) | (8) | dismissal rate (7) | (8) | |
| predicted avg. wage-fairness response | | | | | -0.061* | -0.010 | | | -0.016 | -0.007 | |
| avg. wage-fairness response | | | | | [0.035] | [0.056] | | | [0.015] | [0.015] | |
| local unemployment rate | 9.691*** | 4.454** | -0.739** | -0.224 | | | | | | | |
| | [1.899] | [2.083] | [0.373] | [0.443] | | | | | | | |
| weighted-avg. outside wage | -0.271* | -0.305** | 0.002 | -0.003 | | | | | | | |
| | [0.143] | [0.135] | [0.025] | [0.024] | | | | | | | |
| log(real wage) | 2.579*** | -2.174 | -0.06 | 0.277 | 0.086 | 0.301 | -0.109 | 0.303 | | | |
| | [0.852] | [2.613] | [0.154] | [0.363] | [0.206] | [0.392] | [0.151] | [0.379] | | | |
| 1-5 yrs tenure | -0.083** | -0.080** | 0.023 | 0.016 | 0.012 | 0.011 | 0.003 | 0.01 | | | |
| | [0.036] | [0.036] | [0.028] | [0.028] | [0.025] | [0.025] | [0.025] | [0.025] | | | |
| 6-10 yrs tenure | -0.265*** | -0.265*** | -0.018 | 0.008 | -0.040* | 0.004 | -0.039 | 0.003 | | | |
| | [0.039] | [0.039] | [0.025] | [0.027] | [0.023] | [0.032] | [0.024] | [0.026] | | | |
| >10 yrs tenure | -0.308*** | -0.306*** | 0.000 | -0.006 | -0.022 | -0.012 | -0.015 | -0.013 | | | |
| | [0.036] | [0.037] | [0.028] | [0.028] | [0.028] | [0.030] | [0.030] | [0.027] | | | |
| log (projected work-time) | -0.214* | -0.156 | 0.001 | -0.015 | -0.01 | -0.016 | -0.002 | -0.016 | | | |
| | [0.121] | [0.113] | [0.026] | [0.027] | [0.028] | [0.027] | [0.025] | [0.026] | | | |
| Terminal effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | |
| Year effects | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | |
| N | 15657 | 15657 | 144 | 144 | 144 | 144 | 144 | 144 | 144 | 144 | |
| R-squared | .079 | .081 | .386 | .435 | .382 | .434 | .373 | .435 | | | |

Notes: Robust standard errors in brackets. Errors adjusted for measurement error in outside wage term, clustered by terminal-year for first-stage regressions. Tenure variables are terminal-level averages of individual-level indicator variables. Other covariates vary only at terminal level. Second-stage and reduced-form regressions weighted by number of respondents. *** indicates significance at 1% level, ** at 5% level, * at 10% level.