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Signaling in The Labor Market: New Evidence On Layoffs, and Plant Closings

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SIGNALING IN THE LABOR MARKET:
NEW EVIDENCE ON LAYOFFS, AND PLANT CLOSINGS

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KEYWORDS: laid-off workers, signaling, unemployment, and wages.
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Abstract

In my asymmetric-information model of layoffs, high-productivity workers are more likely to be recalled to their former employer and may choose to remain unemployed rather than to accept a low-wage job. In this case, unemployment can serve as a signal of productivity, and duration of unemployment may be positively related to post-laid-off wages even among workers who are not recalled. In contrast, because workers whose plant closed cannot be recalled, longer unemployment for them should not have a positive signaling benefit. Analysis of the data from the January 1988-2000 Displaced Workers Supplements to the Current Population Survey reveals that the wage/unemployment duration relation differs between laid-off workers and workers displaced through plant closings in the predicted way, and finds evidence consistent with asymmetric information in the U.S. labor market.

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INTRODUCTION

Many economists have analyzed the importance of asymmetric information in explaining labor market outcomes (Spence, 1973; Akerlof, 1976; Waldman, 1984; and Greenwald, 1986; among others). In particular, Gibbons and Katz (1991) developed and tested a model of adverse selection in the labor market. In their paper, they argue that, if employers have private information concerning employees' productivity and if they have discretion over whom to lay off, then the market infers that laid-off workers have *lower* productive ability. The authors argue that workers displaced because of plant closings, in contrast, do not suffer from such adverse inference because all workers lose their jobs when a plant closes. They predict that earnings losses associated with layoffs should be larger than earnings losses associated with plant closings. They confirm this prediction using the 1984-1986 Displaced Workers Supplements to the Current Population Survey.

In their theoretical model, Gibbons and Katz do not allow for workers returning to their former employers, even though many laid-off workers in the United States are rehired by their former employers. Lilien (1980) uses data from the U.S. Bureau of Labor Statistics (BLS) to show that about three-quarters of the workers laid off in manufacturing in the 1970s were rehired by their former employers. Katz (1986) finds that this process is also widespread outside manufacturing. Moreover, Anderson and Meyer (1994) calculate that 28 percent of turnover is temporary (defined as temporary layoffs plus recalls). Finally, the Mass Layoff Statistics program, also sponsored by BLS, reports that 68 percent of employers reporting a layoff in the second quarter of 1998 indicated that they anticipated some type of recall. It also reports that among all establishments expecting a recall, most employers expected to recall more than one-half of the separated employees and to do so within six months.

Many authors have studied the effect of the layoff-rehire process on unemployment duration in the United States (Katz, 1986; Katz and Meyer, 1990; Anderson, 1992). This paper adds to this literature by analyzing theoretically and empirically whether asymmetric

information affects the behavior of both laid-off workers and prospective employers in the United States. My theoretical model offers a new explanation for unemployment among laid-off workers: I find that laid-off workers who are of *high* productivity may *choose* unemployment over a low-paying job as a means of signaling their productivity. Using the 1988-2000 Displaced Workers Supplements to the Current Population Survey, I offer quantitative empirical evidence consistent with this explanation.

In addition to providing an empirical test on whether there is asymmetric information in the labor market, this paper uncovers a new empirical fact about laid-off workers: the relation between post-displacement earnings and unemployment duration for laid-off workers who take new jobs differs from that of observationally equivalent workers who were displaced because of a plant closing.

The main idea behind this paper is that workers know their levels of productivity with their original employers, which are correlated with their probabilities of recall and with their productivity with a new employer.[1] Prospective employers may gain from using workers' private information to select among job applicants who are observationally equivalent. Thus, workers with favorable information wish to signal it to employers, and they do so by taking a costly action--unemployment--for which the expected benefit is positively correlated with their private information. The separating equilibria of this model predict a *positive* relation between post-displacement earnings and unemployment duration for laid-off workers who find a job with a new employer.[2]

[1] An underlying assumption is that employers have discretion over whom to layoff and recall.

[2] For simplicity, the theoretical model does not consider all the well-known factors that lead to the well-documented negative relationship between post-displacement earnings and unemployment duration. Adapting the model to incorporate the negative effect of unemployment on earnings would not change the model's main prediction, namely that asymmetric information and the high rate of recall lead to a positive relationship between post-displacement earnings and duration of unemployment for laid-off workers who take new jobs, holding everything else constant. Ma and Weiss (1993) have also developed a signaling model in which least-able workers choose low-skilled jobs and more-able ones choose unemployment. Their key assumption is that workers possess private information about their own abilities, which is correlated with employers' evaluations. Ma and Weiss do not examine the layoff-rehire process, and they do not empirically test their model.

The relation between post-displacement earnings and unemployment duration is determined by many factors: loss of human capital during unemployment, stigma, unobserved heterogeneity, and, as this paper finds, asymmetric information. Only the last element, combined with the high recall rate in the United States, leads to a positive relation between post-displacement earnings and unemployment duration for laid-off workers who get a job with a new employer. This predicted relationship provides a basis for testing the existence of asymmetric information in the labor market. To control for all unobserved heterogeneity not correlated with being a laid-off worker and with having a positive probability of being recalled, I use workers displaced through plant closings. I assume that these workers cannot be rehired by their former employers.

Using the 1988-2000 Displaced Workers Supplement, I first replicate Gibbons and Katz's results. I then test my model's empirical hypothesis and find that, after controlling for unobservable characteristics using (otherwise observationally equivalent) workers displaced through plant-closings, the post-displacement earnings of laid-off workers who find a job with a new employer *increase* with the length of their unemployment duration. Examining the relationship between earnings changes (instead of post-displacement earnings) and unemployment duration also gives a result consistent with the theoretical model's empirical hypothesis. Finally, I find that, as predicted by the model, laid-off workers have longer expected unemployment duration than (otherwise observationally equivalent) workers displaced through plant closings.

Because a search model may generate empirical predictions similar to those of the asymmetric-information model, I develop additional tests to explore which theoretical framework better explains the empirical findings. Since blue-collar jobs are often covered by collective-bargaining agreements involving explicit layoff- and recall-by-seniority rules, the information content of a layoff and a recall is not necessarily informative of the worker's productivity. Therefore, the asymmetric-information model would predict a stronger positive relationship between post-displacement earnings and

unemployment duration among workers laid off from white-collar jobs than among workers laid off from blue-collar jobs. However, a search model would predict the opposite result because workers displaced from white-collar jobs are less likely to expect recall than are those displaced from blue-collar jobs.[3] In my sample, I find that, after controlling for unobserved heterogeneity, the post-displacement earnings of laid-off workers displaced from white-collar jobs increase with the length of unemployment. No such effect is apparent for blue-collar workers.

The theoretical model is based upon the premise that laid-off workers with low recall expectations find new jobs faster than laid-off workers who expect to be recalled but take new jobs. Katz and Meyer (1990) find evidence supporting this claim. Using a sample of workers whose recall expectations have been identified, Katz and Meyer find, after controlling for observable characteristics, that laid-off workers who expect to be recalled but take new jobs tend to have much longer unemployment spells than observationally equivalent workers who did not expect to be recalled at the time of layoff (page 994, and table VI). Similarly, Anderson (1992) using a different sample of workers whose recall expectations have also been identified finds that those workers who expect to be recalled have significantly lower new-job hazard rates than observationally equivalent workers who do not expect to be recalled.

This paper is organized as follows. The next section presents the theoretical model, which may be of independent interest. Section three discusses the empirical implementation and provides empirical results. Section four summarizes and interprets the findings of this paper.

[3] For a search model to predict a differential relationship between unemployment duration and post-displacement wages for laid-off workers and workers displaced through plant closing, one needs to assume that laid-off workers' subjective recall expectations decline over time. As the subjective recall expectations decline over time, the reservation wage of laid-off workers falls and higher average quality laid-off workers (relative to workers displaced due to plant closings) start accepting new job offers.

THEORETICAL ANALYSIS

I. The Model

This is a two-period model in which initially all workers are laid off. There are two types of laid-off workers: G-type workers and B-type workers. G-type workers were of high productivity with the original employer, and B-type workers were of low productivity with the original employer. I assume that there is a continuum of workers of each type, *t*, where *t* = G or B. The cumulative distribution of all workers is normalized to "1." The proportion of G-type workers is a (the proportion of B-type workers is $1-a$), where $0<a<1$. Although I do not model the layoff decision, I presume that adverse selection operates here. Thus, the fraction of B-type workers among layoffs may well exceed the fraction in the population as a whole, as in Gibbons and Katz (1991).

Both the worker and the original employer know the worker's type with that particular employer, where $t = B$ or G. However, laid-off workers are assumed to look identical to other potential employers. G-type workers are more likely than B-type workers to be of high productivity with a new employer. Specifically, a type-*t* worker will remain the same type of worker with a *new* employer with probability p_t, where $t = B$ or G and $0<p_B<p_G<1$. Viewed alternatively, some workers are better than others, but even good workers perform badly on some jobs and bad workers perform well on others. The productivity of a G-type worker is H and that of a B-type worker is L. I assume that $0<L<H$. After the worker remains with an employer for one period, his or her productivity with that particular employer is revealed to both the worker and the employer but not to the other firms.

At the beginning of period one, workers are laid off and enter the labor market. Prospective employers observe that these workers have been laid off and simultaneously offer them a first-period wage. Workers then choose either to work for a new employer--accepting the highest wage offered (randomizing in case of a tie)--or to become unemployed. An unemployed worker has a current income of zero. At the beginning of

period two, the original employer recalls those former workers who are still unemployed with the probability of r_t, $t = B$, or G. My assumption that $r_B < r_G \leq 1$ guarantees that the employer is more likely to recall high-productivity workers than low-productivity workers. For simplicity, I set $r_B = 0$, (that is, the employer does not recall those workers who are of low productivity at his firm). Prospective employers observe that some unemployed workers are not recalled, and they simultaneously offer these workers a wage. Unemployed workers accept the highest wage offered (randomizing in case of a tie).

Workers work over the course of period two and retire at its end.

For notational simplicity, I assume that there is no discounting between periods. Workers are expected-lifetime-income maximizers. A large finite number of employers exist, and they maximize the present value of earnings. Therefore, each period employers offer a wage equal to workers' expected productivity. Workers and firms are risk-neutral, and they know the population parameters: a, r_t, p_t, H, and L. Because I assumed that $r_B = 0$, then $r_G = r$. I assume that once a worker accepts a job offer, he is precluded from receiving a future offer from a new employer. This assumption greatly simplifies the model without modifying the main result. Similarly, after accepting an offer, workers cannot quit to return to a former employer.[4] This assumption is consistent with the behavior of laid-off workers in the United States. As mentioned earlier, many authors have found empirical evidence consistent with the fact that laid-off workers who expect to be recall choose to wait unemployed (Katz, 1986; Katz and Meyer, 1990; Anderson, 1992).

A perfect Bayesian equilibrium in this model is a strategy combination of workers and firms and a belief structure of firms such that a worker cannot increase his total expected lifetime earnings by changing his first-period choice of being unemployed or taking a first-period job given the wage schedules being offered, and a firm cannot increase

[4]This assumption could be endogenized into the model. For instance, I could assume that the employer bears a cost of hiring someone that may be recalled. The market would then offer an even lower wage to laid-off workers, and those laid-off workers who think that they will be recalled would have a higher incentive to wait unemployed.

its expected profit by offering a different contingency wage schedule given workers' strategies and its beliefs. All proofs are in the appendix.

II. The Fully Separating Equilibrium

The first theorem characterizes all equilibria in which some or all workers choose unemployment in the first period.

Theorem 1. The necessary condition for a perfect Bayesian equilibrium in which some workers choose to wait unemployed is

$$(1 - p_B) \geq \frac{L}{H - L} \qquad (1)$$

H and *L* are, respectively, the maximum and minimum wages that firms would offer to workers who are one period unemployed. *L* is also the minimum loss incurred by a worker who refuses a first period job. Thus, when (1) does not hold, the minimum cost of signaling by choosing unemployment exceeds the maximum potential expected gain.

To establish sufficiency, in lemmas 1-3, I characterize three classes of unemployment equilibrium; one, and only one, of these exists when (1) holds. These perfect Bayesian equilibria are: (a) all G-type workers reject the first period wage, and all B-type workers take the first-period job (Lemma 1); (b) all G-type workers and some B-type workers choose unemployment (Lemma 2); and (c) all laid-off workers choose unemployment (Lemma 3). These are, respectively, fully-separating, semi-separating, and pooling equilibria. For brevity, I examine below only the conditions under which Lemma 1 holds. The characterization of Lemmas 2 and 3 can be found in the appendix. Given the above assumptions, these are the only possible equilibria with unemployment.

That is, for B-type workers to choose unemployment while G-type workers choose low-paying jobs is never an equilibrium.

Lemma 1. For parameter values such that:

$$r(1-p_G)-p_B \geq \frac{L}{H-L} \qquad (2)$$

and

$$p_G - 2p_B < \frac{L}{H-L} \qquad (3)$$

the unique, perfect Bayesian equilibrium that survives the Cho-Kreps intuitive criterion is one in which all G-type workers reject the first-period offer and all B-type workers accept it.

When conditions (2) and (3) hold, the minimum cost of signaling by choosing unemployment is smaller than the maximum potential gain of G-type workers, but greater than the maximum potential gain of B-type workers. Because of informational asymmetries and the existence of recalls among laid-off workers, accepting a job right away is sufficiently damaging to the future employment prospects of a laid-off worker that he may choose unemployment even if there is no disutility from work. Since G-type workers have higher productivity with their former employers and are more likely to be recalled than B-type workers, they have greater incentives to signal their productivity through unemployment. When conditions (2) and (3) hold, all G-type workers choose to reject the first-period market offer, whereas all B-type workers accept it.

In this model, the equilibrium with no voluntary unemployment is also possible and is described in the appendix. However, under certain conditions, this equilibrium fails to satisfy the Cho-Kreps intuitive criterion. The intuitive criterion in this model is as

follows: Starting from an equilibrium with no voluntary unemployment, a worker choosing to wait unemployed is implicitly making the following statement: "I must have a positive probability of being recalled because those workers with no probability of being recalled would not choose unemployment, even if employers believed that only the high-productivity laid-off workers choose unemployment."

In the appendix, I show that the outcome equilibrium that satisfies the intuitive criterion is unique and must be one with voluntary unemployment. In the separating equilibria--the fully (lemma1) and the semi-separating (lemma 2) equilibria--the post-displacement earnings of permanently laid-off workers who accept jobs at the end of period one are lower than those of observationally equivalent permanently laid-off workers who are unemployed during the first period.[5] The next section presents the empirical implementation of this prediction and tests the theoretical model using the Displaced Workers Supplement to Current Population Survey.

EMPIRICAL IMPLEMENTATION

In the signaling model described above, high-productivity laid-off workers are more likely to be recalled by their former employer than low-productivity laid-off workers. Thus, they may choose to remain unemployed rather than to accept a low-wage job. If so, unemployment can serve as a signal of productivity. In this case, unemployment duration may be positively related to post-displacement earnings even among laid-off workers who are not recalled.

However, in the real world, the relation between earnings of displaced workers and unemployment duration is determined by many factors. Among them are unobserved heterogeneity, loss of human capital, stigma, and, as I point out in this paper, asymmetric

[5] It is unclear whether this prediction would hold when all workers choose unemployment (lemma 3) because accepting a first-period job is an out-of-equilibrium strategy. However, an equilibrium in which all laid-off workers choose unemployment is quite unlikely in the United States. For example, in the DWS

information. Most of these factors imply a negative relation between post-displacement earnings and length of unemployment. For simplicity, the theoretical model does not consider all of the above-mentioned factors that lead to the well-documented negative relationship between post-displacement earnings and unemployment duration. Adapting the model to incorporate the negative effect of unemployment on earnings would not change the model's main prediction, namely that asymmetric information and the high rate of recall lead to a positive relationship between post-displacement earnings and duration of unemployment for laid-off workers, holding everything else constant.

To isolate the effects of asymmetric information in the U.S. labor market, I must control for all other factors affecting earnings and the duration of unemployment not associated with having a positive probability of recall. To do so, I use workers displaced through plant closings. I assume that workers displaced when the plant closes cannot be recalled, an assumption that, in this model, implies that they have no incentive to signal their productivity through unemployment. Thus, this model does not imply a positive relationship between unemployment duration and post-displacement earnings for workers displaced because of plant closings.[6]

My empirical hypothesis is that, after I control for unobserved heterogeneity by using (otherwise observationally equivalent) workers who were displaced through plant closings, the post-displacement earnings of laid-off workers who take new jobs right away should be lower than those of laid-off workers who remain longer unemployed. I will test this hypothesis using data from January 1988, 1990, and 1992, and February 1996, 1998, and 2000 from the Displaced Workers Supplement (DWS) to the Current

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sample of laid-off workers used in the next section, more than 10 percent of laid-off workers find jobs without an intervening unemployment spell.

[6] In this paper, workers displaced through plant closings would always accept the first-period job in equilibrium. Thus, to generate some unemployment among workers displaced through plant closings, some frictional unemployment is needed. Adding frictional unemployment for both laid-off workers and workers displaced through plant closings into this model does not alter the results of this paper.

Population Survey (CPS).[7] I will also test this hypothesis against alternative hypotheses, in particular those implied by a standard search model.

The theoretical model presented assumes that some laid-off workers have a positive probability of recall in the second period. As the probability of recall converges toward zero, the expected benefits from waiting unemployed fall, decreasing the incentives to signal. In the United States, most recalls take place within six months. For instance, Katz and Meyer (1990) find that the recall hazard becomes quite low after about twenty-five weeks of unemployment. Similarly, Katz (1986) finds that almost no recalls occur after twenty-six weeks. Thus, any signaling that may occur among laid-off workers in the U.S. labor market should be observed mainly within the time that prospective employers are most likely to infer that workers are waiting for recall, namely within the first couple of months of displacement.

Finally, this model also predicts that, laid-off workers who are not recalled should have longer unemployment duration than that of (observationally equivalent) workers displaced through plant closings. The reasoning behind this prediction is that by waiting, unemployed laid-off workers send a positive signal about their productivity to prospective employers. Such positive inference associated with their longer unemployment duration does not take place when the cause of displacement is plant closing.

I. Data Description

I examined a pooled sample of male workers between the ages of 20 and 61 who were permanently displaced from a private-sector, full-time, non-agricultural, and non-

[7] I do not use the survey years 1984 and 1986 because they did not contain the variable "*initial* unemployment spell." For the 1986 supplement, I can obtain this variable for the subsample of workers who have had *only* one job since displacement. For consistency purposes, I did not include this subsample in this paper, but the results are similar if the 1986 subsample is included. I was unable to use the 1994 supplement because there was an error in the supplement that year and the "initial unemployment spell" variable was *not* collected for all displaced workers who were re-employed at the survey date.

construction job because of a plant closing, slack work, or abolishment of a position or shift.[8] I used permanently displaced workers in an attempt to identify a sample of workers who did *not* return to their previous jobs (and similar wages).[9] Like Gibbons and Katz (1991), I classified as laid-off workers those displaced because of slack work or a position or shift that was eliminated.[10]

I also excluded those workers who reported being a member of a union in their former job because most of union firms have layoff- and recall-by-seniority rules.[11] The information content of a layoff and of a recall depends on whether the employer has any discretion with respect to whom to lay off and recall. In the presence of a layoff- and recall-by-seniority rule, for example, there may be little or no information concerning a workers' productivity revealed by the fact that the worker was laid or recalled by layoff-by-seniority rules.[12]

The sample is restricted to those individuals who were re-employed in wage-and-salary employment at the survey date, who were no more than 36 weeks unemployed, and

[8] I did not include agricultural workers because they tend to have a large number of jobs with a pronounced seasonal pattern. Workers displaced from construction jobs were eliminated from the sample because formulating an appropriate definition of permanent displacement from a construction job is difficult. Like Gibbons and Katz, I focus on males displaced from full-time jobs in an attempt to identify a sample of workers with strong attachments to the labor force. Moreover, the information content that prospective employers infer from observing female workers' employment movements is considerably more complex than that of male workers. For instance, the U.S. society understands that women may want to leave the labor force while they have small children. However, such a choice is not as well understood when taken by a man.

[9] Katz and Meyer (1990) find that the post-displacement hourly earnings of workers with unemployment spells ending in recall are similar to their pre-displacement hourly earnings.

[10] If a worker lost more than one job, the survey questions refer to the lost job he had held the longest.

[11] Unfortunately, prior to the 1994 Supplement, the DWS did not provide information on whether a worker was a member of a union in his predisplacement job. In the next section, I will address this by classifying displaced workers by whether they were displaced from industries with high- or low-rates of unionization.

[12] Abraham and Medoff (1984), for instance, find that (1) 92% of union firms have written rules to deal with permanent layoffs while only 24% of nonunion firms have such written layoff policies, and that (2) 58% of nonunion firms have a practice of sometimes laying off a more senior worker if a junior is believed to be worth more on net, as compared to 17% of union employers.

who had re-employment earnings of at least $40 a week.[13] Later, I address the potential sample biases that may arise from using the DWS and from the fact that I exclude from the sample the workers who were not re-employed at the survey date.

A major change in the DWS was a change in the recall period for which information on job loss was collected. Prior to 1994, the DWS asked workers if they had lost a job in the last five years. Starting in 1994, the DWS asked workers if they had lost a job in the last three years. For consistency purposes, I only used workers who had reported losing a job in the last three years in the 1988, 1990 and 1992 DWS, but the results presented below are robust to including workers who reported losing a job in the last five years.

The restriction that data on all required variables be available leaves a sample of 2,040 workers displaced through plant closings and 2,410 laid-off workers who do not return to the former employer. Basic descriptive statistics for my sample of permanently displaced workers are presented in table 1. More detailed descriptive statistics by length of displacement can be found in appendix tables 1-4. Workers displaced through plant closings have, on average, significantly longer pre-displacement tenure (1.41 more years) than laid-off workers have. This finding suggests that seniority rules may be important in the layoff decision. Furthermore, workers displaced through plant closings have, on average, a significantly higher probability of finding a new job without an intervening unemployment spell (22.06 percent do not suffer unemployment compared with only 15.39 percent of the sample of workers displaced through layoffs) and shorter initial spells of unemployment (1.27 fewer weeks) than workers displaced by layoffs. Because unemployment duration usually increases with pre-displacement tenure, the fact that laid-off workers have longer unemployment spells than those of workers displaced through

[13] I focus on workers who were displaced up to nine months to allow for some extra search time after the first six months of displacement. The results shown below are robust to using samples of workers displaced for up to a year. 92 percent of all displaced workers in my sample had unemployment spells of

plant-closings, despite their shorter tenure, suggests that their incentive to wait unemployed may be greater than that of workers displaced through plant closings. In addition, compared with laid-off workers, workers displaced through plant closings are more experienced, and less educated, a larger percentage of them receive advance notice, and a smaller percentage of them are in white-collar jobs. Finally, workers displaced through plant closings are more likely to be married and less likely to be white.

Table 1 also provides information on the post-displacement earnings relative to the pre-displacement earnings. The earnings loss for the typical displaced worker is substantial: Being displaced reduces the earnings of the "average" worker by $62.80 per week (or $3,516.80 per year).[14] I find that the mean loss in the log of real weekly earnings for workers displaced through layoffs (-.133) is significantly greater than that experienced by workers displaced through plant closings (-.106). Since much evidence indicates that the earnings losses of displaced workers rise substantially with pre-displacement tenure (Podgursky and Swaim, 1987; Kletzer, 1989; and Topel, 1991), the fact that workers displaced through plant closings have smaller earnings losses than workers displaced through layoffs, despite their higher average pre-displacement tenure, suggests that a "lemons effect" may be operating.

Similar results hold when one classifies workers by length of displacement (tables 1-4 in the appendix). The mean loss in the log of real weekly earnings for the "average" worker increases with unemployment duration. Comparing layoff to plant closings, I find that the mean loss in the log of real weekly earnings for laid-off workers with less than one month of unemployment is greater than that for similar workers displaced through plant closings. However, this finding is reversed for workers who are unemployed from

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36 weeks or less, and 98 percent of all displaced workers in my sample had unemployment spells of one year or less.

[14] The average pre-displacement deflated weekly earnings for the sample are $618.13. The measure of pre-displacement wages is the usual weekly earnings before deductions that the worker earned at his job before he became displaced. The measure of post-displacement wages is the usual weekly earnings at his current job (that is, the job he holds at survey date.)

five to twelve weeks, suggesting that there may be a positive effect of some unemployment for laid-off workers versus workers displaced through plant closings.

II. Earnings Equation

II.1. Previous results

Table 2 replicates Gibbons and Katz's results and shows that workers displaced through layoffs experience 3.7 percent greater wage losses than workers displaced through plant closings.[15] Like them, I find that the greater wage loss is explained by lower post-displacement earnings and by higher pre-displacement earnings. Thus, as in Gibbons and Katz, a "lemons effect" seems to be associated with being displaced through a layoff relative to being displaced through plant closings.

II.2. Specification

The theoretical model predicts that, after controlling for unobserved heterogeneity by using observationally equivalent workers who were displaced through plant closings, the post-displacement earnings of laid-off workers who take new jobs right away should be lower than those of laid-off workers who remain longer unemployed. I can test the these predictions by estimating the following equation:

$$Y_i = g + b_1 L_i + a_2 D_i + a_3 D_i^2 + b_2 Z_i + b_3 Z_i^2 + X'_i d + x_i \qquad (4)$$

where: Y_i is the log real post-displacement weekly earnings for worker i for $i=1,...N$;

L_i is a dummy for cause of displacement (L_i = 1 if the worker is laid off, and 0 if the worker is displaced through plant closings);

D_i is the length of unemployment between the time the worker was displaced and the time he found his first job;

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[15] Using January 1984 and 1986 DWS, Gibbons and Katz (1991) find that workers displaced through layoffs experience 4 percent greater wage losses than workers displaced through plant closings.

D_i^2 is the square of the length of unemployment;

Z_i is the interaction between the layoff dummy and the length of unemployment variable*;*

Z_i^2 is the interaction between the layoff dummy and the square of the length of unemployment*;* and

X_i is a vector of observable pre-displacement characteristics.[16]

I assume that prospective employers know the workers' employment history. Besides controlling for workers' observable characteristics, in particular the log real pre-displacement weekly earnings, I also control for workers' pre-displacement industry and occupation, region of displacement, year of displacement, and year of survey. These variables aim to control for macroeconomic and regional effects. All regressions use the Huber/White estimator of variance.

Alternatively, I have examined a similar equation in which the LHS variable is the change in earnings before and after displacement. The results from this specification are consistent with the prediction of the theoretical model and can be found in the tables 10-14 of the appendix.[17]

[16] The covariates are: the covariates are: log (previous earnings deflated by GDP deflator); a spline function in previous tenure (with breaks at 1, 2, 3, and 6 years); eleven dummies for completed education (one for "one to four years"; one for "five to six years"; one for "seven to eight years"; one for "nine years"; one for "ten years"; one for "eleven years"; one for "twelve years"; one for "thirteen years"; one for "fourteen and fifteen years"; one for "sixteen years"; one for "seventeen years"); fourteen "year-of-displacement" dummies; five "year of survey" dummies; one "years since displacement" dummy; one "advance notification" dummy; ten "previous-industry" dummies; five "previous-occupation" dummies; one "experience at displacement" variable and its square; one "pre-displacement marital status" dummy; one "non-white" dummy; one "survey pre-1994" dummy; three "region" dummies; and "state" dummies.

[17] As explained in the theory section, an extended version of this model, with both endogenous layoff and rehire processes, yields the following prediction: "Relative to observationally equivalent workers displaced through plant closings, the earnings losses of laid-off workers decrease as their unemployment spell lengthens." This result occurs because, following Gibbons and Katz, competition among employers and symmetric but imperfect information about workers' productivity the first time workers enter the market yield a single pre-displacement wage, independent of workers' type and the cause of displacement. The prediction regarding the post-displacement earnings is identical to that presented in this paper.

II.3. Main Model

Column 1 of Table 3 displays the results from equation (4). After controlling for unobserved heterogeneity not correlated with having a positive probability of recall, I find that the post-displacement earnings of laid-off workers *increase* with the length of unemployment. Laid-off workers with no unemployment spell experience 3.6 percent lower post-displacement earnings than observationally equivalent workers displaced through plant closings (this finding is consistent with Gibbons and Katz "lemons" effect). However, this differential decreases and becomes positive as the length of unemployment increases, consistent with the asymmetric information model presented in this paper. After being unemployed for four weeks, laid-off workers' post-displacement earnings are similar to those of workers displaced through plant closings; after four months of unemployment, laid-off workers' post-displacement earnings are 2 percent *higher* than those of workers displaced through plant closings. These effects might understate the true signaling effect of unemployment for the following two reasons. First, some laid-off workers included in the sample could end up returning to their original employer and thus they should have higher re-employment wages and shorter initial spells of joblessness than workers who do not return to the original employers.[18] Second, many of the layoffs in the sample are likely to be determined by strict seniority systems.[19]

The results in column 1 also show that displaced workers experience increasing losses in earnings as their unemployment spell lengthens—although the earnings loss is considerably larger for workers displaced through plant closings (an additional week of

[18] The DWS is known to overstate what would be considered job displacement because some laid-off workers end up returning to their original employer after the survey date. This occurs despite the fact that workers entering my sample are re-employed at survey date and have answered "yes" to the question: "In the past 3 years, have you left or lost a job because of a plant closing, an employer going out of business, or a layoff from which you were *not* recalled, or other similar reasons?"

[19] I tried to minimize this concern by excluding those workers who reported being displaced from unionized jobs. However, prior to the 1994 Supplement, the DWS did not identify workers displaced from unionized jobs. Below, I address this concern.

unemployment lowers their weekly earnings at a new job by 1.5 percent, as shown in column 2 of Table 3) than for laid off workers (an additional week of unemployment lowers their weekly earnings at a new job by less than 0.7 percent, as shown in column 3 of Table 3). As mentioned earlier, others have found that workers who are unemployed longer (especially those exhausting unemployment insurance benefits) tend to have larger wage losses than short-term unemployed workers. Loss of human capital, stigma associated with being unemployed, or decreases in the workers' reservation wage are some of the arguments put forth to explain this negative relationship between unemployment duration and earnings of displaced workers. As I pointed out earlier, my theoretical work is not contrary to these arguments. It focuses instead on the effects of asymmetric information and the high probability of recall on post-displacement earnings.

II.4. Testing the Asymmetric Information Model versus the Search Model

While the results so far are consistent with the asymmetric information model, they cannot distinguish between my model and a standard search model combined with a "lemons" effect among laid-off workers at displacement. Thus, to test this model further I distinguish between white- and blue-collar workers.

A search model could explain the *differential* search activity between workers displaced through layoffs and those displaced through plant closings through their different recall expectations. Since laid-off workers have higher recall expectations than those displaced through plant closings, their reservation wage would be higher allowing them to search longer for a good job. As the unemployment spell increased, the recall expectations would fade, generating a steeper post-displacement earnings profile for laid-off workers than for similar workers displaced through plant-closings, and thus leading to a differential earnings pattern similar to that of the one observed in the asymmetric-information model. Because workers laid-off from blue-collar jobs are more likely to expect recall than those laid off from white-collar jobs (Katz and Meyer, 1990), the

search model would then predict a stronger positive relationship between post-displacement earnings and duration of unemployment among workers laid-off from blue-collar jobs than among those laid off from white-collar jobs.

In the asymmetric information model, recall expectations are important due to their information content. Workers know their levels of productivity with their former employers, which are correlated with their probabilities of recall and with their productivity with a new employer. Those workers with favorable information are more likely to expect to be recalled and more willing to take a costly action—unemployment. Because many fewer white- than blue-collar jobs are covered by collective-bargaining agreements involving explicit layoff- and recall-by-seniority rules, the degree of discretion over whom to lay off and recall is likely to be higher in white- than blue-collar jobs, and thus, the information content of a layoff and a recall is considerably higher in white- than blue-collar jobs. Therefore, the asymmetric information model would predict a stronger positive relationship between post-displacement earnings and duration of unemployment among workers laid-off from white-collar jobs than among those laid off from blue-collar jobs. Columns 1 and 2 of table 4 display separate estimates for the two groups.[20] I find that, after controlling for unobserved heterogeneity by using (otherwise observationally equivalent) workers who were displaced through plant closings, the post-displacement earnings of laid-off workers displaced from white-collar jobs increase with the unemployment spell. No such effect is apparent for blue-collar workers. This evidence supports the asymmetric-information model.

An alternative approach is to classify workers by the likelihood that they were displaced from industries with low- and high-unionization rates. The idea being that the information content of a recall should be smaller in those industries with higher unionization rates than in those with lower unionization rates because layoff- and recall-by seniority rules are more common in high-unionization rate industries. Columns 3 and 4

[20] Descriptive statistics of these and other subgroups analyzed in the paper can be found in the Appendix.

of Table 4 show the estimates for workers displaced from industries with low- and high-unionization rates, respectively.[21] I find that, relative to observationally equivalent workers displaced through plant-closings, the post-displacement earnings of laid-off workers displaced from industries with low-unionization rates increase with the length of unemployment. No such effect is apparent for workers in high-unionized industries. Again, these findings are consistent with the asymmetric-information model.

Similarly, one may also be concerned that the results found in column 1 of Table 3 may be driven by differences in the composition of the pool of laid-off workers and that of workers displaced through plant closings. For example, much evidence suggests that advance notice yields a productive pre-displacement search (Addison and Blackburn, 1995; Swaim and Podgursky, 1990). If so, one may be concerned that a pre-displacement search among laid-off workers may be affecting the above results. Moreover, notified workers may differ from their non-notified counterparts in some unmeasured way (Ruhm, 1992). In such a case, one would want to distinguish between those workers who were notified in advance and those who were not. With a sample of workers who do not receive advance notice, the theory predicts that, after one controls for unobserved heterogeneity with workers displaced through plant closing, the post-displacement earnings of laid-off workers should increase with their length of unemployment. Yet the predictions of the asymmetric-information model are not so straightforward when workers receive advance notice. Assuming that (1) productive pre-displacement search occurs among workers who receive advance notice, (2) prospective employers observe the pre-displacement search time, and (3) the longer the pre-displacement notice the more productive the worker's search, the model would predict that, after controlling for unobserved heterogeneity using workers displaced through plant closings, laid-off workers' post-displacement earnings increase with the workers' total search time (instead

[21] For a given year of displacement, I define industries with high-unionization rates as those having a unionization rate above the sample mean rate for that year.

of with the duration of unemployment). Unfortunately, Addison and Blackburn's results (1995) provide no evidence of monotonically increasing benefits from longer pre-displacement written notice. Moreover, they do not find evidence of any incremental value to receiving extended written notice rather than informal notice. Thus, the asymmetric-information model would not necessarily predict a positive relationship between post-displacement earnings and the length of unemployment among laid-off workers. Column 1 of Table 5 displays the estimates for workers who, in my sample, did not receive advance notice. These results are consistent with the theoretical model: Relative to observationally equivalent workers displaced through plant closings, laid-off workers' post-displacement earnings increase with the length of unemployment. As shown in column 2 of Table 5, this pattern is not observed among workers who receive advance notice of displacement. As mentioned earlier, this unobserved pattern may result from complex reasons. Despite its interest, the topic lies beyond the scope of the present paper.

Finally, because the search behavior of unemployment-insurance (UI) recipients may differ from that of nonrecipients, or because UI recipients may differ from their nonrecipients counterparts in some unmeasured way, I distinguish between those workers who received UI benefits and those who did not. Columns 3 and 4 of Table 5 display the results for the two samples. In both samples, after controlling for unobserved heterogeneity with observationally equivalent workers displaced through plant closings, laid-off workers who are unemployed longer receive higher post-displacement earnings.

III. Sensitivity Analysis

III.1. Robustness

The results above are robust to model specifications, to changes in the definition of the sample, and to various changes of the covariates. As mentioned earlier, these

results are also consistent to using the change in earnings before and after displacement as the LHS variables.[22]

III.2. Retrospection bias

The CPS supplements are retrospective in as much as respondents are asked to describe events that may have occurred up to three years in the past.[23] This characteristic is a problem when the errors are not random, such as if a worker recalls only an especially traumatic or costly displacement that occurred four to five years previously. A priori, it is not clear whether this bias is worse for plant closings than for layoffs. Looking at the raw data, I find that, for a given year, many more layoffs are reported in the earlier survey than in the later one. The analogous comparison of plant closings reported reveals a much smaller difference that is even reversed during the late 1980s. Yet, looking at the averages of tenure seems to indicate that particularly traumatic layoffs are more likely to be remembered, which would downward bias the true signaling effect of unemployment (Appendix Tables 21 and 22). To analyze the dimension of this problem, I re-estimate equation (4) dropping the earliest year from each DWS. The results are shown in Appendix Table 23 and show evidence of this downward bias.

III.3. Sample selection bias

The regressions above are based on a sample of displaced workers who were re-employed at the survey date, and therefore, the estimates may reflect sample-selection bias because some of the workers have had little time to find a new good job match. To

[22] The results shown in tables 3 through 5 are robust to alternative functional forms of the unemployment-spell variable, the inclusion of interactions between the log real pre-displacement weekly earnings and the length-of-unemployment-spell variables, and interactions between tenure and the length-of-unemployment-spell variables. The results were also robust to the inclusion of workers with longer spell of initial unemployment, part-time workers, workers earning less than $40 a week, and public-sector workers. I also re-run the regressions dropping outliers. The estimates are available from the author upon request.

[23] Prior to the 1994 Supplement, the DWS asked workers if they had lost a job in the last five years. For consistency purposes, I limited the analysis to those workers who had lost a job in the last three years.

probe the importance of this problem, I re-estimate the equations using a sample of workers who were displaced at least a year before survey date as these workers should have had plenty of time to find a new job. Again, the results accord with the findings.

IV. Unemployment Duration and Cause of Displacement

The theoretical model also predicts that laid-off workers who are not recalled have longer unemployment duration than workers displaced through plant closings. As Table 1 shows, among permanently displaced workers who were re-employed at a survey date, workers displaced through layoffs have longer average initial unemployment spells than those of workers displaced through plant closings. Table 6 shows the analysis of the duration of initial spells of joblessness for a sample of 20-61 year-old males permanently displaced from full-time, private-sector, jobs not in agriculture or construction. The sample contains 5,260 complete spells of joblessness and 439 censored spells. [24]

I analyze the duration of unemployment spell for this sample using semi-parametric proportional hazard-model techniques, and controlling for observable characteristics. I find that workers permanently displaced by layoffs have significantly longer initial unemployment spells than do those displaced by plant closings.

An alternative explanation to this result is the depressing effect of recall expectations on job search as mentioned by Katz (1986). To test whether these results are explained by the search model or the asymmetric information model, I explore various subgroup analyses.

The asymmetric information model predicts that the higher the information content of a recall, all else being equal, the greater the incentive to signal through

[24] Of the 5,260 complete spells, 4,450 were those of individuals who reported post-displacement weekly earnings; the rest had the post-displacement earnings information missing and thus, were excluded from the earnings analysis of Sections II and III. Descriptive statistics for this sample used in this section can be found in Table 9 in the Appendix.

unemployment. Thus, one would expect laid-off workers to have relatively longer unemployment spells than those of similar workers displaced by plant closings in those sectors in which employers have more discretion over whom to recall. Whereas the search model predicts that laid-off workers will have relatively longer unemployment spells than those of similar workers displaced by plant closings in those sectors in which the likelihood of recall is greater.

Rows 2 and 3 in Table 6 show the estimation of the effect of being laid-off on the duration of unemployment spell for the white- and blue-collar samples. I find that workers laid off from white-collar jobs have longer unemployment spells than observationally equivalent workers displaced through plant closings. A smaller differential effect is found among workers displaced from blue-collar jobs. These results, combined with those from Section II.4., support the asymmetric-information model. Rows 4 and 5 in Table 6 display the effects of being laid off on duration in samples of workers displaced from low- and high-unionized industries. Again, as predicted by the model, laid-off workers have relatively longer unemployment spells than similar workers displaced by plant closings in low-versus high-unionized industries.

I also analyze the effect of being laid off on duration by distinguishing whether or not the workers received advance notice, and whether or not they received unemployment insurance benefits. I find that laid-off workers, regardless of whether they received advance notice, have longer unemployment spells than observationally equivalent workers displaced by plant closings (rows 6 and 7 in Table 6). I also find that laid-off workers, regardless of whether they receive UI benefits, have longer unemployment spells than observationally equivalent workers displaced by plant closings (rows 8 and 9 in Table 6).

Overall, the results above were robust to changes in the covariates, the functional form and the subsamples.

CONCLUSION

In the United States, many laid-off workers are recalled to their original employer. If employers have discretion over whom to recall, high-productivity workers are more likely to be recalled and may choose to remain unemployed rather than to accept a low-wage job offered early in their unemployment spell. If so, unemployment can serve as a signal of productivity. In this case, unemployment duration may be positively related to post-displacement wages even among workers who are not recalled. In contrast, because workers displaced through plant closings cannot be recalled, a longer duration of unemployment should not have a positive signaling benefit for such workers. Analysis of the 1988-2000 Displaced Workers Supplements to the Current Population Survey reveals that the earnings and unemployment duration experiences of the two groups behave in the predicted way.

This paper offers a new test of the importance of asymmetric information in the labor market. Evidence has been provided against the "most natural" alternative model, the standard search model. More important, the theoretical model provides the basis for a new empirical finding regarding laid-off workers. After one controls for unobserved heterogeneity, the post-displacement earnings of laid-off workers who do not return to their former employers increase with the length of unemployment.

In "Layoffs and Lemons," Gibbons and Katz showed that prospective employers understood adverse selection in the labor market. The results in my paper indicate that workers are also aware of the existence of adverse selection and of its consequences on their behavior. This implies a need for differential unemployment policies by cause of displacement. Further research will analyze the effects of displaced workers' differential behavior by cause of displacement on policies oriented to reduce unemployment duration.

Table 1
Descriptive Statistics for Displaced Workers
Males Reemployed at Survey date
DWS 1988-2000

	Means		
		Reason for displacement	
Variable	Entire sample	Plant closing	Layoff
Layoff = 1 (percent)	54.16	0	100
Previous tenure (years)	4.70	5.46	4.05
	(6.09)	(6.61)	(5.53)
Change in log real weekly earnings	-.121	-.106	-.133
	(.507)	(.482)	(.526)
Log of previous weekly earnings	6.25	6.23	6.27
	(.59)	(.57)	(.60)
Log of current weekly earnings	6.13	6.12	6.13
	(.69)	(.60)	(.65)
Length of unemployment (weeks)	7.88	7.20	8.47
	(9.01)	(8.86)	(9.10)
No unemployment after displacement = 1 (percent)	18.45	22.06	15.39
Advance notice = 1 (percent)	42.20	53.28	32.82
Current education (years)	13.19	13.01	13.34
	(2.35)	(2.34)	(2.35)
Current (age-education-6) (years)	17.32	17.62	17.07
	(10.14)	(10.08)	(10.20)
White collar in previous job = 1 (percent)	48.02	46.52	49.29
Previous job in manufacturing = 1 (percent)	36.54	36.52	36.56
Current age (years)	36.49	36.60	36.39
	(10.24)	(10.03)	(10.41)
Currently married = 1 (percent)	65.89	67.79	64.27
Non white = 1 (percent)	9.89	11.27	8.71
N	4,450	2,040	2,410

Note.- The numbers in parenthesis are standard deviations. All weekly wages are deflated by the gross domestic product (GDP) deflator (base year = 1996). The white-collar sample consists of workers whose pre-displacement occupations were in the managerial and professional specialties or in the technical, sales, and administrative support specialties.

Table 2
Gibbons and Katz's Earnings Equation
Males Reemployed at Survey Date
DWS 1988-2000

	Dependent variables: Weekly earnings[♣]		
N = 4,450	Change	Pre-displacement	Post-displacement
Layoff	-.037[**]	.024[*]	-.010
	(.015)	(.014)	(.016)
R-squared	.0776	.4541	.3482

Note: The numbers in parentheses are standard errors. All regressions use the White estimator of variance. In addition to the variable shown in the table, the covariates are: a spline function in previous tenure (with breaks at 1, 2, 3, and 6 years); eleven dummies for completed education (one for "one to four years"; one for "five to six years"; one for "seven to eight years"; one for "nine years"; one for "ten years"; one for "eleven years"; one for "twelve years"; one for "thirteen years"; one for "fourteen and fifteen years"; one for "sixteen years"; one for "seventeen years"); fourteen "year-of-displacement" dummies; ten "previous-industry" dummies; five "previous-occupation" dummies; one "experience at displacement" variable and its square; one "pre-displacement marital status" dummy; one "non-white" dummy; one "survey pre-1994" dummy; three "region" dummies; and "state" dummies. Columns (1) and (3) also include five "year of survey" dummies; and one "years since displacement" variable.

[♣] Dependent variable: col. 1 = log(current earnings/previous earnings); col. 2 = log(previous earnings deflated by GDP deflator); and col. 3 = log(current earnings deflated by GDP deflator)

[*] Estimate significantly different from zero at the 90% confidence level

[**] Estimate significantly different from zero at the 95% confidence level

Table 3
Post-Displacement Earnings Equation
Males Reemployed at Survey Date
DWS 1988-2000

	Dependent variable: Post-displacement weekly earnings ♣		
		Reason for displacement	
	Whole sample N = 4,450	Plant Closings N = 2,040	Layoffs N = 2,410
Unemployment spell	-.017***	-.016***	-.007**
	(.004)	(.004)	(.004)
Unemployment spell	.0004***	.0004***	.0000
Squared	(.0001)	(.0001)	(.0001)
Layoff Dummy	-.036	n.a.	n.a.
	(.022)		
Layoff dummy	.010**	n.a.	n.a.
x Unemployment spell	(.005)		
Layoff dummy	-.0004**	n.a.	n.a.
x Unemployment spell squared	(.0002)		
R-squared	.5036	.5251	.5145

Note: The numbers in parentheses are standard errors. All regressions use the White estimator of variance. In addition to the variables shown in the table, the covariates are: log (previous earnings deflated by GDP deflator); a spline function in previous tenure (with breaks at 1, 2, 3, and 6 years); eleven dummies for completed education (one for "one to four years"; one for "five to six years"; one for "seven to eight years"; one for "nine years"; one for "ten years"; one for "eleven years"; one for "twelve years"; one for "thirteen years"; one for "fourteen and fifteen years"; one for "sixteen years"; one for "seventeen years"); fourteen "year-of-displacement" dummies; five "year of survey" dummies; one "years since displacement" dummy; one "advance notification" dummy; ten "previous-industry" dummies; five "previous-occupation" dummies; one "experience at displacement" variable and its square; one "pre-displacement marital status" dummy; one "non-white" dummy; one "survey pre-1994" dummy; three "region" dummies; and "state" dummies.

♣ Dependent variable: log(current earnings deflated by GDP deflator)

** Estimate significantly different from zero at the 95% confidence level

*** Estimate significantly different from zero at the 99% confidence level

n.a. not applicable

Table 4
Post-Displacement Earnings Equation
Males Reemployed at Survey Date
DWS 1988-2000

	Dependent variable: Post-displacement weekly earnings ♣			
	White-collar N = 2,137	Blue-collar N = 2,313	Low-unionization N = 2,269	High-unionization N = 2,181
Unemployment spell	-.018***	-.017***	-.021***	-.013**
	(.006)	(.005)	(.005)	(.005)
Unemployment spell	.0004**	.0004**	.0005***	.0002
Squared	(.0002)	(.0006)	(.0002)	(.0002)
Layoff Dummy	-.032	-.037	-.056*	-.038
	(.032)	(.031)	(.033)	(.032)
Layoff dummy	.015**	.004	.017**	.005
x Unemployment spell	(.007)	(.007)	(.007)	(.007)
Layoff dummy	-.0006**	-.0001	-.0006*	-.0002
x Unemployment spell squared	(.0003)	(.0002)	(.0003)	(.0002)
R-squared	.5300	.3739	.5267	.4354

Note: The numbers in parentheses are standard errors. All regressions use the White estimator of variance. In addition to the variables shown in the table, the covariates are: log (previous earnings deflated by GDP deflator); a spline function in previous tenure (with breaks at 1, 2, 3, and 6 years); eleven dummies for completed education (one for "one to four years"; one for "five to six years"; one for "seven to eight years"; one for "nine years"; one for "ten years"; one for "eleven years"; one for "twelve years"; one for "thirteen years"; one for "fourteen and fifteen years"; one for "sixteen years"; one for "seventeen years"); fourteen "year-of-displacement" dummies; five "year of survey" dummies; one "years since displacement" dummy; one "advance notification" dummy; ten "previous-industry" dummies; five "previous-occupation" dummies; one "experience at displacement" variable and its square; one "pre-displacement marital status" dummy; one "non-white" dummy; one "survey pre-1994" dummy; three "region" dummies; and "state" dummies.

♣ Dependent variable: log(current earnings deflated by GDP deflator)

* Estimate significantly different from zero at the 90% confidence level

** Estimate significantly different from zero at the 95% confidence level

*** Estimate significantly different from zero at the 99% confidence level

Table 5
Post-Displacement Earnings Equation
Males Reemployed at Survey Date
DWS 1988-2000

	Dependent variable: Post-displacement weekly earnings ♣			
	No advance notice N = 2,572	Advance Notice N = 1,878	No UI benefits N = 2,439	UI benefits N = 1,988
Unemployment spell	-.021***	-.012**	-.026***	-.009
	(.006)	(.005)	(.006)	(.006)
Unemployment spell	.0005**	.0003	.0008***	.0002
Squared	(.0002)	(.0002)	(.0002)	(.0002)
Layoff dummy	-.074**	.033	-.014	-.122**
	(.033)	(.032)	(.025)	(.054)
Layoff dummy x	.017**	-.005	.017**	.018**
unemployment spell	(.007)	(.008)	(.008)	(.008)
(Layoff dummy x	-.0005**	.0000	-.0007**	-.0005**
unemployment spell)	(.0002)	(.0003)	(.0003)	(.0002)
squared				
R-squared	.4897	.5579	.5645	.4533

Note: The numbers in parentheses are standard errors. All regressions use the White estimator of variance. In addition to the variables shown in the table, the covariates are: log (previous earnings deflated by GDP deflator); a spline function in previous tenure (with breaks at 1, 2, 3, and 6 years); eleven dummies for completed education (one for "one to four years"; one for "five to six years"; one for "seven to eight years"; one for "nine years"; one for "ten years"; one for "eleven years"; one for "twelve years"; one for "thirteen years"; one for "fourteen and fifteen years"; one for "sixteen years"; one for "seventeen years"); fourteen "year-of-displacement" dummies; five "year of survey" dummies; one "years since displacement" dummy; one "advance notification" dummy; ten "previous-industry" dummies; five "previous-occupation" dummies; one "experience at displacement" variable and its square; one "pre-displacement marital status" dummy; one "non-white" dummy; one "survey pre-1994" dummy; three "region" dummies; and "state" dummies. Columns (3) and (4) also include one "advance notice" dummy.

♣ Dependent variable: log(current earnings deflated by GDP deflator)

** Estimate significantly different from zero at the 95% confidence level

*** Estimate significantly different from zero at the 99% confidence level

Table 6
Semi-Parametric Hazard Model Estimates
Males Including Those Who Did Not Find a Job at Survey Date
DWS 1988-2000

Dependent variable = Log (weeks of joblessness)
Cox proportional hazard model specification

		Layoff dummy	Log likelihood
1. Whole sample	N = 5,699	-.199***	-43,594.72
		(.026)	
2. White-collar workers	N = 2,683	-.243***H	-18,470.28
		(.040)	
3. Blue-collar workers	N = 3,016	-.164***	-21,153.27
		(.035)	
4. Non-unionized workers	N = 2,841	-.252***HHH	-19,771.32
		(.038)	
5. Unionized workers	N = 2,858	-.153***	-19,860.43
		(.037)	
6. No advance notice	N = 3,285	-.170***	-23,293.39
		(.035)	
7. Advance notice	N = 2,414	-.239***	-16,380.24
		(.039)	
8. No UI benefits	N = 2,942	-.146***HH	-20,801.69
		(.034)	
9. UI benefits	N = 2,727	-.131***	-18,766.00
		(.039)	

Note: The reported models were estimated by maximum likelihood with censoring explicitly treated using the DEAD option in STATA. The numbers in parentheses are standard errors. All regressions use the White estimator of variance. The reported specifications include: log (previous earnings deflated by GDP deflator); tenure; eleven dummies for completed education (one for "one to four years"; one for "five to six years"; one for "seven to eight years"; one for "nine years"; one for "ten years"; one for "eleven years"; one for "twelve years"; one for "thirteen years"; one for "fourteen and fifteen years"; one for "sixteen years"; one for "seventeen years"); fourteen "year-of-displacement" dummies; five "year of survey" dummies; one "years since displacement" variable; one "advance notification" dummy; ten "previous-industry" dummies; five "previous-occupation" dummies; one "experience at displacement" variable and its square; one "pre-displacement marital status" dummy; one "non-white" dummy; one "survey pre-1994" dummy; three "region" dummies; and "state" dummies.

*** Estimate significantly different from zero at the 99% confidence level
H Estimate is significantly different from that of the complimentary subgroup at the 90% confidence level
HH Estimate is significantly different from that of the complimentary subgroup at the 95% confidence level
HHH Estimate is significantly different from that of the complimentary subgroup at the 99% confidence level

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Appendices

SIGNALING IN THE LABOR MARKET: NEW EVIDENCE ON LAYOFFS, AND PLANT CLOSINGS

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APPENDIX

A. Characterization of equilibria

Lets define $h = \dfrac{(1-r)a}{(1-r)a + (1-a)}$, where η is the probability that a G-type worker accepts a new job offer in the second period when all workers choose to reject the first period offer. Let w_G and w_B be the expected productivity of a G-type worker and a B-type worker, respectively, at a new job, where w_G and w_B are defined as:

$$w_G = p_G H + (1 - p_G) L$$

and

$$w_B = p_B H + (1 - p_B) L$$

Proof of theorem 1. Suppose that there is an equilibrium in which some workers prefer to wait unemployed than to accept the job right away. Then,

$$rH + (1-r) w(2, U, h, l) \geq w(1, W, h, l) + w_G \quad (5)$$

$$w(2, U, h, l) \geq w(1, W, h, l) + w_B \quad (6)$$

where $w(1, W, h, l)$ and $w(2, U, h, l)$ are the wages offered to displaced workers who accept a job in the first period and in the second period, respectively. Consistency requires that $w(1, W, h, l) \geq L$ and $w(2, U, h, l) \leq H$. Inequalities (5) and (6) become

$$H \geq L + p_G H + (1 - p_G) L \quad (7)$$

$$H \geq L + p_L H + (1 - p_L) L \quad (8)$$

respectively, and since $p_L < p_H$, inequality (1) follows.

Proof of lemma 1. Expressions (2) and (3) can be rewritten as

$$rH + (1-r) w_G \geq w_B + w_G \quad (9)$$

and

$$w_G < 2 w_B \quad (10)$$

respectively. Expressions (9) and (10) say that if prospective employers offer a wage of w_G to workers who reject the first period offer, and a wage of w_B to workers who accept the first period offer, then it is optimal for G-type workers to reject the first-period offer and for B-type workers

to accept it. Given these worker's equilibrium strategies, prospective employers choose a second-period wage of w_G for laid-off workers who are unemployed during the first period and a wage of w_B for laid-off workers who accept a job at the beginning of the first period. Thus, the strategies just described are equilibrium strategies.

Lemma 2. There is a perfect Bayesian equilibrium in which all G-type workers and a proportion t of B-type workers wait unemployed when:

$$h(p_G - p_B) - p_B \le \frac{L}{H - L} \le p_G - 2p_B \qquad (11)$$

$$r \ge \frac{(p_G - p_B)[H - L]}{2(1 - p_B)[H - L] - H} \qquad (12)$$

and t is given by the following equation

$$t = \frac{a(1-r)}{(1-a)} \frac{(p_G - 2p_B)[H - L] - L}{p_B[H - L] + L} \qquad (13)$$

Proof of lemma 2. Suppose (11) is true. Since, $V(2,U,l,t)$ ranges from $[hw_G + (1-h)w_B]$ to w_G and is continuous, there must exist a $\tau \in [0,1]$ that satisfies (11). Reordering expression (12) and (13), it is easy to see that they say the following: If prospective employers offer $V(2,U,l,t)$ to laid-off workers who are unemployed during the first period and w_B to laid-off workers who accept the first-period job offer, G-type workers will strictly prefer to reject the offer while B-type workers will be indifferent between rejecting the second period job offer or accepting it. Supposing that all G-type workers and a fraction τ of B-type workers reject the first-period job offer, then prospective employers will offer a wage of $V(2,U,l,t)$ to laid-off workers who wait one period unemployed and a first period wage of w_B to workers who accept the second period job. Therefore, the strategies described in this lemma are the equilibrium strategies.

Lemma 3. There is a perfect Bayesian pooling equilibrium in which all types of laid-off workers reject job offers in the second period when the following conditions hold:

$$\frac{L}{H-L} \le r(1-p_B) + h(p_G - p_B)(1-r) - p_G \qquad (14)$$

$$\frac{L}{H-L} \le h(p_G - p_B) - p_B \qquad (15)$$

Proof of lemma 3. Notice that (14) and (15) imply that

$$rH + (1-r)\left[hw_G + (1-h)w_B\right] \ge w_B + w_G \qquad (16)$$

$$hw_G + (1-h)w_B \ge 2w_B \qquad (17)$$

Suppose that prospective employers offer $\left[hw_G + (1-h)w_B\right]$ to laid-off workers who were unemployed during the first period, and w_B to laid-off workers who accept a job in the first period. Inequalities (16) and (17) say that both types of workers reject the first period job offer and choose to wait one period unemployed. Supposing that all laid-off workers choose to wait unemployed one period, and observing an out-of-equilibrium employment history of accepting a second-period job by a worker, it is possible that prospective employers believe that they were observing a B-type worker. Those beliefs would lead them to offer that worker the following wage: w_B.

Under condition (1), I can also construct another hybrid equilibrium, described in Lemma 4. However, I find this equilibrium to be unsatisfactory

Remark 1. There is a perfect Bayesian equilibrium in which all B-type workers accept a first period offer, and a proportion g of G-type workers choose to wait one period unemployed when

$$r(1-p_G) - a(p_G - p_B) - p_B \le \frac{L}{H-L} \le r(1-p_G) - p_B \qquad (18)$$

$$r > \frac{p_G - p_B}{1-p_B} \qquad (19)$$

and g is given by:

$$(1-g) = \frac{(1-a)}{a} \frac{[r(1-p_G) - p_B][H-L] - L}{[r(1-p_G) - p_G][H-L] - L}$$

Proof of remark 1. The proof is similar to lemma 2 and thus omitted.
This completes the proof of theorem 1.

The equilibrium characterized by remark 1 is unsatisfactory for the following reason. Suppose that fewer than g of G-type workers choose unemployment, then the expected productivity of workers accepting a first period market offer would exceed $V(1,W,g,0)$. Then, more G-type workers would accept the first-period market offer, and the equilibrium would not be sustained. Conversely, if more than g choose to reject the first-period market offer, the expected productivity of laid-off workers who accept the first-period job offer would be lower, and fewer G-type workers would choose to accept the first-period job. Thus, it seems unlikely that an economy would ever converge to the equilibrium described in remark 1.[1]

B. Equilibrium with no voluntary unemployment

Theorem 2. There is a perfect Bayesian equilibrium in which there is no voluntary unemployment when

$$\frac{L}{H-L} > r[1 - a(p_G - p_B) - p_B] - p_G \qquad (20)$$

Proof of theorem 2. Inequality (20) can be rewritten as:

$$[aw_G + (1-a)w_B] + w_G > rH + (1-r)[aw_G + (1-a)w_B] \qquad (21)$$

On the other hand, since $w_B > 0$, I have that

$$[aw_G + (1-a)w_B] + w_B > [aw_G + (1-a)w_B] \qquad (22)$$

Inequalities (21) and (22) say that all laid-off workers choose to accept the first period wage. Since all workers choose to work during the first period, firms offer them a first-period wage of

[1] Notice that the other hybrid equilibrium does not have this instability problem. If the fraction of B-type workers who rejected the offer increased (or decreased), this would lead to lower (or higher) earnings for

$[aw_G + (1-a)w_B]$. Firms can have consistent beliefs that if the out-of-equilibrium action "being unemployed for one period" is observed, it would have been taken by a randomly selected worker. Thus, they can set the wage offered to workers who are unemployed during the first period to $[aw_G + (1-a)w_B]$.

C. Equilibrium refinements

In this section, I apply the Cho Kreps (1987) intuitive criterion to my model. Under certain conditions, the equilibrium in theorem 2 fails to satisfy the intuitive criterion.

Theorem 3. *The equilibrium with no voluntary unemployment described in theorem 2 fails to satisfy the intuitive criterion if and only if*

$$\frac{L}{H-L} \le r(1-p_G) - a(p_G - p_B) - p_B \qquad (23)$$

and

$$\frac{L}{H-L} > p_G - a(p_G - p_B) \qquad (24)$$

Proof of theorem 3. I first show that (23) and (24) are sufficient. Inequalities (23) and (24) can be rewritten

$$[aw_G + (1-a)w_B] + w_G \le rH + (1-r)w_G \qquad (25)$$

and

$$[aw_G + (1-a)w_B] + w_B > w_G \qquad (26)$$

Inequality (26) implies that it is an out-of-equilibrium strategy for a B-type worker to reject a first-period job, whereas inequality (25) implies that it is not an out-of-equilibrium strategy for a G-type worker to reject a first-period job. Thus, if a laid-off worker chooses to wait unemployed, he must be a G-type laid-off worker. Inequality (23) implies that the equilibrium with no voluntary unemployment fails to satisfy the intuitive criterion.

Inequalities (23) and (24) are not only a sufficient condition, but also necessary ones.

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those who wait unemployed. Thus, this would bring these workers back to the postulated distribution of actions.

If $[aw_G + (1-a)w_B] + w_B > w_G$, then a B-type worker would not benefit from waiting unemployed one period even when by doing so he would be identified as an G-type laid-off worker. And if $[aw_G + (1-a)w_B] + w_G \leq rH + (1-r)w_G$ then it would be optimal for a G-type worker to reject a first-period offer.

Theorem 4. *All equilibria with some voluntary unemployment satisfy the intuitive criterion.*

Proof of theorem 4. Since the separating and the two hybrid equilibria do not involve an unreached information set, they satisfy the intuitive criterion. I only need to show that the equilibrium in which all laid-off workers choose to wait unemployed for one period satisfies the intuitive criterion. The only way the intuitive criterion would rule out the equilibrium where everyone chooses to wait unemployed would be if, when observing an out-of-equilibrium action from a worker, prospective employers would believe this worker was a G-type worker. However, since G-type workers have a positive probability of being recalled, this restriction on prospective employers' beliefs is not possible. Thus, when prospective employers observe a worker accepting a firsts-period offer, they believe that he is a B-type worker. This will dissuade workers from accepting an offer in the first period. ~

Corollary 1. *If (23) and (24) hold, the equilibrium outcome that satisfies the intuitive criterion is unique and must be one with voluntary unemployment.*

Proof of corollary 1. Inequalities (23) and (24) only contradict condition (18) in theorem 1. Together with theorems 3 and 4, I know that an equilibrium that satisfies the intuitive criterion must be one with voluntary unemployment. Because the equilibria in lemmas 1-3 in theorem 1 are mutually exclusive, the conclusion follows.

Table 1. Descriptive statistics for displaced workers who get re-employed without unemployment spell using the DWS (1988-2000)

Males re-employed at survey date

	Means		
		Reason of displacement	
Variables	Entire sample	Plant closing	Layoff
Layoff = 1 (percent)	45.19	0	100.00
Previous tenure (years)	5.65	6.21	4.98
	(6.61)	(6.76)	(6.37)
Change in log real weekly earnings	-.057	-.048	-.068
	(.497)	(.472)	(.525)
Log of previous weekly earnings	6.33	6.35	6.31
	(.57)	(.56)	(.59)
Log of current weekly earnings	6.28	6.30	6.25
	(.64)	(.60)	(.69)
Length of unemployment (weeks)	0	0	0
No unemployment after displacement = 1 (percent)	100	100	100
Advance notice = 1 (percent)	50.06	60.67	37.20
Current education (years)	13.43	13.37	13.50
	(2.19)	(2.15)	(2.23)
Current (age-education-6) (years)	17.37	17.73	16.94
	(9.78)	(9.54)	(10.04)
White collar in previous job = 1 (percent)	52.01	51.78	52.29
Previous job in manufacturing = 1 (percent)	35.08	35.11	35.04
Current age (years)	36.75	37.02	36.43
	(9.88)	(9.59)	(10.24)
Currently married = 1 (percent)	70.77	73.11	67.92
Non white = 1 (percent)	7.31	7.11	7.55
N	821	450	371

Note.- The numbers in parenthesis are standard deviations. All weekly wages are deflated by the gross domestic product (GDP) deflator (base year = 1996). The white-collar sample consists of workers whose pre-displacement occupations were in the managerial and professional specialties or in the technical, sales, and administrative support specialties

Table 2. Descriptive statistics for displaced workers who are unemployed between one and four weeks using the DWS (1988-2000)

Males re-employed at survey date

	Means		
		Reason of displacement	
Variables	Entire sample	Plant closing	Layoff
Layoff = 1 (percent)	52.71	0	100.00
Previous tenure (years)	3.79	4.57	3.10
	(5.30)	(5.89)	(4.60)
Change in log real weekly earnings	-.058	-.043	-.071
	(.484)	(.436)	(.523)
Log of previous weekly earnings	6.14	6.15	6.14
	(.58)	(.57)	(.60)
Log of current weekly earnings	6.08	6.11	6.07
	(.61)	(.59)	(.62)
Length of unemployment (weeks)	2.33	2.28	2.38
	(1.16)	(1.15)	(1.16)
No unemployment after displacement = 1 (percent)	0	0	0
Advance notice = 1 (percent)	39.50	50.47	29.66
Current education (years)	13.00	12.90	13.09
	(2.34)	(2.42)	(2.27)
Current (age-education-6) (years)	16.07	16.90	15.34
	(10.22)	(10.29)	(10.12)
White collar in previous job = 1 (percent)	44.03	45.75	42.49
Previous job in manufacturing = 1 (percent)	35.61	34.68	36.44
Current age (years)	35.04	35.77	34.40
	(10.24)	(10.16)	(10.28)
Currently married = 1 (percent)	63.69	65.86	61.74
Non white = 1 (percent)	11.23	12.28	10.29
N	1,567	741	826

Note.- The numbers in parenthesis are standard deviations. All weekly wages are deflated by the gross domestic product (GDP) deflator (base year = 1996). The white-collar sample consists of workers whose pre-displacement occupations were in the managerial and professional specialties or in the technical, sales, and administrative support specialties

Table 3. Descriptive statistics for displaced workers who are between five and twelve weeks unemployed using the DWS (1988-2000)

Males re-employed at survey date

	Means		
		Reason of displacement	
Variables	Entire sample	Plant closing	Layoff
Layoff = 1 (percent)	58.78	0	100.00
Previous tenure (years)	4.71	5.62	4.08
	(6.28)	(7.07)	(5.57)
Change in log real weekly earnings	-.163	-.196	-.139
	(.525)	(.552)	(.503)
Log of previous weekly earnings	6.28	6.24	6.31
	(.59)	(.59)	(.59)
Log of current weekly earnings	6.12	6.04	6.17
	(.65)	(.62)	(.66)
Length of unemployment (weeks)	8.63	8.69	8.59
	(2.34)	(2.36)	(2.33)
No unemployment after displacement = 1 (percent)	0	0	0
Advance notice = 1 (percent)	40.41	50.44	33.38
Current education (years)	13.23	12.88	13.48
	(2.46)	(2.48)	(2.42)
Current (age-education-6) (years)	17.71	17.93	17.55
	(10.10)	(10.09)	(10.11)
White collar in previous job = 1 (percent)	49.86	44.54	53.60
Previous job in manufacturing = 1 (percent)	35.82	36.03	35.68
Current age (years)	36.92	36.78	37.02
	(10.14)	(10.00)	(10.24)
Currently married = 1 (percent)	66.25	67.47	65.39
Non white = 1 (percent)	10.08	13.32	7.81
N	1,111	458	653

Note.- The numbers in parenthesis are standard deviations. All weekly wages are deflated by the gross domestic product (GDP) deflator (base year = 1996). The white-collar sample consists of workers whose pre-displacement occupations were in the managerial and professional specialties or in the technical, sales, and administrative support specialties.

Table 4. Descriptive statistics for displaced workers who are unemployed between thirteen and thirty-six weeks using the DWS (1988-2000)

Males re-employed at survey date

	Means		
		Reason of displacement	
Variables	Entire sample	Plant closing	Layoff
Layoff = 1 (percent)	58.89	0	100.00
Previous tenure (years)	5.33	6.10	4.80
	(6.41)	(6.99)	(5.92)
Change in log real weekly earnings	-.230	-.188	-.260
	(.508)	(.464)	(.535)
Log of previous weekly earnings	6.31	6.23	6.38
	(.578)	(.54)	(.59)
Log of current weekly earnings	6.08	6.04	6.12
	(.60)	(.56)	(.63)
Length of unemployment (weeks)	22.96	23.04	22.91
	(6.22)	(6.43)	(6.08)
No unemployment after displacement = 1 (percent)	0	0	0
Advance notice = 1 (percent)	41.96	53.45	33.92
Current education (years)	13.26	12.97	13.46
	(2.35)	(2.21)	(2.42)
Current (age-education-6) (years)	18.89	18.53	19.14
	(10.14)	(10.19)	(10.10)
White collar in previous job = 1 (percent)	49.00	44.24	52.32
Previous job in manufacturing = 1 (percent)	40.17	42.20	38.75
Current age (years)	37.12	37.48	38.58
	(10.35)	(10.23)	(10.42)
Currently married = 1 (percent)	64.88	65.73	64.29
Non white = 1 (percent)	9.67	11.76	8.21
N	951	391	560

Note.- The numbers in parenthesis are standard deviations. All weekly wages are deflated by the gross domestic product (GDP) deflator (base year = 1996). The white-collar sample consists of workers whose pre-displacement occupations were in the managerial and professional specialties or in the technical, sales, and administrative support specialties.

Table 5. Descriptive statistics for displaced workers by whether they were displaced from white- or blue-collar jobs using the DWS (1988-2000)

Males re-employed at survey date

	Means					
	White-collar			Blue-collar		
		Reason of displacement			Reason of displacement	
Variables	Entire sample	Plant closing	Layoff	Entire sample	Plant closing	Layoff
Layoff = 1 (percent)	55.59	0	100.00	52.83	0	100.00
Previous tenure (years)	5.16	5. 70	4.72	4.27	5.25	3.39
	(6.34)	(6.73)	(5.98)	(5.81)	(6.50)	(4.97)
Change in log real weekly earnings	-.134	-.120	-145	-.108	-.094	-.121
	(.507)	(.489)	(.521)	(.507)	(.477)	(.532)
Log of previous weekly earnings	6.48	6.43	6.52	6.03	6.05	6.02
	(.58)	(.58)	(.59)	(.50)	(.50)	(.51)
Log of current weekly earnings	6.35	6.31	6.37	5.93	5.95	5.90
	(.64)	(.64)	(.65)	(.54)	(.51)	(.56)
Length of unemployment (weeks)	7.99	6.81	8.93	7.79	7.53	8.01
	(8.97)	(8.53)	(9.20)	(9.05)	(9.13)	(8.97)
No unemployment after displacement = 1 (percent)	19.98	24.55	16.33	17.03	19.89	14.48
Advance notice = 1 (percent)	41.88	54.48	31.82	42.50	52.25	33.80
Current education (years)	14.43	14.23	14.58	12.05	11.95	12.14
	(2.03)	(2.05)	(2.00)	(2.03)	(2.04)	(2.02)
Current (age-education-6) (years)	17.95	17.88	18.01	16.74	17.41	16.15
	(10.02)	(9.87)	(10.13)	(10.23)	(10.25)	(10.18)
White collar in previous job = 1 (percent)	100.00	100.00	100.00	0	0	0
Previous job in manufacturing = 1 (percent)	25.88	24.55	26.94	46.39	46.93	45.91
Current age (years)	38.34	38.05	38.57	34.78	35.33	34.28
	(10.10)	(9.88)	(10.28)	(10.06)	(9.99)	(10.11)
Currently married = 1 (percent)	67.57	67.76	67.42	64.33	67.83	61.21
Non white = 1 (percent)	7.77	8.43	7.24	11.85	13.75	10.15
N	2,137	949	1,188	2,313	1,091	1,222

Note.- The numbers in parenthesis are standard deviations. All weekly wages are deflated by the gross domestic product (GDP) deflator (base year = 1996). The white-collar sample consists of workers whose pre-displacement occupations were in the managerial and professional specialties or in the technical, sales, and administrative support specialties.

Table 6. Descriptive statistics for displaced workers by whether they were displaced from industries with high-unionization rates or not using the DWS (1988-2000)
Males re-employed at survey date

	Means					
	Low-unionization pre-displacement jobs			High-unionization pre-displacement jobs		
		Reason of displacement			Reason of displacement	
Variables	Entire sample	Plant closing	Layoff	Entire sample	Plant closing	Layoff
Layoff = 1 (percent)	53.77	0	100.00	54.56	0	100.00
Previous tenure (years)	4.03	4.58	3.56	5.39	6.39	4.55
	(5.41)	(5.90)	(4.90)	(6.65)	(7.17)	(6.07)
Change in log real weekly earnings	-.105	-.083	-.123	-.137	-.130	-.143
	(.516)	(.487)	(.540)	(.496)	(.477)	(.511)
Log of previous weekly earnings	6.21	6.18	6.24	6.29	6.28	6.29
	(.61)	(.59)	(.62)	(.56)	(.54)	(.58)
Log of current weekly earnings	6.11	6.09	6.12	6.15	6.15	6.15
	(.65)	(.63)	(.67)	(.60)	(.57)	(.62)
Length of unemployment (weeks)	7.55	6.69	8.29	8.23	7.73	8.65
	(8.78)	(8.54)	(8.91)	(9.24)	(9.16)	(9.29)
No unemployment after displacement = 1 (percent)	18.47	22.97	14.59	18.43	21.09	16.22
Advance notice = 1 (percent)	37.99	50.33	27.38	46.58	56.41	3840
Current education (years)	13.49	13.32	13.64	12.88	12.69	13.04
	(2.36)	(2.38)	(2.33)	(2.30)	(2.26)	(2.33)
Current (age-education-6) (years)	16.48	16.37	16.56	18.21	18.95	17.59
	(10.07)	(9.91)	(10.20)	(10.15)	(10.09)	(10.17)
White collar in previous job = 1 (percent)	61.13	60.15	61.97	34.39	32.09	36.30
Previous job in manufacturing = 1 (percent)	0	0	0	74.55	75.18	74.03
Current age (years)	35.92	35.63	36.18	37.07	37.62	36.61
	(10.21)	(9.95)	(10.43)	(10.23)	(10.01)	(10.40)
Currently married = 1 (percent)	62.67	64.06	61.48	69.23	71.75	67.14
Non white = 1 (percent)	10.14	11.82	8.69	9.63	10.07	8.74
N	2,269	1,049	1,220	2,181	991	1,190

Note.- The "high-unionization pre-displacement jobs" sample consists of workers whose pre-displacement industries had unionization rates above the sample mean rate. The numbers in parenthesis are standard deviations. All weekly wages are deflated by the gross domestic product (GDP) deflator (base year = 1996). The white-collar sample consists of workers whose pre-displacement occupations were in the managerial and professional specialties or in the technical, sales, and administrative support specialties.

Table 7. Descriptive statistics for displaced workers by whether they received advance notice using the DWS (1988-2000)

Males re-employed at survey date

	Means					
	No advance notice			Advance notice		
		Reason of displacement			Reason of displacement	
Variables	Entire sample	Plant closing	Layoff	Entire sample	Plant closing	Layoff
Layoff = 1 (percent)	62.95	0	100.00	42.12	0	100.00
Previous tenure (years)	4.16	4.70	3.84	5.43	6.13	4.47
	(5.72)	(6.29)	(5.33)	(6.50)	(6.81)	(5.90)
Change in log real weekly earnings	-.122	-.110	-.128	-.119	-.102	-.142
	(.531)	(.514)	(.540)	(.472)	(.454)	(.496)
Log of previous weekly earnings	6.23	6.20	6.25	6.27	6.25	6.30
	(.60)	(.59)	(.60)	(.57)	(.55)	(.59)
Log of current weekly earnings	6.11	6.09	6.12	6.15	6.15	6.16
	(.64)	(.64)	(.65)	(.61)	(.57)	(.65)
Length of unemployment (weeks)	8.00	7.34	8.39	7.72	7.07	8.62
	(8.91)	(8.63)	(9.05)	(9.15)	(9.06)	(9.20)
No unemployment after displacement = 1 (percent)	15.94	18.58	14.39	21.88	25.12	17.45
Advance notice = 1 (percent)	0	0	0	100.00	100.00	100.00
Current education (years)	13.16	12.94	13.29	13.23	13.08	13.45
	(2.35)	(2.33)	(2.35)	(2.36)	(2.35)	(2.35)
Current (age-education-6) (years)	17.56	17.56	17.56	17.00	17.68	16.07
	(10.32)	(10.27)	(10.36)	(9.89)	(9.91)	(9.78)
White collar in previous job = 1 (percent)	48.29	45.33	50.03	47.66	47.56	47.79
Previous job in manufacturing = 1 (percent)	32.89	31.48	33.72	41.53	40.94	42.35
Current age (years)	36.69	36.46	36.83	36.20	36.72	35.50
	(10.40)	(10.13)	(10.56)	(10.00)	(9.93)	(10.06)
Currently married = 1 (percent)	65.24	66.74	64.36	66.77	68.72	64.10
Non white = 1 (percent)	9.72	11.75	8.52	10.11	10.86	9.10
N	2,572	953	1,619	1,878	1,087	791

Note.- The numbers in parenthesis are standard deviations. All weekly wages are deflated by the gross domestic product (GDP) deflator (base year = 1996). The white-collar sample consists of workers whose pre-displacement occupations were in the managerial and professional specialties or in the technical, sales, and administrative support specialties.

Table 8. Descriptive statistics for displaced workers by whether they received unemployment insurance benefits using the DWS (1988-2000)

Males re-employed at survey date

	Means					
	No UI benefits			UI benefits		
		Reason of displacement			Reason of displacement	
Variables	Entire sample	Plant closing	Layoff	Entire sample	Plant closing	Layoff
Layoff = 1 (percent)	50.88	0	100.00	58.20	0	100.00
Previous tenure (years)	4.26	4.81	3.73	5.25	6.43	4.40
	(5.86)	(6.02)	(5.66)	(6.33)	(7.30)	(5.38)
Change in log real weekly earnings	-.064	-.067	-.062	-.190	-.165	-.208
	(.498)	(.484)	(.512)	(.508)	(.474)	(.531)
Log of previous weekly earnings	6.21	6.23	6.20	6.30	6.23	6.34
	(.63)	(.61)	(.65)	(.53)	(.51)	(.54)
Log of current weekly earnings	6.15	6.16	6.14	6.11	6.07	6.13
	(.65)	(.62)	(.68)	(.60)	(.57)	(.61)
Length of unemployment (weeks)	4.00	3.55	4.44	12.62	12.43	12.76
	(6.18)	(5.89)	(6.42)	(9.63)	(9.73)	(9.57)
No unemployment after displacement = 1 (percent)	31.04	34.97	27.24	3.12	3.49	2.85
Advance notice = 1 (percent)	40.71	51.59	30.22	44.11	56.08	35.52
Current education (years)	13.20	13.10	13.30	13.18	12.89	13.39
	(2.38)	(2.35)	(2.41)	(2.31)	(2.33)	(2.28)
Current (age-education-6) (years)	16.48	16.80	16.17	18.40	18.84	18.09
	(10.14)	(9.97)	(10.30)	(10.05)	(10.12)	(9.98)
White collar in previous job = 1 (percent)	48.30	48.66	47.95	47.79	43.68	50.73
Previous job in manufacturing = 1 (percent)	32.10	31.64	32.55	41.90	43.32	40.88
Current age (years)	35.65	35.86	35.45	37.55	37.70	37.45
	(10.29)	(9.98)	(10.59)	(10.07)	(10.00)	(10.12)
Currently married = 1 (percent)	64.45	67.36	61.64	67.76	68.59	67.16
Non white = 1 (percent)	10.05	11.35	8.78	9.76	11.19	8.73
N	2,439	1,198	1,241	1,988	831	1,157

Note.- The numbers in parenthesis are standard deviations. All weekly wages are deflated by the gross domestic product (GDP) deflator (base year = 1996). The white-collar sample consists of workers whose pre-displacement occupations were in the managerial and professional specialties or in the technical, sales, and administrative support specialties.

Table 9. Descriptive statistics for displaced workers using the DWS (1988-2000)

Males including those who did not find a job at survey date

	Means		
		Reason of displacement	
Variables	Entire sample	Plant closing	Layoff
Layoff = 1 (percent)	54.69	0	100.00
Previous tenure (years)	4.91	5.70	4.25
	(6.36)	(6.94)	(5.75)
Change in log real weekly earnings	-.149	-.128	-.166
	(.567)	(.515)	(.61)
Log of previous weekly earnings	6.25	6.23	6.27
	(.59)	(.57)	(.61)
Log of current weekly earnings	6.10	6.10	6.11
	(.67)	(.63)	(.60)
Length of unemployment (weeks)	12.01	10.93	12.90
	(17.03)	(16.31)	(17.55)
No unemployment after displacement = 1 (percent)	16.35	19.52	13.73
Advance notice = 1 (percent)	42.36	53.21	33.37
Current education (years)	13.09	12.90	13.25
	(2.40)	(2.38)	(2.40)
Current (age-education-6) (years)	17.86	18.19	17.58
	(10.36)	(10.33)	(10.39)
White collar in previous job = 1 (percent)	47.08	45.47	48.41
Previous job in manufacturing = 1 (percent)	37.27	36.64	37.79
Current age (years)	36.93	37.06	36.81
	(10.38)	(10.17)	(10.55)
Currently married = 1 (percent)	65.17	66.65	63.94
Non white = 1 (percent)	10.04	11.00	9.24
N	5,699	2,582	3,117

Note.- The numbers in parenthesis are standard deviations. All weekly wages are deflated by the gross domestic product (GDP) deflator (base year = 1996). The white-collar sample consists of workers whose pre-displacement occupations were in the managerial and professional specialties or in the technical, sales, and administrative support specialties.

Table 10. Earnings equation using the DWS (1988-2000)

Males re-employed at survey date

	Dependent variables: Weekly earnings♣		
N =4,450	Change	Pre-displacement	Post-displacement
Unemployment spell	-.017***	-.002	-.042***
	(.004)	(.004)	(.004)
Unemployment spell squared	.0004***	.0001	.0004***
	(.0001)	(.0001)	(.0001)
Layoff dummy	-.040*	-.004	-.042
	(.024)	(.022)	(.026)
Layoff dummy	.009*	.003	.012**
x unemployment spell	(.005)	(.005)	(.006)
Layoff dummy	-.0004**	.0000	-.0004*
x unemployment spell squared	(.0002)	(.0002)	(.0002)
R-squared	.0939	.4556	.3557

Note: The numbers in parentheses are standard errors. All regressions use the White estimator of variance. In addition to the variable shown in the table, the covariates are: a spline function in previous tenure (with breaks at 1, 2, 3, and 6 years); eleven dummies for completed education (one for "one to four years"; one for "five to six years"; one for "seven to eight years"; one for "nine years"; one for "ten years"; one for "eleven years"; one for "twelve years"; one for "thirteen years"; one for "fourteen and fifteen years"; one for "sixteen years"; one for "seventeen years"); fourteen "year-of-displacement" dummies; one "advance notification" dummy; ten "previous-industry" dummies; five "previous-occupation" dummies; one "experience at displacement" variable and its square; one "pre-displacement marital status" dummy; one "non-white" dummy; one "survey pre-1994" dummy; three "region" dummies; and "state" dummies. Columns (1) and (3) also include five "year of survey" dummies; and one "years since displacement" variable.

♣ Dependent variable: col. 1 = log(current earnings/previous earnings); col. 2 = log (previous earnings deflated by GDP deflator); and col. 3 = log(current earnings deflated by GDP deflator)

* Estimate significantly different from zero at the 90% confidence level

** Estimate significantly different from zero at the 95% confidence level

*** Estimate significantly different from zero at the 99% confidence level

Table 11. Earnings equation using the DWS (1988-2000)

Workers displaced from white- and blue-collar jobs, re-employed at survey date

	Dependent variables: Weekly earnings♣					
	White-collar (N=2,137)			Blue-collar (N=2,313)		
	Change	Pre-displacement	Post-displacement	Change	Pre-displacement	Post-displacement
Unemployment spell	-.016***	-.005	-.022***	-.016***	-.002	-.018***
	(.006)	(.006)	(.007)	(.005)	(.004)	(.005)
Unemployment spell squared	.0003	.0002	.0006**	.0003*	.0000	.0004*
	(.0002)	(.0002)	(.0002)	(.0002)	(.0002)	(.0002)
Layoff dummy	-.041	.019	-.020	-.041	-.007	-.048
	(.034)	(.034)	(.038)	(.035)	(.030)	(.034)
Layoff dummy	.013*	.005	.018**	.003	.003	.006
x unemployment spell	(.008)	(.007)	(.009)	(.008)	(.006)	(.007)
Layoff dummy	-.0005**	-.0001	-.0007**	-.0001	.0000	-.0001
x unemployment spell squared	(.0003)	(.0003)	(.0003)	(.0003)	(.0002)	(.0003)
R-squared	.1364	.4189	.3388	.1053	.3678	.2595

Note: The white-collar sample consists of workers whose pre-displacement occupations were in the managerial and professional specialties or in the technical, sales and administrative support specialties. The numbers in parentheses are standard errors. All regressions use the White estimator of variance. The covariates are described in table 10.

♣ Dependent variable: col. 1 and 4 = log (current earnings/previous earnings); col. 2 and 5 = log (previous earnings deflated by GDP deflator); and col. 3 and 6 = log (current earnings deflated by GDP deflator)

Table 12. Earnings equation using the DWS (1988-2000)

Workers displaced from low- and high-unionized industries, re-employed at survey date

	Dependent variables: Weekly earnings♣					
	Low-unionization pre-displacement jobs (N=2,269)			High-unionization pre-displacement jobs (N=2,181)		
	Change	Pre-displacement	Post-Displacement	Change	Pre-displacement	Post-displacement
Unemployment spell	-.018***	-.009	-.027***	-.015***	.005	-.010*
	(.036)	(.006)	(.006)	(.005)	(.005)	(.006)
Unemployment spell squared	.0004*	.0003	.0007***	.0003*	-.0002	.0001
	(.0002)	(.0002)	(.0002)	(.0002)	(.0002)	(.0002)
Layoff dummy	-.060*	.012	-.069*	-.039	-.001	-.040
	(.036)	(.034)	(.038)	(.034)	(.030)	(.036)
Layoff dummy	.014*	.007	.021**	.005	.001	.005
x unemployment spell	(.008)	(.008)	(.009)	(.007)	(.006)	(.008)
Layoff dummy	-.0006**	-.0001	-.0007**	-.0002	.0001	-.0001
x unemployment spell squared	(.0003)	(.0003)	(.0003)	(.0002)	(.0002)	(.0003)
R-squared	.1028	..4496	.3687	.1189	.4820	.3772

Note: The "high-unionization pre-displacement jobs" sample consists of workers whose pre-displacement industries had unionization rates above the sample mean rate. The numbers in parentheses are standard errors. All regressions use the White estimator of variance. The covariates are described in table 10.

♣ Dependent variable: col. 1 and 4 = log(current earnings/previous earnings); col. 2 and 5 = log (previous earnings deflated by GDP deflator); and col. 3 and 6 = log(current earnings deflated by GDP deflator)

Table 13. Earnings equation using the DWS (1988-2000)

Workers who did and did not receive advance notice, re-employed at survey date

	Dependent variables: Weekly earnings ♣					
	No advance notice N=2,572			Advance notice N=1,878		
	Change	Pre-displacement	Post-displacement	Change	Pre-displacement	Post-displacement
Unemployment spell	-.017***	-.007	-.024***	-.012*	.001	-.011*
	(.006)	(.005)	(.006)	(.005)	(.005)	(.006)
Unemployment spell squared	.0004*	.0002	.0005***	.0003	.0000	.0002
	(.0002)	(.0002)	(.0002)	(.0002)	(.0002)	(.0001)
Layoff dummy	-.057	-.040	-.092**	.015	.041	.058
	(.036)	(.033)	(.037)	(.034)	(.032)	(.038)
Layoff dummy x unemployment spell	.013*	.010	.023***	-.003	-.005	-.008
	(.008)	(.007)	(.008)	(.008)	(.007)	(.009)
Layoff dummy x unemployment spell squared	-.0004*	-.0002	-.0006**	-.0001	.0003	.0002
	(.0003)	(.0002)	(.0003)	(.0003)	(.0003)	(.0003)
R-squared	.0943	.4535	.3581	.1505	.4874	.3980

Note: The numbers in parentheses are standard errors. All regressions use the White estimator of variance. The covariates are described in table 10.

♣ Dependent variable: col. 1 and 4 = log(current earnings/previous earnings); col. 2 and 5 = log (previous earnings deflated by GDP deflator); and col. 3 and 6 = log(current earnings deflated by GDP deflator)

Table 14. Earnings equation using the DWS (1988-2000)

Workers who received unemployment insurance benefits or not, re-employed at survey date

	Dependent variables: Weekly earnings ♣					
	No unemployment benefits N=2,439			Unemployment benefits N=1,988		
	Change	Pre-displacement	Post-displacement	Change	Pre-displacement	Post-displacement
Unemployment spell	-.023***	-.006	-.030***	-.014***	.010*	-.004
	(.007)	(.007)	(.007)	(.006)	(.005)	(.007)
Unemployment spell squared	.0007**	.0002	.0009***	.0003	-.0003	.0000
	(.0003)	(.0003)	(.0003)	(.0002)	(.0002)	(.0002)
Layoff dummy	-.010	-.023	-.030	-.165***	.086	-.078
	(.027)	(.027)	(.030)	(.058)	(.046)	(.060)
Layoff dummy x unemployment spell	.018*	-.002	.016*	.020**	-.006	.015
	(.009)	(.009)	(.010)	(.009)	(.007)	(.009)
Layoff dummy x unemployment spell squared	-.0008*	.0002	-.0006*	-.0006**	.0002	-.0004
	(.0004)	(.0004)	(.0004)	(.0003)	(.0002)	(.0003)
R-squared	.0870	.4818	.4199	.1266	.4423	.3134

Note: The numbers in parentheses are standard errors. All regressions use the White estimator of variance. The covariates are described in table 10.

♣ Dependent variable: col. 1 and 4 = log(current earnings/previous earnings); col. 2 and 5 = log (previous earnings deflated by GDP deflator); and col. 3 and 6 = log(current earnings deflated by GDP deflator)

Table 15. Descriptive statistics for displaced workers by whether they were displaced from unionized jobs or not using the DWS (1988-2000)

Males re-employed at survey date

	Means					
	Unionized			Non-unionized		
		Reason of displacement			Reason of displacement	
Variables	Entire sample	Plant closing	Layoff	Entire sample	Plant closing	Layoff
Layoff = 1 (percent)	56.15	0	100.00	49.90	0	100.00
Previous tenure (years)	4.37	4.89	3.96	5.96	7.21	4.71
	(5.78)	(6.10)	(5.49)	(7.23)	(7.96)	(6.19)
Change in log real weekly earnings	-.099	-.089	-.107	-.179	-.158	-.200
	(.517)	(.497)	(.532)	(.493)	(.472)	(.513)
Log of previous weekly earnings	6.25	6.22	6.28	6.26	6.26	6.26
	(.61)	(.60)	(.62)	(.52)	(.50)	(.54)
Log of current weekly earnings	6.15	6.13	6.17	6.08	6.10	6.06
	(.65)	(.64)	(.66)	(.57)	(.53)	(.60)
Length of unemployment (weeks)	7.40	6.54	8.06	9.03	8.40	9.67
	(8.70)	(8.40)	(8.87)	(9.71)	(9.58)	(9.81)
No unemployment after displacement = 1 (percent)	20.01	24.10	16.81	15.80	19.31	12.27
Advance notice = 1 (percent)	36.63	50.04	26.16	54.93	60.75	49.10
Current education (years)	13.42	13.26	13.54	12.65	12.49	12.81
	(2.34)	(2.34)	(2.33)	(2.23)	(2.21)	(2.24)
Current (age-education-6) (years)	17.33	17.36	17.30	17.82	18.80	16.83
	(10.18)	(10.06)	(10.27)	(10.24)	(10.28)	(10.11)
White collar in previous job = 1 (percent)	56.35	56.14	56.51	27.66	26.51	28.81
Previous job in manufacturing = 1 (percent)	19.62	17.41	21.34	72.92	72.33	73.51
Current age (years)	36.71	36.58	36.81	36.44	37.27	35.62
	(10.33)	(10.10)	(10.51)	(10.13)	(10.03)	(10.17
Currently married = 1 (percent)	64.24	66.13	62.77	70.28	71.94	68.60
Non white = 1 (percent)	9.92	11.61	8.61	10.12	11.07	9.17
N	3,104	1,361	1,743	1,551	777	774

Note.- The unionized sample consist of workers who reported loosing a unionized pre-displacement job. Because the DWS did not collect information on whether the pre-displacement job was unionized prior to 1994, for those workers in the 1988-1992 DWS, we classify displaced from a unionized job if he was displaced from an industry with higher than average unionization rates. The numbers in parenthesis are standard deviations. All weekly wages are deflated by the gross domestic product (GDP) deflator (base year = 1996). The white-collar sample consists of workers whose pre-displacement occupations were in the managerial and professional specialties or in the technical, sales, and administrative support specialties.

Table 16. Post-displacement earnings equation using the DWS (1988-2000)

Males re-employed at survey date

	Dependent variable: Post-displacement weekly earnings ♣	
	Unionized N = 1,551	Non-unionized N = 3,104
Unemployment spell	-.010*	-.022***
	(.006)	(.005)
Unemployment spell	.0002	.0006***
Squared	(.0002)	(.0002)
Layoff Dummy	-.082*	-.012
	(.042)	(.027)
Layoff dummy	.010	.012*
x Unemployment spell	(.008)	(.006)
Layoff dummy	-.0003	-.0005**
x Unemployment spell squared	(.0003)	(.0002)
R-squared	.4538	.5213

Note: The unionized sample consist of workers who reported loosing a unionized pre-displacement job. Because the DWS did not collect information on whether the pre-displacement job was unionized prior to 1994, for those workers in the 1988-1992 DWS, we classify displaced from a unionized job if he was displaced from an industry with higher than average unionization rates. The numbers in parentheses are standard errors. All regressions use the White estimator of variance. In addition to the variables shown in the table, the covariates are: log (previous earnings deflated by GDP deflator); a spline function in previous tenure (with breaks at 1, 2, 3, and 6 years); eleven dummies for completed education (one for "one to four years"; one for "five to six years"; one for "seven to eight years"; one for "nine years"; one for "ten years"; one for "eleven years"; one for "twelve years"; one for "thirteen years"; one for "fourteen and fifteen years"; one for "sixteen years"; one for "seventeen years"); fourteen "year-of-displacement" dummies; five "year of survey" dummies; one "years since displacement" dummy; one "advance notification" dummy; ten "previous-industry" dummies; five "previous-occupation" dummies; one "experience at displacement" variable and its square; one "pre-displacement marital status" dummy; one "non-white" dummy; one "survey pre-1994" dummy; three "region" dummies; and "state" dummies.

♣ Dependent variable: log(current earnings deflated by GDP deflator)

* Estimate significantly different from zero at the 90% confidence level

** Estimate significantly different from zero at the 95% confidence level

*** Estimate significantly different from zero at the 99% confidence level

Table 17. Earnings equation using the DWS (1988-2000)

Workers displaced from unionized jobs or not using the DWS (1988-2000),

Males re-employed at survey date

	Dependent variables: Weekly earnings♣					
	Non-unionized (N=3,104)			Unionized (N=1,551)		
	Change	Pre-displacement	Post-Displacement	Change	Pre-displacement	Post-displacement
Unemployment spell	-.019***	-.008	-.027***	-.013**	.006	-.007
	(.005)	(.005)	(.005)	(.006)	(.036)	(.006)
Unemployment spell squared	.0005*	.0003	.0008***	.0003	-.0003*	.0000
	(.0002)	(.0002)	(.0002)	(.0002)	(.0002)	(.0002)
Layoff dummy	-.023	.008	-.012	-.077*	-.016	-.091*
	(.028)	(.027)	(.030)	(.045)	(.036)	(.046)
Layoff dummy	.010	.006	.016*	.009	.001	.010
x unemployment spell	(.007)	(.006)	(.007)	(.009)	(.007)	(.009)
Layoff dummy	-.0004*	-.0002	-.0006*	-.0004	.0001	-.0002
x unemployment spell squared	(.0002)	(.0002)	(.0003)	(.0003)	(.0002)	(.0003)
R-squared	.0979	..4673	.3684	.1367	.4575	.3293

Note: The unionized sample consist of workers who reported loosing a unionized pre-displacement job. Because the DWS did not collect information on whether the pre-displacement job was unionized prior to 1994, for those workers in the 1988-1992 DWS, we classify displaced from a unionized job if he was displaced from an industry with higher than average unionization rates. The numbers in parentheses are standard errors. All regressions use the White estimator of variance. The covariates are described in table 10. For those workers in the 1988-1992 DWS, we classify displaced from a unionized job if he was displaced from an industry with higher than average unionization rates.

♣ Dependent variable: col. 1 and 4 = log(current earnings/previous earnings); col. 2 and 5 = log (previous earnings deflated by GDP deflator); and col. 3 and 6 = log(current earnings deflated by GDP deflator)

* Estimate significantly different from zero at the 90% confidence level

** Estimate significantly different from zero at the 95% confidence level

*** Estimate significantly different from zero at the 99% confidence level

Table 18. Descriptive statistics for displaced workers by cause of displacement using the DWS (1988-2000)

Males re-employed at survey date

	Means		
	Reason of displacement		
Variables	Plant closing	Slack work	Shift or position abolished
Layoff = 1 (percent)	0	100.00	100.00
Previous tenure (years)	5.46	3.08	5.53
	(6.61)	(4.44)	(6.61)
Change in log real weekly earnings	-.106	-.111	-.166
	(.482)	(.533)	(.515)
Log of previous weekly earnings	6.23	6.13	6.47
	(.57)	(.57)	(.59)
Log of current weekly earnings	6.12	6.02	6.31
	(.60)	(.62)	(.66)
Length of unemployment (weeks)	7.20	8.04	9.12
	(8.86)	(8.85)	(9.42)
No unemployment after displacement = 1 (percent)	22.06	14.20	17.23
Advance notice = 1 (percent)	53.28	31.82	34.35
Current education (years)	13.01	12.88	14.05
	(2.34)	(2.34)	(2.18)
Current (age-education-6) (years)	16.39	15.94	18.80
	(10.17)	(10.12)	(10.08)
White collar in previous job = 1 (percent)	46.52	38.00	66.60
Previous job in manufacturing = 1 (percent)	36.52	40.53	30.46
Current age (years)	36.60	34.81	38.82
	(10.03)	(10.31)	(10.10)
Currently married = 1 (percent)	67.79	60.97	69.33
Non white = 1 (percent)	11.27	9.34	7.67
N	2,040	1,458	952

Note.- The numbers in parenthesis are standard deviations. All weekly wages are deflated by the gross domestic product (GDP) deflator (base year = 1996). The white-collar sample consists of workers whose pre-displacement occupations were in the managerial and professional specialties or in the technical, sales, and administrative support specialties.

Table 19 Post-displacement earnings equation by cause of displacement using the DWS (1988-2000)

Males re-employed at survey date

	Dependent variable: Post-displacement weekly earnings ♣	
	Plant Closings and Slack Work N = 3,498	Plant Closings and Shift or Position Abolished N = 2,992
Unemployment spell	-.017***	-.017***
	(.004)	(.004)
Unemployment spell	.0004***	.0004***
Squared	(.0001)	(.0001)
Layoff Dummy	-.041	-.033
	(.027)	(.030)
Layoff dummy	.010*	.010*
x Unemployment spell	(.006)	(.006)
Layoff dummy	-.0004*	-.0004*
x Unemployment spell squared	(.0002)	(.0002)
R-squared	.4908	.5245

Note: The numbers in parentheses are standard errors. All regressions use the White estimator of variance. In addition to the variables shown in the table, the covariates are: log (previous earnings deflated by GDP deflator); a spline function in previous tenure (with breaks at 1, 2, 3, and 6 years); eleven dummies for completed education (one for "one to four years"; one for "five to six years"; one for "seven to eight years"; one for "nine years"; one for "ten years"; one for "eleven years"; one for "twelve years"; one for "thirteen years"; one for "fourteen and fifteen years"; one for "sixteen years"; one for "seventeen years"); fourteen "year-of-displacement" dummies; five "year of survey" dummies; one "years since displacement" dummy; one "advance notification" dummy; ten "previous-industry" dummies; five "previous-occupation" dummies; one "experience at displacement" variable and its square; one "pre-displacement marital status" dummy; one "non-white" dummy; one "survey pre-1994" dummy; three "region" dummies; and "state" dummies.

♣ Dependent variable: log(current earnings deflated by GDP deflator)

* Estimate significantly different from zero at the 90% confidence level

** Estimate significantly different from zero at the 95% confidence level

*** Estimate significantly different from zero at the 99% confidence level

Table 20. Earnings equation by cause of displacement using the DWS (1988-2000)

Workers re-employed at survey date

	Dependent variables: Weekly earnings ♣					
	Slack work and plant closings (N=3,498)			Shift or position abolished and plant closings (N=2,992)		
	Change	Pre-displacement	Post-displacement	Change	Pre-displacement	Post-Displacement
Unemployment spell	-.016***	-.002	-.019***	-.016***	-.002	-.018***
	(.004)	(.004)	(.004)	(.004)	(.004)	(.004)
Unemployment spell squared	.0004	-.0001	.0004***	.0004***	.0000	.0004***
	(.0001)	(.0001)	(.0001)	(.0001)	(.0001)	(.0001)
Layoff dummy	-.025	-.040	-.063**	-.058*	.049	-.009
	(.029)	(.027)	(.030)	(.031)	(.029)	(.034)
Layoff dummy x unemployment spell	.008	.004	.012*	.010	.002	.012
	(.006)	(.006)	(.007)	(.007)	(.006)	(.007)
Layoff dummy x unemployment spell squared	-.003	-.0000	-.0004*	-.0004*	.0001	-.0003
	(.0002)	(.0002)	(.0002)	(.0002)	(.0002)	(.0003)
R-squared	.0996	4276	.3441	.1058	.4766	.3643

Note: The numbers in parentheses are standard errors. All regressions use the White estimator of variance. The covariates are described in table 10.

♣ Dependent variable: col. 1 and 4 = log(current earnings/previous earnings); col. 2 and 5 = log (previous earnings deflated by GDP deflator); and col. 3 and 6 = log(current earnings deflated by GDP deflator)

* Estimate significantly different from zero at the 90% confidence level

** Estimate significantly different from zero at the 95% confidence level

*** Estimate significantly different from zero at the 99% confidence level

Table 21. Number of layoffs and plant closings reported in a given year using the DWS (1988-2000)

Workers re-employed at survey date

Survey Year	Year of Displacement	Cause of Displacement	
		Layoffs	Plant closings
1988		149	131
	1987		
1990		100	148
1990		146	103
	1989		
1992		114	157
1996		185	103
	1995		
1998		92	81
1998		163	95
	1997		
2000		86	79

Table 22. Average pre-displacement tenure reported for a given year by cause of displacement using the DWS (1988-2000)

Workers re-employed at survey date

	Year of Displace	Cause of Displacement	
Survey Year		Layoffs	Plant closings
1988		3.6	5.6
	1987		
1990		4.5	4.5
1990		2.5	4.2
	1989		
1992		4.4	5.4
1996		3.5	5.1
	1995		
1998		5.2	4.8
1998		3.9	5.4
	1997		
2000		5.5	6.8

Table 23. Post-displacement earnings equation using the DWS (1988-2000)

Males re-employed at survey date

	Dependent variable: Post-displacement weekly earnings ♣	
	Whole sample N = 4,450	Displaced within the last two years N = 3,114
Unemployment spell	-.017***	-.024***
	(.004)	(.005)
Unemployment spell	.0004***	.0006***
Squared	(.0001)	(.0002)
Layoff Dummy	-.036	-.067**
	(.022)	(.027)
Layoff dummy	.010**	.019***
x Unemployment spell	(.005)	(.006)
Layoff dummy	-.0004**	-.0006***
x Unemployment spell squared	(.0002)	(.0002)
R-squared	.5036	.5127

Note: The numbers in parentheses are standard errors. All regressions use the White estimator of variance. In addition to the variables shown in the table, the covariates are: log (previous earnings deflated by GDP deflator); a spline function in previous tenure (with breaks at 1, 2, 3, and 6 years); eleven dummies for completed education (one for "one to four years"; one for "five to six years"; one for "seven to eight years"; one for "nine years"; one for "ten years"; one for "eleven years"; one for "twelve years"; one for "thirteen years"; one for "fourteen and fifteen years"; one for "sixteen years"; one for "seventeen years"); fourteen "year-of-displacement" dummies; five "year of survey" dummies; one "years since displacement" dummy; one "advance notification" dummy; ten "previous-industry" dummies; five "previous-occupation" dummies; one "experience at displacement" variable and its square; one "pre-displacement marital status" dummy; one "non-white" dummy; one "survey pre-1994" dummy; three "region" dummies; and "state" dummies.

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