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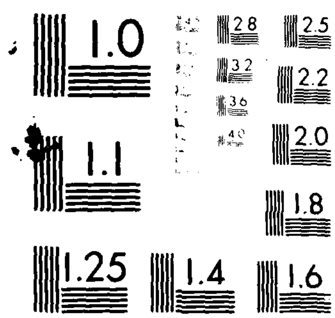

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EARNINGS LOSSES OF WORKERS DISPLACED BY PLANT CLOSINGS

Arlene Holen
Christopher Jehn
Robert P. Trost

The Public Research Institute

A Division of the Center for Naval Analyses

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Prepared under contract J-9-K-6-0016 for:

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Washington D.C. 20210

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This study estimates the earnings losses of workers who lose their jobs in a plant closing. A unique data set was used: Social Security earnings records of over 9,000 workers employed in plants that actually closed. Separate estimates are made for workers by age and sex and the effects on losses of economic and demographic variables are also estimated. Alternative methodologies are discussed and used to estimate losses of workers who never work after the plant closing.

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INTRODUCTION

BACKGROUND

It is a fundamental theorem of economics that free international trade benefits society as a whole. Thus, removing barriers to trade, such as import quotas or tariffs, is generally viewed as beneficial. But reducing trade barriers will impose costs on some members of society. In particular, workers and the owners of capital in industries that compete with imports will be hurt. Our concern here is the losses suffered by workers in import-sensitive industries. This study estimates the earnings losses experienced by workers who are displaced when the plant in which they are working closes.

Not only plant closings, of course, can cause earnings losses. Losses in earnings can also result from reduced hours or wage rates, from temporary layoffs, or selected permanent layoffs. Since plant closings would generally represent the most severe and costly consequence of increased trade, evidence from plant closings should provide an indication of what losses would be in the most severe cases. Though trade liberalization is the principal motivation for this study, the results should be applicable to plant closings that result from other causes, such as shifts in demand or technological change.

Previous studies have measured earnings losses, but these have suffered from a number of shortcomings. For example, estimates of workers' losses were based in a number of studies on a very short period following the plant closing. Also, workers' earnings prior to the plant closing were usually examined only for the 12 months immediately prior to the closing. In addition, many previous studies lacked a "control group"; that is, workers' earnings before and after the plant closing were compared, but there was no attempt to estimate what workers might have earned in the absence of the plant closing. (For example, see Corson, et al. [1]. Also, see Holen, [2], for an extensive discussion of past studies in this area.)

These problems were avoided by Louis Jacobson in his studies of earnings losses due to displacement in the steel industry [3] and in 11 manufacturing industries [4]. Jacobson's estimates were based on the Social Security Administration's Longitudinal Employer-Employee Data (LEED) file. With these data Jacobson was able both to examine earnings over long periods of time and to construct a statistical control group. His methodology, however, cannot distinguish between voluntary and involuntary leavers from an industry, nor does it deal explicitly with individuals who withdrew from the labor force. Also, his studies examine only the experience of prime-age (i.e., 23-53 year-old) males.

By contrast, this study looks at actual plant closings. That is, all workers we investigate were involuntarily separated from their plant and all layoffs were permanent. Another contribution of this study is its explicit analyses of the losses of women and older workers, and of labor force withdrawal (which we discuss in an appendix), which have been highlighted as important problems in Jacobson's and other prior studies. Also, this study examines a long earnings history for all workers.

THE NATURE OF LOSSES

Before we discuss the data and our analysis, consider the general problem of estimating earnings losses of displaced workers. Earnings losses have two principal components.

First, there are non-pecuniary losses, sometimes referred to as "psychic" damage. These losses can take several forms. Many workers will be giving up a job they have gotten used to, like, and wouldn't voluntarily leave. Many workers will find it distasteful but necessary to move to a different city or part of the country. Some workers may suffer damage to their physical health as well as the loss of self-respect and confidence as a result of their unemployment.

Second, there are pecuniary losses. These pecuniary losses will include fringe benefits lost, such as coverage for medical and other insurance, any retirement benefits that might be lost when the plant closes, and, most obviously, direct wage and salary losses. In this study we focus on wage and salary losses.

There are, of course, several factors offsetting these losses. First, taxes on earned wages make net losses less than the losses in earnings that we estimate here. Also, in many cases workers will be compensated by transfer payments, such as unemployment insurance, trade adjustment assistance, and direct welfare payments. Second, for workers not working full-time or not working at all after the plant closes, the time they would have spent working is worth something to them. They can engage in work in the home or they can consume leisure. In either case, the time spent not working is not a total loss.

Here we are concerned with wage and salary losses. There are three principal sources of these earnings losses. The first is the immediate spell of unemployment workers would suffer while they look for new jobs after the plant closes. In their new jobs, workers may be unable to capitalize on skills they have learned that are particularly valuable in their former firms or industry. This loss in "human capital" to individual workers (reflected in lower wages at their new job compared to the old) is the second source of earnings loss. Loss of union "rent" may also be associated with lower earnings upon reemployment. The third source of loss is subsequent spells of unemployment. These may result because newly-hired workers are among the first laid off, and displaced workers will typically be treated as new hires by their new employers.

These notions are illustrated in figure 1, a hypothetical picture of an individual worker's earnings loss following a plant closing. The solid line represents the earnings of the worker in the absence of a plant closing. The dashed line represents earnings after the plant closes. The initial dip in earnings after the plant closes reflects the immediate unemployment. The difference between the solid and dashed lines subsequent to the initial dip reflects the loss of human capital and any subsequent unemployment spells the worker might suffer. The total area between these two lines is our definition of earnings loss. In other words, earnings loss is defined as the difference between what a worker did earn after a plant closes and what he would have earned had there been no plant closing.

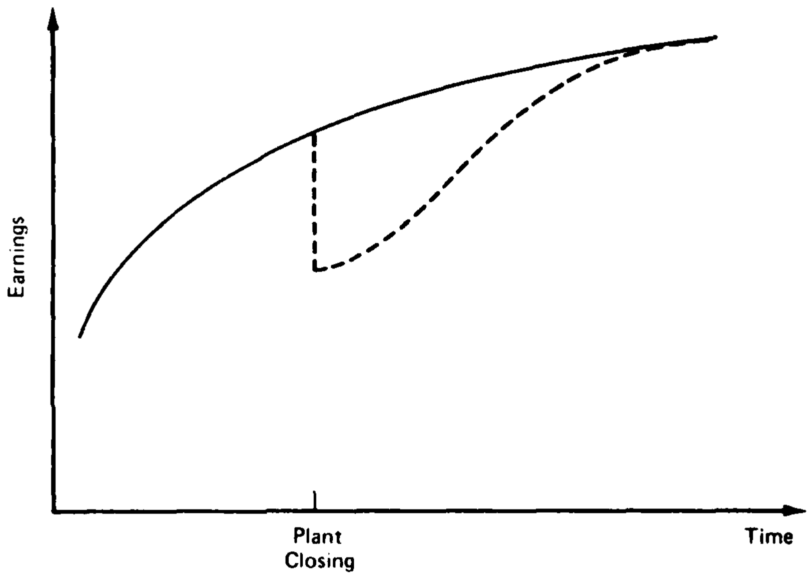

FIG. 1: EARNINGS LOSSES RESULTING FROM A PLANT CLOSING

What will affect the size of these losses? Loss of union rent and specific human capital will be important. These losses should be a function of the workers' skills and perhaps the industry in which they were working. They may also be a function of such personal characteristics as age, race, and sex. For example, young workers may have accumulated very few specific skills of value to a firm or industry and thus their human capital losses may be significantly lower than those of more experienced workers.

A second factor affecting the size of the workers' losses will be how easy it is for workers to get back into the labor market and how quickly their earnings resume the path they would have taken had there not been a plant closing. Again, this may be a function of personal characteristics such as age, race, and sex, but it will also be a function of the business cycle at the time of the plant closing. If the economy is in the middle of a recession, workers will find it much harder to obtain new jobs. Similarly, local labor market characteristics should be important. In strong and extensive local labor markets, workers should have little trouble finding new jobs. If the labor market is weak, displaced workers will find it harder to obtain new jobs, particularly jobs that are equivalent to those they lost. Another factor affecting the duration of unemployment and loss in earnings is the impact of transfer payments such as unemployment insurance and trade adjustment assistance benefits. Workers who receive these payments remain out of the labor force longer than workers who do not receive them. Hence, the payments themselves could increase measured losses.

It is also possible that advance warning of the plant closing could affect losses. If workers have advance notice of the plant closing, they may have the opportunity to look for new jobs before their plant actually closes. This should lessen or eliminate the losses due to any unemployment immediately following the plant closing.

So far our discussion has implicitly assumed that everyone put out of work by a plant closing ultimately finds new employment. This, of course, is not always the case. Indeed, we might expect that some workers displaced by a plant closing will never obtain another job. This is true of some proportion of workers in previous studies as well as in our sample. Others may participate in the labor force on less than a full-time basis after the plant closing. Partial withdrawal from the labor force will be reflected by a significant reduction in earnings, and will be the result of either part-time or part-year work or of intermittent spells of full-time work separated by spells of unemployment. Some may withdraw completely from the labor force--for example, older workers who decide to retire early as a result of a plant closing, or other workers whose productivity at home exceeds that at work. Measuring losses for workers who partially or completely withdraw from the labor force presents an important conceptual problem. If withdrawal from the labor force is voluntary, counting actual (that is, post-closing) earnings as zero will clearly result in an overstatement of earnings losses. Even if the withdrawal from the labor force is involuntary, such as a forced retirement or a housewife being unable to find another job, clearly the losses will still be overestimated by assuming that post-closing earnings are zero. After all, the additional time that the worker now has available that can be spent in productive activity in the home or in leisure activity is worth something more than zero. And the value of this time is independent of whether not working is voluntary.

This discussion suggests two contrasting ways of treating the labor force withdrawal problem. First, we can assume that workers who withdraw from the labor force could have earned the same as those who do not withdraw, and thus the losses of withdrawers are the same as the losses of those (similar workers) who did find new jobs. This interpretation may lead to an underestimate of the losses of those workers who withdraw. At the other extreme we could assume that those who withdraw from the labor force could earn nothing (because they couldn't find new jobs), and therefore their losses are equal to the total of what they would have earned had there been no plant closing. A further discussion of the problems involved in estimating the losses of those who withdraw is contained in the appendix. The analysis we present in the appendix also tries to estimate what workers who withdraw from the labor force would have earned had they worked after the plant closing.

To summarize, we will attempt to measure earnings losses as the difference between actual earnings and what would have been earned had the worker not been caught in the plant closing. This measure overestimates pecuniary losses to the extent that it ignores taxes, transfer payments, and the value of time not spent in the labor market. Also, this measure does not tell us what portion of these losses can be attributed to the fact that workers remain unemployed longer because they are receiving transfer payments. It underestimates pecuniary losses to the extent it does not account for fringe benefits. It may further underestimate total losses because it excludes non-pecuniary losses.

THE DATA

DATA COLLECTION

This study uses longitudinal earnings data based on "summary earnings records" from the Social Security Administration (SSA). These are the administrative records the Social Security system uses to compute benefit entitlements for Social Security beneficiaries. A sample of about 9,500 workers was drawn from 42 plants that actually closed in 1969, 1970, 1971 and 1972 in nine different industries. For each worker we know annual covered earnings from 1952 (for workers who are old enough) through 1975. We also know the age, race, and sex of each worker.

The procedure for collecting these data proved to be quite arduous; indeed, because of various legal and administrative problems, including meeting requirements for protecting confidentiality, they took over two years to assemble*. We wished to obtain data on the earnings of workers for several years after their plant had closed abruptly. We wanted earnings for several (three to five) years so that we could examine the pattern of losses after the plant closing. Because we would obtain earnings data only through 1975, we selected plants which closed around 1970. (Closings from earlier years were ruled out because they could be difficult to verify and less representative of the current labor market.) We wanted plants which closed abruptly because data from plants which closed gradually might be biased. For example, in a plant which closed gradually, those workers who were left when the plant finally closed might have higher than average losses because they were the least mobile.** In addition to these criteria, we also wanted to choose plants from industries that had been hit particularly hard by import competition.

The collection process began with our developing a list of candidate plants, plants in import-sensitive industries that we suspected had been closed abruptly. We obtained these closings from a number of sources, including the applications for trade adjustment assistance to the Department of Labor; industry sources such as trade associations; labor union sources, particularly the Industrial Union Department of the AFL-CIO; and individuals on the staff of the U.S. International Trade Commission. We also consulted the New York Times, Wall Street Journal, and selected trade publications. This list of plants was carefully

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* We would like to thank Warren Buchler, Vincent Liberatore, Creston Smith, and Lois Alexander, all of SSA, for their help.

** We examined one gradually-closed plant as part of a five-plant pilot data collection process. For that plant, workers in the plant at the time of closing were older and had higher earnings than the average worker in the plant one year earlier.

screened to ensure, to the best of our ability, that all these plants had been permanently closed. The verification was time consuming and took several forms. We consulted local newspapers and libraries; other published sources, such as the Funk and Scott Index of Corporations and Industries; and industry experts at the U.S. International Trade Commission. We also made telephone calls to local industry sources. This process narrowed our original list of over 100 plants down to about 60. We still could not be sure precisely when these plants had closed, whether they had closed gradually or abruptly, or how many workers they had employed. To learn this, we submitted the names and addresses of about 60 plants to the SSA. For most plants the SSA was able to tell us quarterly employment for years around the suspected closing. Using this information, we were able to make a final selection of 42 plants that closed abruptly. We also chose these 42 plants on the basis of industry, plant size, plant location, and local labor market conditions (we wanted as much variety as possible). We allocated our sample of roughly 9,500 observations (a limit set by the SSA) among the 42 plants on a roughly equal basis. Thus, for smaller plants we requested data for most of the workers employed during the quarter prior to the closing. For larger plants we requested data for randomly selected samples of workers.

As we suggested earlier, these data offer a number of advantages over data used in previous studies. We know annual earnings for our sample workers for between three and six years (depending on when the plant closed) after the plant closing. We know annual earnings for up to 20 years before the plant closing. And, for all years, we know in which calendar quarters each worker had covered earnings. And, of course, we know the age, race, and sex of each of the workers. We are reasonably sure all workers in our sample were permanently laid off and neither subject to recall nor actually recalled by their former employers.

As usual, however, our data set is not entirely free from shortcomings. These are largely a function of the characteristics of the administrative records from which it is derived. Because these records are used to determine entitlement to Social Security benefits, the earnings data do not include earnings beyond the taxable wage base in a given year and they do not include earnings not covered by the Social Security tax. To extrapolate earnings beyond the taxable wage base, we used an algorithm developed by the SSA. (See [5], p. 6.) In contrast, there is no straightforward procedure for estimating uncovered earnings. This means we cannot distinguish between labor force withdrawal and work in an uncovered job. (The most common case of the latter would be employment with the federal government or with some state and local government agencies.) Thus our data set overstates the extent of withdrawal from the labor force and any reduction in earnings following job displacement. Because of the characteristics and likely skills of the workers in our sample, however, we do not believe that the magnitude of this overstatement is large.* It is also possible that death, disability, and reporting errors might produce overstatements of labor force withdrawal and earnings reductions.

DATA DESCRIPTION

The complete data set contains the yearly earnings for 1952 through 1975 of 9,500 individuals who worked in a manufacturing plant just prior to its closing. There are 42 different plants, four different closing years (1969, 1970, 1971 and 1972), five regions of the country, and nine different industries represented in the sample. Of these 9,500 observations, some were lost because of coding errors. The final data set consists of 9,479 individuals (5,470 males and 4,009 females). Tables 1 and 2 list the industries, states and regions represented in the sample.

TABLE 1

INDUSTRIES REPRESENTED IN SAMPLE

Industry	SIC Code	Number of Plants
Weaving and textiles	221	7
Men's clothing	231	3
Industrial chemicals	281	4
Rubber shoes	302	2
Shoes	314	13
Glass	321	3
Radio & TV (electronics)	365, 366, & 367	5
Auto	371	4
Musical Instruments	393	1
		42

Tables 3 to 5 present some summary statistics for the entire sample (the plant from the musical instrument industry is excluded from these tables). Table 3 gives the percent female, percent non-white, and average age of the workers in each industry. Table 4 gives the mean earnings for each industry in the year prior** to closing and the year after closing, by sex and age. Table 5 gives the percent of the sample

* In 1975, 90 percent of all paid employment was covered. See [6], table 35.

** Throughout this paper, the year prior or after means "calendar year." For example, if the plant closed in June of 1970, the year prior would be the full calendar year 1969, and the year after would be the full calendar year 1971. Also, these averages were calculated from the entire sample. Hence, the averages were calculated from a sample that included zero earnings.

that had zero earnings, low earnings, or were apparent full-time workers in the year prior to closing and in the year after closing. We define "low earnings" as annual earnings less than minimum wage (2,000 hrs. x minimum hourly wage) but greater than zero. We define "full-time" workers as individuals who have annual earnings that are greater than or equal to minimum-wage earnings.

TABLE 2

STATES REPRESENTED IN SAMPLE

Region 1: Northeast

Maine
New Hampshire
New Jersey
New York
Pennsylvania
Rhode Island
Massachusetts

Region 2: North Central

Michigan
Missouri
Ohio
Wisconsin
Illinois

Region 3: Deep South

Alabama
Georgia

Region 4: Other South

Florida
Maryland
Tennessee
Virginia
West Virginia

Region 5: West

Arizona
California

TABLE 3

DEMOGRAPHIC CHARACTERISTICS OF THE SAMPLE

Industry	% Female	% Non-White	Average Age
Weaving & textiles	39.7	11.6	42.8
Men's clothing	79.9	33.7	39.5
Industrial chemicals	9.0	6.0	48.4
Rubber shoes	82.1	8.9	41.1
Shoes	66.0	2.6	46.0
Glass	3.0	8.0	31.4
Radio & TV	54.9	35.5	38.6
Auto	4.2	23.6	39.4
TOTAL	42.4	13.7	40.8

TABLE 4

MEAN REAL EARNINGS (IN CONSTANT 1970 DOLLARS)

	Males				Females			
	Under 40		Over 40		Under 40		Over 40	
Industry	Year prior to closing	Year after closing	Year prior to closing	Year after closing	Year prior to closing	Year after closing	Year prior to closing	Year after closing
Weaving & textiles	3833	4274	5800	4397	2805	1962	4038	2105
Men's clothing	6532	5120	10892	5935	3572	1780	4837	1899
Industrial chemicals	7261	6575	7906	4374	5282	4372	5965	3771
Rubber shoes	6784	4430	6788	3639	3579	2431	4074	2151
Shoes	4769	4578	6355	4271	2849	2260	3642	2028
Glass	3423	2492	8696	3839	3137	2060	6049	3927
Radio & TV	6533	6421	9555	7501	3453	1907	5302	1916
Auto	6509	5661	8896	5060	5108	3824	6698	4154

TABLE 5

PERCENT ACTIVE IN LABOR FORCE BEFORE AND AFTER THE PLANT CLOSING

	Males				Females			
	Under 40		Over 40		Under 40		Over 40	
Earnings	Year prior to closing	Year after closing	Year prior to closing	Year after closing	Year prior to closing	Year after closing	Year prior to closing	Year after closing
Zero	1.0	4.8	0.7	18.7	5.1	21.5	1.6	28.8
Low	16.1	19.1	5.8	21.2	40.8	42.8	26.7	38.6
Apparently full-time	82.9	76.1	93.5	60.1	54.1	35.7	71.8	32.6

METHODOLOGY

In this section we present the methodology used to answer the following question: What are the average yearly earnings losses of workers who lose their jobs because the plant in which they are working closes? We define these losses as the difference between what the worker would have earned (if the plant had not closed) and what the worker does earn.

Defining what the worker would have earned had the plant not closed is the function of a "control group." Control or comparison groups can be selected in a number of ways, each way implying a different concept of earnings loss when the control group's experiences are compared with the experiences of displaced workers. No single choice is necessarily the correct one. For example, one could use average workers in manufacturing industries as controls. The comparison would then measure losses of displaced workers relative to average wage and layoff expectations in manufacturing. Alternatively, one could use workers in the same industry who did not lose their jobs. This comparison is used here. It has the advantage of greater underlying similarities between the groups. It has the disadvantages of measuring losses relative to prevailing industry wages which may themselves be affected by imports.

There were three general methods available to us for estimating control group earnings. First, a second sample of plants, plants that did not close, could have been developed. The earnings of workers in these plants could then have been used as control group earnings. This approach was rejected because the SSA had limited the size of our sample. Thus, using this technique would have reduced our sample of closed plants by about one-half. This was deemed too high a price to pay.

A second approach would have used data from the SSA's LEED file to estimate control group earnings, as Jacobson did. (See [3] and [4].) This approach too was rejected on practical grounds. Using the LEED file would have further delayed the analysis, and would have required additional resouces.*

A third approach uses the displaced workers' earnings prior to the plant closing to determine control group earnings. This is the approach we selected. In essence, the displaced workers serve as the control group, too. The exact procedure we used is as follows.

* The LEED file is a one-percent sample of the labor force and hence is an enormous data set covering over one million individuals.

The control earnings for a worker in an industry are based on the average earnings for that industry* and the worker's prior earnings. We first calculate the percent of average industry earnings each worker's income was in the three years prior to the plant closing and calculate the average of these three percentages. Call this average $\bar{P}$. We then assume that each worker would have continued to earn this same average percent ($\bar{P}$) of average industry earnings in the near future if the plant had not closed. For example, suppose that in all three years prior to the plant closing, an individual who works in the shoe industry makes 90 percent of the average earnings of all workers in the shoe industry. If in the year following the plant closing the average earnings in that industry are $10,000, then the individual's control earnings for that year would be $9,000.

Of course, additional years of experience should have an effect on earnings, relative to the industry average. Therefore, we made the following adjustments to the percent ($\bar{P}$) of average industry earnings as each individual aged:

Males

$$\bar{P}_{t+1} = \bar{P}_t + 6.37 - (2 \times .0661 \times AGE_t)$$

Females

$$\bar{P}_{t+1} = \bar{P}_t + 1.75 - (2 \times .0139 \times AGE_t) .$$

Simple regressions of $\bar{P}$ on age, age^2, and a set of industrial, regional, closing year, and race dummies were the basis for these adjustments. These two regressions (one for males and one for females) were estimated with the entire sample. The dependent variable was $\bar{P}$ and the independent variables (besides age and age^2) are described in table 11. For males the coefficient on age was 6.37 and for females this coefficient was 1.75. The age^2 coefficient was -.0661 for males and -.0139 for females.

We can see that males' earnings increase with age more rapidly than do females'. For example, an individual who is 40 years old and is earning 90 percent of industry average when the plant closes will have a new $\bar{P}$ of

$$90 + 6.37 - (2 \times .0661 \times 40) = 91.1$$

if male, and

* These were average weekly earnings of production workers, reported by the Bureau of Labor Statistics in Employment and Earnings, multiplied by 52.

$$90 + 1.75 - (2 \times .0139 \times 40) = 90.6$$

if female.

This technique is similar to Jacobson's ([3] and [4]) in that both techniques compare earnings of displaced workers with earnings of other workers in the same industry. Jacobson, however, had annual earnings for employed workers (from the SSA's LEED file) in each industry he examined. He used an "autoregressive earnings function" to estimate control group earnings based on the experience of these employed workers. That is, he estimated an equation of the following general form:

$$Y_t = a_o + a_1 Y_{t-1} + a_2 Y_{t-2} + b'X + u \ , \tag{1}$$

where Y_t is earnings in year t, X is a set of exogenous variables (such as age, race, sex), u is a disturbance or error term, and the a_i and b are coefficients estimated by the regression technique. Jacobson estimated equation (1) using data for employed workers in each of several industries. He then used the results of that estimation as the measure of what displaced workers in the same industry would have earned had they not been displaced.*

The autoregressive technique has the virtue of resting on human capital theory. (See [8].) Because we did not have longitudinal earnings data for employed workers who were not displaced, however, a suitable way to use the autoregressive technique did not present itself. Nonetheless, the method used here has several strong points. It combines information about past earnings in a single measure. There is far less danger with this data set than with Jacobson's that bias may result from the higher probability of displacement among individual workers whose productivity is low. Like the autoregressive technique, our method makes use of information about the worker's past earnings history (though not as completely as does the autoregressive technique). Indeed, because we calculate each displaced worker's control earnings separately, we are implicitly using the information contained in the disturbance term in equation (1). Also, because the control group calculations are based on average industry earnings, this methodology, like Jacobson's, takes into account the effect of the economy as a whole on each of the industries studied.

As explained earlier, earnings losses will be estimated by subtracting actual earnings from the control group earnings. Since in any

* See Harry Gilman's critique of Jacobson's methodology [8]. Gilman's arguments highlight some of the difficulties of estimating earnings losses.

given year following the closing some individuals will have positive earnings and others will have low or zero earnings, there is a methodological question that needs to be asked here. How should the losses for the zero earners be calculated? Counting zero earnings as such leads unambiguously to overestimation of losses, but ignoring them may lead to underestimating losses.

There are several ways to calculate the losses of individuals who have zero earnings following the plant closing. One approach is to correct for selectivity bias* and then predict "potential" market earnings for the zero earners. These potential earnings are then used in place of actual earnings to calculate earnings losses. ("Potential" earnings should not be confused with "control" earnings. Control earnings refer to the earnings an individual would have earned had the plant not closed. Potential earnings are the market earnings that an individual, had he worked in the market, would have made given the plant did close and in general will be different from control earnings.) The appendix describes and applies this approach.

A second and conceptually similar approach to the zero earner problem is to predict "potential" earnings for zero earners, by projecting past earnings, without taking account of selectivity bias. This approach is also described and applied in the appendix. The approach taken in the main body of this report is to calculate losses only for individuals with positive earnings.

Finally, we need to account for expected unemployment when calculating losses. To do this, we assume that a one percent rise (fall) in the unemployment in an industry implied a one percent fall (rise) in the expected fraction of the year a worker would be employed. For example, consider a plant that closed in 1971. If the average unemployment rate was five percent in 1968 to 1970 (the three years prior to the closing), and the rate in 1975 was 10 percent, we adjusted control earnings in 1975 downward by 5 (10 minus 5) percent. The industrial unemployment rates that we use to make the adjustment are shown in table 6.

* Selectivity bias stems from the higher probability of observing labor market earnings for individuals with better job opportunities.

TABLE 6

INDUSTRIAL UNEMPLOYMENT RATE FOR MALES AND FEMALES[a]

	66		67		68		69		70		71		72		73		74		75	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Weaving & textiles	2.0	5.7	2.6	5.2	1.8	5.5	2.8	5.8	3.9	8.3	4.1	7.8	3.2	6.4	2.9	5.4	6.0	7.9	10.2	17.7
Men's clothing	5.6	6.3	4.7	7.1	3.7	6.5	5.6	6.0	7.5	8.4	8.3	10.1	5.5	7.7	6.2	7.2	7.4	9.5	13.8	14.9
Industrial chemicals	1.9	4.3	1.9	5.7	1.8	4.4	1.7	4.4	2.9	6.6	3.9	8.4	3.4	7.6	2.7	8.8	4.0	9.1	5.1	14.3
Rubber shoes	2.8	4.4	2.8	5.8	2.6	4.5	2.5	4.5	4.2	6.8	5.7	8.6	4.9	7.8	3.0	6.1	5.3	9.2	9.8	19.6
Shoes	1.9	4.3	1.9	5.7	1.8	4.4	1.7	4.4	2.9	6.6	3.9	8.4	3.4	7.6	2.7	8.8	4.0	9.1	5.1	14.3
Glass	3.0	3.4	3.0	4.1	2.6	3.7	2.4	3.8	4.7	4.5	5.3	5.7	5.2	5.3	3.5	4.0	5.3	8.4	9.4	12.3
Radio & TV	1.5	3.8	2.3	6.3	2.1	4.9	1.9	4.6	3.7	8.8	4.7	9.6	3.6	7.5	2.7	5.7	3.1	8.4	8.6	17.8
Auto	2.8	1.7	4.2	4.0	2.5	3.1	2.9	4.2	7.4	6.9	5.3	5.4	4.7	3.9	2.3	2.9	9.0	11.5	15.9	17.2
Musical instruments	3.6	5.9	3.6	7.2	3.1	6.5	2.8	6.6	5.6	7.8	6.3	10.0	6.2	9.2	5.3	9.5	5.5	9.5	10.4	18.6

[a]From "Unemployed Persons by Industry of Last Job and Sex," Employment and Earnings, U.S. Department of Labor, Bureau of Labor Statistics.

RESULTS

EARNINGS LOSSES

Tables 7 through 10 present our estimates of earnings losses for males and females. The data from the four different closing years are combined, using the year of the plant closing as a common reference point. These losses are presented as an absolute dollar loss (in constant 1967 dollars) and as a percent of average income (in constant 1967 dollars) in the year prior to the closing. A number in parentheses indicates a gain. For example, table 9 presents absolute dollar losses for males. This table shows that we have data on 314 males who had positive earnings in the year following the closing and who were working for a firm in the glass industry that went out of business in one of four years: 1969, 1970, 1971 or 1972. The average loss for these males was $2320 in the first year following the closing. As shown in table 10, this amounted to a 32.2 percent reduction in their real mean pre-closing income (i.e., 2320/mean pre-closing income (in 1967 dollars) x 100 = 32.2). A similar interpretation holds for the rest of tables 9 and 10 and for tables 7 and 8.

Tables 8 and 10 tell us that percent losses generally decline over time.* For example, table 10 indicates that males working in the weaving and textiles industry went from a 13.9 percent loss in the first year after closing to a 1.2 percent gain in the third year after closing.

Table 10 also shows that the percent losses for males are generally greater in the relatively high-wage industries (such as industrial chemicals and automobiles) than in the low-wage industries (such as weaving and textiles, and shoes). Jacobson [4] and Mathematica [1] also found higher losses in high-wage industries.** For females no obvious such pattern emerges from table 8.

How accurate are the figures in tables 7 through 10? We cannot be sure, of course, since there are not tests of statistical significance to apply. But it is reassuring that the patterns in losses are consistent with findings of other studies and also conform to expectations based on economic theory. Theoretical reasoning would predict that losses in earnings, perhaps high initially due to losses in

* The only major exception to this pattern is for males in the glass industry, where percent losses increase from 11.7 percent in the third year after closing to 39.1 percent in the sixth year after closing.
** The Mathematica study [1] also shows much higher losses for permanently displaced workers (as would be the case in a plant closing) than for workers who are eventually recalled by the same company.

TABLE 7

FEMALE[a] LOSSES (GAINS) IN YEAR i FOLLOWING A PLANT CLOSING
(In Constant 1967 Dollars)

Industry	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Weaving & textiles	1231 (507)	686 (477)	382 (465)	157 (441)	NA	NA
Men's clothing	1302 (424)	656 (418)	455 (400)	82 (381)	355 (206)	NA
Industrial chemicals	864 (55)	655 (57)	812 (58)	402 (55)	NA	NA
Rubber shoes	(150) (218)	(651) (243)	(1328) (232)	(1294) (229)	NA	NA
Shoes	519 (1234)	246 (1193)	(11) (1137)	(203) (1097)	(177) (827)	(418) (294)
Glass	1151 (23)	148 (23)	984 (23)	1007 (15)	NA	NA
Radio & TV	1372 (413)	425 (447)	(14) (429)	(215) (412)	NA	NA
Auto	692 (36)	168 (34)	1018 (38)	(326) (35)	721 (20)	NA
Musical instruments	3001 (42)	2185 (31)	2034 (30)	NA	NA	NA
Avg. loss	873 (2952)	365 (2923)	72 (2812)	(180) (2665)	(55) (1053)	(418) (294)

[a]Number in parentheses below losses is the number of observations.

TABLE 8

FEMALE PERCENT LOSSES (GAINS) IN YEAR i

Industry	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Weaving & textiles	38.2	21.3	11.9	4.9	NA	NA
Men's clothing	38.9	19.3	13.6	2.5	8.8	NA
Industrial chemicals	17.6	19.6	16.6	8.2	NA	NA
Rubber shoes	(5.0)	(21.5)	(43.9)	(42.7)	NA	NA
Shoes	17.4	8.2	(.4)	(6.8)	(6.0)	(16.0)
Glass	20.4	26.2	17.4	18.5	NA	NA
Radio & TV	37.8	11.7	(.4)	(5.9)	NA	NA
Auto	14.7	3.6	21.6	(6.9)	14.7	NA
Musical instruments	59.1	43.0	40.0	NA	NA	NA
Avg. percent loss	26.7	11.2	2.2	(5.6)	(1.8)	(16.0)

TABLE 9

MALE[a] LOSSES (GAINS) IN YEAR i FOLLOWING A PLANT CLOSING
(In Constant 1967 Dollars)

Industry	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Weaving & textiles	606 (901)	293 (879)	(55) (849)	(120) (782)	NA	NA
Men's clothing	1225 (120)	744 (121)	119 (118)	(495) (117)	331 (70)	NA
Industrial chemicals	1978 (598)	1764 (585)	1409 (557)	1311 (520)	NA	NA
Rubber shoes	1644 (51)	(419) (53)	(1081) (52)	(690) (51)	NA	NA
Shoes	786 (743)	472 (713)	162 (676)	(89) (632)	(309) (415)	286 (191)
Glass	2320 (814)	1215 (756)	842 (712)	1023 (468)	1390 (225)	2499 (219)
Radio & TV	503 (442)	(28) (443)	(394) (426)	(352) (401)	NA	NA
Auto	2242 (939)	1372 (920)	555 (904)	285 (865)	25 (285)	NA
Musical instruments	1691 (148)	1499 (121)	1300 (117)	NA	NA	NA
Avg. loss	1474 (4756)	881 (4591)	429 (4411)	267 (3836)	216 (995)	1468 (410)

[a]Number in parentheses below losses is number of observations.

TABLE 10

MALE PERCENT LOSSES (GAINS) IN YEAR 1

Industry	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Weaving & textiles	13.9	6.7	(1.2)	(2.7)	NA	NA
Men's clothing	18.1	11.0	1.2	(7.3)	4.2	NA
Industrial chemicals	28.9	25.7	20.6	19.1	NA	NA
Rubber shoes	27.8	(7.1)	(18.3)	(11.7)	NA	NA
Shoes	15.2	9.1	3.1	(1.7)	(6.2)	5.5
Glass	32.2	16.8	11.7	14.0	21.7	39.1
Radio & TV	7.5	(.4)	(5.8)	(5.2)	NA	NA
Auto	33.8	20.7	8.4	4.3	.3	NA
Musical instruments	23.7	21.0	18.2	NA	NA	NA
Avg. percent loss	24.1	14.4	7.0	4.4	3.5	25.4

specific human capital and investment in search and new skills, would diminish over time as labor market adjustment takes place. Annual losses steadily fall after the plant closing, rising only in the recession years of 1974 and 1975 for some industries.

Also, theoretical reasoning would predict that, across industries, losses would be higher in high-wage, unionized industries, where layoffs would entail greater losses in specific human capital, or rent. As noted, our results, broadly similar to Jacobson's [4] and Mathematica's [1], indicate that losses for males are greatest in high-wage industries like autos, and lowest in low-wage industries, like shoes and weaving and textiles.*

We should point out that the results presented here do not include losses of those who withdraw from the labor market. However, the appendix presents two alternative methodologies for calculating the losses of those individuals.

While tables 7 to 10 give some idea of the average losses of all individuals, and show losses by sex and by industry, they do not distinguish losses according to other characteristics. For example, tables 7 to 10 do not tell us whether older workers lose more than younger workers, whether blacks lose more than whites, and so forth. To give some idea of these relative comparisons, tables 11 and 12 present the results of ordinary least squares (OLS) regressions. The dependent variable in each of these tables is losses calculated by the method described earlier. The independent variables are age and age^2 and dummy variables for industry (see table 1), sex, and region (see table 2).

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* These estimated earnings losses can be compared with Jacobson's. Four industries (automobiles, shoes, radio and television receivers, and weaving and textiles) were used in both studies and a fifth used here (industrial chemicals) has a close counterpart (petroleum refining) in Jacobson's study. The table below compares the findings of the two studies for earnings losses of "prime-age" males in the first two years after the plant closing:

Industry	This study[a]	Jacobson[b]
Automobiles	27.3%	43.4%
Shoes	12.2	11.3
Radio & TV	3.6	0.7
Weaving & textiles	10.3	7.4
Industrial chemicals (petroleum refining)	27.3	12.4

[a]Taken as an average from table 10.
[b]From table 7, reference [4].

Since losses entered as a positive number and gains as a negative number, a positive coefficient indicates larger losses.

These regression results indicate that losses vary with age and with labor market strength. First, consider the age and age^2 coefficients for the female loss regressions presented in table 11. In the regression where first-year losses is the dependent variable, the age coefficient is 33.44 and the age^2 coefficient is .05. What these coefficients tell us is that older females suffer higher losses than younger females. This same result is true in the second and third-year regressions and also in the sixth-year regression. In the fourth and fifth-year loss regressions for females, the age coefficient is negative while the age^2 coefficient is positive. Despite the negative coefficient on age, losses still generally increase with age in the fourth and fifth year after closing. For example, consider the fourth year loss regression for females. If we evaluate the partial effect of a change in age on the change in loss we get $-38.26 + 2 \times (1.02) \times \text{Age}$. When this partial effect is evaluated at age 40 we get 43.32. Hence, even with the negative coefficient on age we still get a positive impact of age on loses.

The age and age^2 coefficients for males presented in table 12 also indicate that age generally has an overall positive effect on losses. For example, in the first-year loss regression for males the age coefficient is 89.41 and the age^2 coefficient is -.34. If we evaluate the partial change of age on losses for a worker who is 40 years old we get 62.21 ($= 89.41 - 2 \times (.34) \times 40$).

In summary, the age and age^2 coefficients presented in tables 11 and 12 indicate that older workers generally lose more than younger workers.

A second interesting conclusion that can be drawn from tables 11 and 12 concerns the effect of the national unemployment rate on losses. One might expect that workers laid off in a recession period would fair worse than workers laid off in a boom period. Generally speaking, we find this to be true. For example, consider the first-year loss equation presented in table 11 for females and table 12 for males. In both cases the unemployment coefficients are positive and significant. This indicates that first-year losses will be higher in recession years when the unemployment rate is high than in boom years when the unemployment rate is low. After the first year, the impact of unemployment on losses declines and in some cases is even significantly negative (for females in the third and fourth year after closing). We conclude that the general health of the economy has a strong impact on losses immediately following the closing and steadily declines thereafter.

The remaining coefficients in tables 11 and 12 are for dummy variables. These coefficients indicate that white females generally have

TABLE 11

LOSS REGRESSIONS FOR FEMALES[a]

(Dependent Variable[b] = Loss in Year i Following a Closing)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
UNEMP	780.91 (34.93)	558.71 (23.84)	-655.73 (28.48)	-173.29 (28.84)	-108.97 (0.84)	NA
Age	33.44 (4.23)	3.89 (0.05)	13.41 (0.54)	-38.26 (4.22)	-32.18 (1.27)	11.02 (0.05)
AgeSQ	.05 (0.07)	0.39 (3.21)	0.32 (1.88)	1.02 (17.99)	0.92 (6.24)	0.21 (0.09)
DSIC 221	546.31 (17.35)	858.04 (31.04)	684.60 (23.10)	1078.53 (42.77)	NA	NA
DSIC 231	753.78 (29.74)	811.69 (38.11)	648.68 (20.41)	697.33 (24.32)	1057.75 (15.01)	NA
DSIC 281	-19.95 (0.01)	696.95 (7.66)	922.20 (13.47)	1101.54 (17.60)	NA	NA
DSIC 302	-335.00 (7.77)	-382.74 (7.47)	-902.38 (41.82)	-458.89 (9.76)	NA	NA
DSIC 321	816.97 (4.81)	1681.25 (19.52)	1963.68 (21.90)	1979.86 (16.61)	NA	NA
DSIC 367	786.78 (42.04)	727.87 (31.27)	363.51 (8.89)	702.44 (25.63)	NA	NA
DSIC 371	653.81 (4.71)	471.89 (2.29)	1544.91 (25.16)	448.13 (2.05)	865.79 (4.50)	NA
DSIC 393	3303.72 (117.29)	2059.14 (39.69)	4567.53 (70.30)	NA	NA	NA
DWHITE	195.39 (3.62)	242.77 (5.73)	271.17 (6.30)	233.03 (4.66)	-123.95 (0.33)	-523.99 (0.26)
DREG 1	718.66 (14.28)	380.85 (3.19)	367.66 (2.86)	-4.64 (0.00)	131.96 (0.11)	NA
DREG 2	182.26 (0.67)	444.26 (3.93)	-82.56 (0.11)	-137.55 (0.32)	630.01 (7.20)	NA
DREG 3	606.57 (6.43)	556.78 (4.64)	122.28 (0.20)	-303.07 (1.19)	NA	NA
DREG 4	1077.60 (33.84)	902.17 (21.27)	509.64 (5.87)	182.28 (0.75)	NA	NA
Constant	-6056.66	-4510.42	1772.04	259.85	44.41	-615.67
NOB	2952.	2923.	2812.	2665.	1053.	294.
R Square	0.18	0.12	0.15	0.13	0.10	0.04
Standard error	1729.71	1747.38	1818.10	1777.84	1763.66	1779.61

[a]F-statistics in parentheses.
[b]Losses are entered as a positive number and gains as a negative.

TABLE 12

LOSS REGRESSIONS FOR MALES[a]

(Dependent Variable[b] = Loss in Year i Following a Closing)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
UNEMP	779.39	-122.12	16.85	133.74	-182.95	NA
	(16.44)	(0.63)	(0.04)	(8.99)	(0.89)	
Age	89.41	54.02	1.67	16.42	88.34	269.11
	(20.65)	(6.62)	(0.01)	(0.45)	(3.30)	(11.30)
AgeSQ	-0.34	0.18	0.79	0.58	-0.42	-2.52
	(1.93)	(0.47)	(7.97)	(3.39)	(0.44)	(5.49)
DSIC 221	-1279.87	-889.56	-525.79	-548.23	NA	NA
	(66.85)	(24.70)	(9.34)	(7.36)		
DSIC 231	87.63	479.76	384.16	-110.87	2798.[illegible]	NA
	(0.09)	(2.74)	(1.69)	(0.13)	(19.87)	
DSIC 281	498.49	831.94	1198.63	1021.17	NA	NA
	(8.71)	(17.76)	(42.47)	(21.27)		
DSIC 302	611.55	-837.68	-1120.03	-526.04	NA	NA
	(2.25)	(4.21)	(7.21)	(1.47)		
DSIC 321	894.54	309.73	508.50	892.18	3612.86	2239.36
	(30.90)	(3.67)	(6.56)	(18.45)	(20.72)	(42.59)
DSIC 367	-225.96	-143.02	-214.69	-200.60	NA	NA
	(1.56)	(0.55)	(1.36)	(0.90)		
DSIC 371	1022.64	742.76	741.17	437.36	183.96	NA
	(21.09)	(10.13)	(9.75)	(2.99)	(0.29)	
DSIC 393	839.55	494.55	1139.80	NA	NA	NA
	(6.56)	(2.27)	(6.68)			
DWHITE	58.16	-8.24	-30.89	125.30	11.39	1856.48
	(0.17)	(0.00)	(0.04)	(0.60)	(0.00)	(0.67)
DREG 1	-1059.03	-749.84	-174.00	-387.10	1923.68	NA
	(16.27)	(7.07)	(0.38)	(1.61)	(6.72)	
DREG 2	-623.58	-28.91	-237.62	-479.36	2191.32	NA
	(10.63)	(0.02)	(1.35)	(4.44)	(12.71)	
DREG 3	1472.03	1341.08	934.83	580.69	NA	NA
	(26.03)	(19.61)	(8.83)	(3.06)		
DREG 4	-455.37	-362.38	-344.23	-538.69	NA	NA
	(3.04)	(1.66)	(1.49)	(3.09)		
Constant	-5656.92	-899.52	-1255.94	-2349.49	-3588.62	-7367.44
NOB	4756.	4591.	4411.	3836.	995.	410.
R Square	0.20	0.15	0.12	0.11	0.11	0.19
Standard error	2745.63	2851.60	2871.47	2966.43	2917.29	3199.33

[a]F-statistics in parentheses.
[b]Losses are entered as a positive number and gains as a negative.

significantly higher dollar losses than non-white females (see the DWHITE coefficient in table 11), but that white males do not lose significantly more than non-white males (see the DWHITE coefficient in table 12).

The SIC dummy variables for males indicate that males in the high-wage industries like industrial chemicals, autos and glass generally have the highest dollar losses (see the DSIC281, DSIC371 and DSIC321 coefficients presented in table 12). It's hard to find any such obvious pattern for females, although females in the musical instrument industry (SIC 393) seem to have unusually high losses.

It's difficult to make much of the regional dummies presented in tables 11 and 12. However, one interesting result is that females in the South (Region 4) seem to fare worse than females in the West (Region 5, the omitted group) while males in the South fare slightly better than males in the West.

In summary, tables 11 and 12 indicate that older workers generally have higher dollar losses than younger workers, white females have higher dollar losses than non-white females and that first-year losses are higher in recession years than in boom years.

EFFECTS OF ADVANCE NOTICE

It is often assumed that advance notice of plant closure facilitates labor market adjustment following displacement, but there is little empirical evidence available. (See, for example, Gilman [7].) Knowing the effects of advance notice might also shed light on the job-search behavior of displaced workers. Consequently, in this section we address the question: For those workers employed in plants that close, does advance notice affect earnings losses?

Advance notice can be given formally (for example, in writing to each worker or by public announcement), or informally by word of mouth. Sometimes, changes in the activity at the plant, such as reductions in raw materials inventory) may signal an impending closing or at least extensive layoffs. In other words, it is very difficult to determine the precise amount of advance notice. For 17 of the plants in our sample we were able to document advance notice ranging from one to twelve months. For 13 other plants we found no advance notice. For the 12 remaining plants we did not have enough information about advance notice and we did not include these plants in the analysis. For all plants, our advance notice data must be viewed as minimums. There may well have been some advance notice in plants where we saw none and, for those plants where we know notice was given, workers may have been aware of the impending closing before any formal notice.

To estimate the effects of advance notice, we regressed losses of workers on age, age^2, sex, race, industry and regional dummies, and a continuous variable (ADN) for the number of months of advance notice each individual worker received. The size and significance of the ADN coefficient will tell us if giving advance notice lowers a worker's losses. Table 13 presents the coefficient and t-statistic of the advance notice variable from two OLS regressions. One ("low wage industries") included all industries except the high wage industries of autos and industrial chemicals. The other ("high wage industries") included only the observations from the auto and industrial chemical industries. A negative coefficient indicates that individuals who worked in a plant that received more advance notice had lower losses than similar workers who did not receive as much advance notice. A positive coefficient implies the opposite is true.

Table 13 tells us that advance notice does not significantly reduce losses. Indeed, the only significant coefficients in table 13 are positive, indicating that advance notice is associated with increased losses. While there is no reason to believe that advance notice by itself should increase losses, advance notice may be given in just those cases where losses are expected to be high.

From these regression results, we cannot conclude that giving workers advance notice affects earnings favorably in the years after the closing. Of course, this result could also be due to our uncertain measurement of advance notice actually given in each plant.

Earnings Losses

The results presented in table 13 are based on our sample of individuals who were actually working in the 30 plants several months (usually 4) prior to that plant's closing. However, individuals who take advantage of advance notice are unlikely to be still working in these plants during this sample period. This may seriously bias downward the estimates of the effect of advance notice on losses. To get around this problem of bias, a second sample was drawn from six of the 30 plants. This second sample (henceforth the "early dip" sample) was drawn from the population of individuals who were working in one of these six plants approximately one year prior to the closing.

Tables 14 and 15 give the average losses and advance notice of the individuals working in these "early dip" plants. Unfortunately, these tables tell us little concerning the impact of advance notice on losses. If we break the six plants into low-wage and high-wage industries, we see that four plants are in low-wage industries (weaving and textiles, shoes, and radio and TV) and two are in a high-wage industry (industrial chemicals). First, look at males in the low-wage industries. Three plants had one month's advance notice and one had 12 months' advance notice. For males, the first-year losses for two of the three low-wage plants that received only one month's notice were actually lower than the losses of the low-wage plant that received 12 months' notice. For the one low-wage plant with one month's notice that did

TABLE 13

EFFECTS OF ADVANCE NOTICE ON FEMALE LOSSES[a]

Dependent Variables	Advance Notice Coefficient: Males	Advance Notice Coefficient: Females
Low-Wage Industries		
First-year losses	133 (5.9)	74 (3.0)
Second-year losses	123 (4.9)	72 (2.8)
Third-year losses	113 (4.5)	36 (1.3)
High-Wage Industries		
First-year losses	171 (1.1)	-911 (1.9)
Second-year losses	440 (2.8)	-197 (.43)
Third-year losses	281 (1.7)	-263 (.60)

[a]This effect is measured by the magnitude, sign and significance of the coefficient on the advance notice variable. Losses are entered in regression as positive numbers.

TABLE 14

MALE LOSSES[a] (GAINS) AND ADVANCE NOTICE
IN SIX "EARLY DIP" PLANTS

Industry	Advance Notice (in months)	Year 1 (1967 $)	Year 2 (1967 $)	Year 3 (1967 $)
Weaving & textiles	1	624 (2086) (n=145)	402 (2013) (n=135)	124 (2367) (n=130)
Shoes	1	620 (2245) (n=39)	229 (3237) (n=41)	(311) (1880) (n=38)
Shoes	1	1455 (2839) (n=86)	758 (3343) (n=84)	377 (4023) (n=76)
Radio & TV	12	1050 (3290) (n=119)	(11) (3185) (n=115)	(622) (2745) (n=104)
Industrial chemicals	8	3165 (3425) (n=116)	2450 (3641) (n=116)	1564 (4295) (n=112)
Industrial chemicals	12	(51) (2940) (n=180)	130 (3139) (n=176)	6 (2953) (n=172)

[a]"Loss" in parentheses is a gain. Numbers in parentheses below losses are standard deviations and number of observations.

TABLE 15

FEMALE LOSSES[a] (GAINS) AND ADVANCE NOTICE IN SIX "EARLY DIP" PLANTS

Industry	Advance Notice (in months)	Year 1 (1967 $)	Year 2 (1967 $)	Year 3 (1967 $)
Weaving & textiles	1	695 (1677) (n=102)	583 (1579) (n=102)	455 (1423) (n=100)
Shoes	1	450 (1558) (n=90)	230 (1548) (n=96)	(99) (1546) (n=93)
Shoes	1	655 (1663) (n=67)	7 (1431) (n=68)	(226) (1456) (n=64)
Radio & TV	12	1869 (2493) (n=56)	1058 (2340) (n=53)	547 (2017) (n=47)
Industrial chemicals	8	(2665) (805) (n=2)	(3945) (1146) (n=2)	(4113) (3003) (n=2)
Industrial chemicals	12	269 (2180) (n=35)	(28) (1668) (n=35)	146 (2021) (n=35)

[a]See table 14.

have higher losses than the low-wage plant with 12 months' notice, this difference in losses is only $405 ($1455-$1050) and is not statistically significant (t=.94). In the second and third year after the closing, males in the low-wage plant that received 12 months' notice do seem to fare slightly better than males in the low-wage plants without advance notice. However, it is questionable that advance notice should reduce losses two and three years following a closing but not in the first year following a closing. For this reason, little emphasis should be placed on the perceived beneficial impact of advance notice on second- and third-year losses.

For females in the low-wage industries, table 15 shows no beneficial impact of advance notice on losses. Indeed, we again see a positive association between advance notice and losses in earnings.

Some of the evidence here suggests that advance notice may be helpful. In the high-wage plants of tables 14 and 15, one plant (industrial chemicals) received eight months' notice and the other twelve, both substantial amounts. It is interesting to note that males working in the high-wage plant with twelve months' notice did have significantly lower losses than those who received eight months' notice. Since there were only two females working in the high-wage plant with eight months' notice, and 35 in the plant with 12 months' notice, there is just not enough data to say anything about female losses in the high-wage industry of industrial chemicals.

Regression results pooling information on advance notice for the "early dip" sample are not presented. Such analysis would not be meaningful because there is not enough variation in advance notice.

With all the shortcomings mentioned above, we feel these data do not warrant additional analyses. We conclude that advance notice does not seem to significantly reduce losses.

Mix of Workers

Some have argued that employers incur costs when giving advance notice. It seems plausible to assume that "high quality" workers will be the first to leave once a formal notice of closure is given. If this is the case, then employers who give advance notice will be left with relatively less productive workers in the final months before closing. While we can't directly measure changes in worker productivity in the final months before closing, we can identify the average age, percent non-white and percent female for the six "early dip" plants at two different times before closing, approximately one year and approximately three months prior. We can see if the change in the mixture of workers is different in the plants that gave substantial advance notice relative to those that did not.

Table 16 summarizes the information from the six "double dip" plants concerning the change in the mix of workers over time. There are no systematic differences in the change in worker mix among the three plants that gave sizeable advance notice. Therefore, these data do not support the notion that employers incur costs (as measured by a change in the mix of workers) when they give advance notice.

WHO LEAVES EARLY

In this section, we examine two groups of individuals, (1) workers who leave the job several months before the plant closes and (2) workers who remain on the job until the plant actually closes, to determine the characteristics of the leavers relative to the characteristics of the stayers. The data come from a subset of two plants, for which we drew 100% samples of workers at two points in time, one year before closing and shortly before closing. Both these plants closed in 1971. One of the plants was in the shoe industry and was located in the East. The other was in the industrial chemical industry and was located in the Midwest. The workers in the shoe plant were given one month's notice about the closing and the workers in the chemical plant were given eight months' notice. The information we have on these workers is yearly earnings from 1952 to 1975, their race, age, and sex, and whether they left prior to the plant closing.

We identify the characteristics of the leavers relative to the characteristics of the stayers with probit analysis.* Table 17 presents the probit coefficients. The estimates are based on 318 individual observations. Of these, 157 worked in the shoe plant, and 161 worked in the chemical plant. All 318 of these workers were under age 62 in 1971.

The dependent variable in table 17 is equal to one if the worker leaves early and equal to zero otherwise. Of the 318 workers, 64 left early and 254 remained until the plants closed.

The coefficients represent the impact of each independent variable on the probability of leaving early. So a positive coefficient on any particular variable means that an increase in the size of this variable leads to an increased probability of leaving early. The first independent variable is a dummy which takes on the value of one if the individual worked in the plant that gave the longer advance notice and zero otherwise. The coefficient is negative but insignificant. One should be careful, however, about placing too much confidence in this evidence that advance notice does not matter. Since we have data from two plants, there are other differences between the two plants than the difference in advance notice. The workers who received eight months' notice also worked in the industrial chemical industry and worked in the Midwest. Individuals who received the short (one-month) notice worked

* See Maddala [10], ch. 9.

TABLE 16

CHARACTERISTICS OF WORKERS IN PLANTS
ONE YEAR AND 3 MONTHS PRIOR TO CLOSING

Industry	Advance Notice (in months)	Average Age[a] 1 yr. Prior	Average Age[a] 3 Mo. Prior	%Non-White 1 yr. Prior	%Non-White 3 Mo. Prior	%Female 1 yr. Prior	%Female 3 Mo. Prior
Weaving & textiles	1	44.26 (13.98) (n=324)	43.68 (14.21) (n=308)	14.8	16.9	45.4	48.1
Shoes	1	40.87 (16.41) (n=207)	44.26 (15.01) (n=180)	3.9	3.9	75.9	76.1
Shoes	1	53.25 (15.00) (n=276)	54.26 (14.01) (n=246)	2.2	1.6	51.5	53.7
Radio & TV	12	45.84 (12.88) (n=237)	44.30 (13.11) (n=174)	6.3	6.9	37.1	32.8
Industrial chemicals	8	46.91 (10.25) (n=174)	47.97 (9.47) (n=154)	5.8	2.6	1.2	1.3
Industrial chemicals	12	44.07 (14.16) (n=263)	45.27 (13.45) (n=139)	19.8	23.7	17.1	18.7

[a]Standard error and number of observations in parentheses.

in the shoe industry and in the East. So the coefficient of the advance notice dummy really measures the simultaneous impact of longer advance notice, industry, plant, and region. It is quite possible that the chemical industry and the Midwest region have a negative impact (relative to shoes and the East region) on the probability of leaving early. If this is the case, and if advance notice has an equal but positive impact, then the measured impact of the dummy variable would be zero even though longer advance notice has a positive effect. At most, the results of the probit model suggest that giving advance notice may not have a significant impact on leaving early.

The second independent variable was a female dummy variable. The coefficient is negative but insignificant. This indicates that the probability of leaving early is not significantly different for males and females.

The last independent variable is the natural logarithm of age. The coefficient is negative and significant. This indicates that older individuals are less likely to leave early than are younger individuals.

In summary, we found that being female does not affect the probability of leaving early, but that being older reduces that probability. Also, we found no conclusive evidence that giving advance notice increases the probability of leaving early.

TABLE 17

PROBIT COEFFICIENTS SHOWING THE EFFECT OF EXOGENOUS VARIABLES ON THE STAY/LEAVE DECISION

Dependent variable = 0 if leave early
= 1 if stay

Variable	Coefficient	t-statistic
Intercept	4.597	4.59
Dummy advance notice (=1 if advance notice)	-.027	.13
Dummy female (=1 if female)	-.056	.25
Ln(Age)	-1.445	5.37
Number of observations	318	
Number who stayed	254	
Number who left early	64	
Log(likelihood ratio)	31.15	
Degrees of freedom	3	

SUMMARY AND CONCLUSIONS

The data used here represent a significant improvement over those used in earlier studies of earnings losses due to displacement. We are virtually certain that the workers whose experience we analyzed here were displaced by actual plant closings and not eventually rehired into their former plants. We can take into account withdrawals from the labor force, and we include industries with high proportions of female workers. We know their earnings for many years prior to the plant closing and for four to six years after the year of the closing. For a small subset of our sample, we can distinguish between workers who left the plant during the quarter of its closing and those who left in earlier quarters. For many of the workers in our sample, we also know whether they received advance notice of the closing.

The analyses presented here do not exhaust all the possibilities. Nonetheless, a number of generalizations are possible. First, and perhaps most important, earnings losses due to displacement are not permanent. That is, post-closing earnings reach the same level they would have reached in the absence of a plant closing within three to five years after the closing. That doesn't mean earnings losses aren't important. They are. In our sample, they ranged from zero to nearly 60 percent of pre-closing earnings in the first year after closing and in one case (females in the musical instrument industry) losses were still 40 percent of pre-closing earnings in the third year after closing. (See tables 8 and 10.)

Of course, these loss estimates are subject to considerable uncertainty. We can never know how well we have estimated control earnings. Thus, a useful future research task would estimate earnings losses of these workers using alternative or more refined methodologies for estimating control earnings. For example, more explicit adjustment for local and national economic conditions could be made, or a completely different technique (such as Jacobson's [4]) could be used.

Perhaps more important, while our methodology does estimate earnings losses, it ignores other aspects of total pecuniary losses. We cannot estimate the loss of fringe benefits. Since fringe benefits are generally proportional to direct wages and salaries, their omission should bias downward our estimates of absolute losses but not seriously affect our estimates of percent losses. One fringe benefit, retirement benefits, is probably an exception to this rule. Loss of retirement benefits is analogous to the loss of a lump sum. How important this is for the workers in our sample is a matter for conjecture. Our earnings loss estimates are without a doubt biased downward as a measure of total pecuniary losses because of the omission of fringe benefits.

We have also not accounted for changes in tax payments by the workers, nor for receipt by the workers of transfer payments like unemployment insurance (UI) benefits and Trade Adjustment Assistance (TAA) benefits. The workers in our sample are probably paying federal, state and local income taxes at a marginal rate of about 20 to 25 percent. Thus, our measure of earnings loss is biased upward by 20 to 25 percent due to the lack of an adjustment for taxes. Also, we do not estimate the extent to which receipt of TAA, UI and supplemental unemployment benefits may have offset losses in earnings.

Older workers fare worse than younger workers. Of course, the omission of retirement benefits is particularly troublesome for older workers. Those who lost retirement benefits (an unknown number) no doubt lost a great deal. But many others may be collecting retirement benefits (even those who are apparently working full time).

Advance notice of a plant closing does not seem to seriously affect subsequent earnings losses. Workers in plants that apparently gave advance notice do not fare appreciably better than workers who received no advance notice. Also, advance notice does not seem to cause workers to leave their plants earlier. In any case, these findings are also tentative because of limited sample size and questionable data on the amount of advance notice given.

While our analysis of the earnings losses of workers did not include the experience of those who apparently withdrew from the labor force, we do analyze them in the appendix. We excluded labor force withdrawals from the main text because of the difficulties in getting accurate estimates of losses for these workers. To calculate these losses we must subtract potential post-closing earnings (which are not observed for dropouts) from projected or control earnings (which are also unobservable). The losses of dropouts, then, have to be estimated by subtracting one unobservable variable from another. Because of these obvious inaccuracies, we excluded dropouts from the main text. We do feel, however, that the estimation of these losses is an interesting methodological exercise. For this reason, in the appendix we propose and apply two procedures for estimating the losses of labor force dropouts. Including these apparent dropouts with either of our two proposed methods does increase our estimate of earnings losses for both men and women. In some industries earnings losses in the first year after the closing are over 30 percent of control earnings. (See tables A-10 and A-12.) A further discussion of these results is given in the appendix. We do not recommend, however, that the losses presented in the appendix be taken too seriously.

To summarize, we found that earnings losses are not permanent. They can be large however: as high as 27 percent for males in each of the first two calendar years after the closing. Earnings losses are higher in high-wage, unionized industries. We did not estimate losses of fringe benefits, changes in tax payments, or the effect of receipt of

UI and TAA benefits. These omissions introduce a bias of unknown sign and magnitude in earnings losses as a measure of total pecuniary loss. Older workers fare worse than younger workers. Finally, advance notice does not seem to affect earnings losses.

The analysis presented here does not completely exploit the richness of our data set. Analysis of the effects of local labor market conditions and analysis of the experience of specific demographic groups are two obvious examples of further research that these data warrant. We hope that the data description and analyses described here stimulate that further research.

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APPENDIX A

LOSSES ADJUSTED FOR LABOR FORCE WITHDRAWAL

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LOSSES ADJUSTED FOR LABOR FORCE WITHDRAWAL

INTRODUCTION

In the main body of this paper we estimate the earnings losses suffered by workers who were active in the labor force after being displaced by a plant closing. One drawback of the approach used to estimate these losses is that it does not include in the analysis the losses suffered by workers who withdraw from the labor force after the plant closes. If the average losses of this omitted group are dramatically different from the losses of full-time workers, then the average losses we estimate will be biased. For example, it may well be that workers who withdraw from the labor force have lower market wages than workers with similar characeristics who choose to work. Indeed, economic theory suggests that if leisure is a normal good and two similar individuals are faced with different market wages, the individual with the lower wage rate is the one who is most likely to withdraw from the labor force.* In the case of individuals who withdraw then, losses (as measured by lower potential earnings) would be expected to be greater than the losses of active workers with similar characeristics and the same pre-closing earnings.

In this appendix we discuss and apply two methods that take into account the losses of workers who either completely or partially withdraw from the labor force, as well as full-time workers. The first method takes into account possible selectivity bias, while the second method does not.

As we mentioned in the conclusions of the main report, estimating the losses of these labor force withdrawals offers an interesting methodological exercise. However, because the estimation of losses for these "dropouts" requires the subtraction of one unobservable variable (potential post-closing earnings) from another (control earnings), we do not recommend that the results presented in this appendix be taken too seriously.

METHOD 1: CORRECTING FOR SELECTIVITY BIAS

While there are good reasons for excluding from the analysis workers who were not regularly active in the labor force before the

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* This, of course, assumes that the labor supply curve is positively sloped over the region of lower wages.

plant closed,* excluding workers who were active before the closing but who drop out after may seriously distort the picture we are trying to paint. For example, suppose we want to estimate the losses of a woman who is making $4.00 an hour and working 2,000 hours a year before the plant closes. Her earned income would be $8,000. Suppose that after the plant closes she can only earn $2.00 an hour. After working for a few months (200 hours), she decides that her time at home is worth more than $2.00 an hour and she drops out of the labor force. The question is, how should we calculate the losses of this woman? Should she be excluded from the analysis, or should we treat her the same as a woman who earns $3.00 an hour and works 2,000 hours after the closing?

For simplicity, suppose her projected earnings after the plant closes are also $8,000. If we merely subtract projected earnings from actual earnings ($400), we would get a loss of $7,600. In general, $7,600 will be larger than actual losses. If the woman withdraws from the labor force, she must place a value of $2.00 per hour or more on her household activities (work and leisure). Then, a better approximation of her losses is $4,000 (= $8,000 - $2.00/hr. x 2,000 hrs.). On the other hand, the $7,600 would not overstate true losses if the woman did not spend her non-working hours in leisure or in household production. For example, if the woman did not voluntarily withdraw from the labor force, and she spent all non-working hours searching for a job, then the $7,600 would be a better measure of her losses. It seems clear that the best way to handle this situation is neither to exclude her from the analysis, nor to impute a $7,600 loss for her. Rather, we need another way of estimating losses of workers who have apparently withdrawn from the labor force after the plant closes. What we do here is base these losses on the estimated salaries workers would have earned had they decided to work full time. This requires predicting a "potential" salary for the workers who have withdrawn from the labor force.

One solution to this prediction problem is to assume that workers who withdraw from the labor force have the same potential annual salaries as similar workers who decide to remain active in the labor force. (This is the assumption made when we estimate losses with Method 2, which is described below.) Although the assumption of similar opportunities may not be unreasonable, one could argue that those workers with the poorest opportunities are those most likely to withdraw. After all, those who remain actively at work choose to remain active, and those who withdraw choose to withdraw.

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* The most notable reason for excluding these workers is that they are probably either new entrants into the labor force or "permanent" part-time workers. Since we are primarily interested in estimating the losses of established full-time workers, we should not include them in the analysis.

The possibility of such self-selectivity bias in the earnings data precludes the use of a simple method to predict potential salaries for the workers who withdraw from the labor force. Here the term "self-selectivity bias" simply means that the annual salaries we do observe may not be a sample that is randomly taken from the entire population. The individuals who choose to remain active in the labor force (workers whose annual salaries we observe) may have higher than average wages. If so, then it would not be correct to predict the annual salaries of <u>inactive</u> workers on the basis of the annual salaries of <u>active</u> workers with similar characteristics. For a further discussion of self-selectivity bias, see Maddala [A-1].

To see how we calculate losses for the workers who withdraw from the labor force, consider a plant that closes in 1971. Suppose we want to estimate losses in 1972 for the individuals in that plant. We assume that in any given year a worker decides whether to be active in the labor force for the entire year. We define "active in the labor force" to mean the individual is working full time. Individuals who do not remain active, then, have decided to either partially or completely withdraw from the labor force. While we cannot perfectly observe this decision, we can make a reasonable assumption about that decision based on earnings. We assume that anyone with annual earnings that imply full-time work at less than the minimum wage has either partially or completely withdrawn from the labor force, and anyone with annual earnings of at least full-time minimum wages is active in the labor force. For the active workers, we can easily calculate losses with the methodology described in the main body of this paper. To calculate losses for the workers who withdraw from the labor force, we first need to predict potential annual earnings. As argued earlier, we cannot in general use ordinary least squares regression to make these predictions because of the possibility of self-selectivity bias. However, we can use the two-stage procedures of Heckman [A-2] and Lee and Trost [A-4] to make these predictions. Briefly, what we do is the following.

After the plant closes, we assume that all workers can earn some full-time earnings Y. These earnings depend on a set of characteristics X_2, and a disturbance term $\varepsilon_2 \sim N(0, \sigma_2^2)$. Equation 1 gives this relationship:

$$Y = B_2'X_2 + \varepsilon_2 \quad . \tag{1}$$

For labor force withdrawals, all we observe is the decision to withdraw (and that only by assumption). So equation (1) should be rewritten:

$$Y^* = B_2'X_2 + \varepsilon_2 \tag{1a}$$

where $Y = Y^*$ if $IW = 1$, and we do not observe Y if $IW = 0$. Here, IW is an index equal to 1 if the individual is active in the labor force and equal to 0 if the individual withdraws.

The above model differs slightly from the Heckman [A-3] and Nelson [A-5] models. In those models, Y is unobservable for the non-labor-force participants, but is observed for everyone else. In our model, Y is assumed to be unobservable for partial labor force withdrawals as well as for non-labor-force participants.

Using the methods discussed in Heckman [A-2] and Lee and Trost [A-4] we can predict potential annual salaries for individuals who withdraw from the labor force after the plant closes, but who were active in the labor force before the plant closing. We will then have annual salaries for everybody in the sample. For the labor force withdrawals, the salary will be a predicted salary. For those active in the labor force, it will be the observed salary. Using a method similar to the one described in the main body of the paper, we project what earnings would have been had the plant not closed. Losses for each year are then equal to the difference between these projected earnings and actual (or predicted) earnings in each of the years after the plant closes.

RESULTS USING METHOD 1

In this section we present the estimated 1972 losses for individuals who were caught in a plant closing in 1971.* Table A-1 gives the actual average earnings (in constant 1970 dollars) of the female workers for 1970 and 1972, and table A-2 gives the average male earnings for 1970 and 1972.

The estimation of losses using this approach (method 1) requires several steps. First, we divide the 1972 sample into active and inactive workers. We define an unobservable index IW*, whereby an individual decides whether or not to work full time. While we never observe IW*, we do observe (by assumption) the decision of whether to be active in the labor force. So we also define an index IW, where IW=1 if the individual chooses to work full time and IW=0 if the individual works part time. A labor force participation choice equation is specified as:

$$IW^* = B_1^{*\prime}X_1 - \epsilon_1^*, \qquad (2)$$

* We estimate losses for only one year because the technique used here is computationally expensive.

TABLE A-1

YEARLY MEAN EARNINGS FOR FEMALES IN CONSTANT 1970 DOLLARS[a]

	1970	1972
Weaving & textiles	4495 (970) (n=407)	2375 (2204) (n=407)
Men's clothing	4121 (732) (n=100)	2814 (1685) (n=100)
Industrial chemicals	6492 (1262) (n=54)	4470 (3644) (n=54)
Rubber shoes	4847 (1369) (n=100)	4624 (2097) (n=100)
Shoes	4609 (1867) (n=141)	2810 (2812) (n=141)
Glass	7590 (2068) (n=12)	5910 (6057) (n=12)
Radio and TV	4864 (1618) (n=363)	2073 (2357) (n=363)
Automobiles	6536 (1485) (n=14)	4656 (4221) (n=14)
Total	4765 (1476) (n=1201)	2734 (2603) (n=1201)

[a]Standard errors and number of observations in parentheses.

TABLE A-2

YEARLY MEAN EARNINGS FOR MALES
IN CONSTANT 1970 DOLLARS[a]

	1970	1972
Weaving and textiles	5813 (2228) (n=670)	5231 (3174) (n=670)
Men's clothing	5946 (1994) (n=38)	6005 (2562) (n=38)
Industrial chemicals	8056 (1997) (n=596)	5442 (3994) (n=596)
Rubber shoes	6344 (1829) (n=12)	6369 (2046) (n=12)
Shoes	7041 (3094) (n=172)	5828 (4778) (n=172)
Glass	9668 (2551) (n=304)	3554 (3851) (n=304)
Radio and TV	8741 (4051) (n=350)	8025 (5431) (n=350)
Automobiles	7617 (2256) (n=584)	5637 (4267) (n=584)
Total	7579 (2927) (n=2726)	5589 (4247) (n=2726)

[a]Standard errors and number of observations in parentheses.

where we only observe

$IW = 1$ if $\varepsilon_1^* < B_1^{*\prime} X_1$ (works full time)

$= 0$ otherwise (partially or completely withdraws in 1972).

[B_1^* is a vector of parameters to be estimated, X_1 is a set of exogenous characteristics and $\varepsilon_1^* \sim N(0, \sigma_{\varepsilon_1^*}^2)$. Equation (2) implies the following probit model:

$$\mathrm{Prob}(IW = 1) = F(B_1' X_1) - U_1 \tag{2a}$$

where $F(.)$ is the standard normal cumulative density function, $F(B_1' X_1)$ is the probability that an individual with exogenous characteristics X_1 works, $B_1 = B_1^*/\sigma_{\varepsilon_1^*}$, and U_1 is a disturbance term. We also define a standardized disturbance term $\varepsilon_1 = \varepsilon_1^*/\sigma_{\varepsilon_1^*}$.

The sign and significance of the estimated parameters in B_1 will tell us the characteristics of those individuals who are more likely to be active in the labor force. Since males and females may behave quite differently in terms of labor force participation, we estimate equation (2a) separately for males and females. The estimates $(\hat{B}_1)$ of B_1 are presented in table A-3 for females and males.

The second step necessary to estimate losses requires two-stage regression analysis discussed in Heckman [A-2] and Lee and Trost [A-4]. In this second step of the two-stage procedure the 1972 earnings of individuals who worked full-time in 1972 are regressed on a set of exogenous variable X_2 and a variable to correct for selectivity bias equal to $\dfrac{-f(\hat{B}_1' X_1)}{F(\hat{B}_1 X_1)}$. This regression is shown as equation (3).

$$Y = B_2 X_2 + \sigma_{12} \left[\frac{-f(\hat{B}_1' X_1)}{F(\hat{B}_1 X_1)} \right] + \eta_2 \ . \tag{3}$$

In equation (3), Y is the 1972 earnings of active workers, X_2 is a set of exogenous variables, $f(.)$ is the standard normal density function, σ_{12} is covariance between ε_1 and ε_2, and η_2 is a term with zero mean. The consistent estimates of B_2 from this two-stage regression are presented in table A-4.

The third step is to predict annual earnings for workers who withdraw from the labor force. These predictions are based* on the estimated coefficients $\hat{B}_2$ and $\hat{\sigma}_{12}$. With annual earnings for all individuals in the sample, we estimate losses using the methodology discussed earlier. Before presenting these results we examine the results in tables A-3 and A-4 more closely.

The independent variables in the probit and regression equations include dummy variables for race, industry, region, and age. To see how the coefficients on these variables are interpreted, consider the probit estimates for females presented in table A-3. There are 1,201 individual observations, and of these, 529 worked full time in 1972 and 672 did not. The dependent variable for this table is equal to one if the individual works full time and equal to zero otherwise. Since all independent variables are dummy variables, a positive coefficient indicates that the group in question is more likely to work full time than the group represented by the intercept term.** For example, the positive coefficient on the age dummy (≤ 30), indicates that women under 30 are more likely to be working full time than women over 40 (though the coefficient does not achieve statistical significance). The other coefficients are interpreted similarly.

Table A-3 also gives the probit coefficients for males. There are 2,726 individual observations. Of these, 1,946 were active in the labor force in 1972 and 780 had lower than minimum wage earnings. The interpretation of the estimated coefficients for males is the same as the interpretation given above for females.

Table A-4 contains the two-stage estimates for females and males. The dependent variable is 1972 earnings in dollars. The independent variables are similar to those used in the probit equations, with an additional "missing variable" $\frac{-f(\hat{B}_1' X_1)}{F(\hat{B}_1 X_1)}$ included. The regressions are estimated using data on active workers only.

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* The expected earnings of individuals who withdraw from the labor force are given by the conditional expectation:

$$E(Y|IW=0) = B_2 X_2 + \sigma_{12} \left[\frac{(B_1' X_1)}{1-F(B_1 X_1)} \right].$$

** The intercept term includes: shoe industry, Northwest region, black, and age greater than 40.

TABLE A-3

PROBIT ESTIMATES[a] SHOWING THE EFFECT OF EXOGENOUS VARIABLES ON THE FULL-TIME WORK DECISION

Dependent Variable = 1 if worked full time
= 0 otherwise

	Females	Males
Intercept	-.0447	.1960
	(.27)	(1.51)
Dummy White	-.0443	.3159
	(.38)	(3.95)
Industry Dummies		
Rubber shoes	1.7615	3.1823
	(2.64)	(1.90)
Auto	.7485	1.1072
	(1.56)	(5.61)
Men's clothing	.3069	1.8089
	(1.57)	(4.95)
Radio & TV	-.2129	.4408
	(1.54)	(3.41)
Weaving and textiles	.1463	.5672
	(1.04)	(4.57)
Glass	.6254	-23.25
	(1.59)	(1.57)
Industrial chemicals	.6297	.4036
	(2.99)	(3.14)
Region Dummies		
North Central	-.7278	-.7459
	(1.13)	(4.97)
Deep South	-.5703	-.5223
	(4.28)	(5.04)
Other South	-.4939	-.3102
	(4.68)	(3.58)
West	-.5000	1.4430
	(1.95)	(7.48)
Dummy age F 30	.0909	.2988
	(.82)	(3.85)
Dummy age 31 to 40	.1763	.2679
	(1.70)	(3.64)
Number of observations	1201.	2726.
Did not work full time	672.	780.
Worked full time	529.	1946.
-2 x log likelihood ratio	151.45	302.03
Degrees of freedom	14.	14.

[a]Asymptotic t-values are in parentheses.

TABLE A-4

TWO-STAGE REGRESSION COEFFICIENTS USED TO PREDICT FULL-TIME EARNINGS

(Dependent Variable - 1972 Earnings[a] of Full-Time Workers)

	Females	Males
Missing variable (-f/F)	-2520.77	525.22
	(1.60)	(0.60)
Dummy white	986.89	1280.71
	(3.74)	(3.88)
Industry Dummies		
Rubber shoes	-333.42	-1742.47
	(0.97)	(3.93)
Auto	3549.85	185.57
	(4.79)	(0.47)
Men's clothing	-926.02	-1079.07
	(2.37)	(2.78)
Radio & TV	-3.10	2039.55
	(0.03)	(4.63)
Weaving and textiles	4794.68	-956.04
	(4.74)	(1.82)
Glass	3095.03	-433.87
	(4.24)	(1.09)
Industrial chemicals	1439.70	-2149.12
	(1.58)	(1.82)
Region Dummies		
Deep South	-547.99	-342.98
	(0.82)	(0.97)
Other South	-1269.60	-1057.19
	(2.26)	(4.53)
Dummy age ≤ 25	-97.06	-1168.28
	(0.27)	(3.65)
Dummy age 26-30	384.51	-231.04
	(1.36)	(0.80)
Dummy age 31-35	111.61	47.62
	(0.363)	(0.16)
Dummy age 36-40	443.07	-28.81
	(1.43)	(0.09)
Constant	2543.61	7957.14
R^2	0.1983	0.1246
Standard error	1855.05	3626.18
Number of observations	529.	1946.

[a]Asymptotic t-values are in parentheses.

Consider the regression results for women presented in table A-4. The positive coefficient on the white dummy indicates that white females earn more than non-white females. The positive coefficient on the glass industry dummy indicates that women working in the glass industry earn more than women working in the shoe industry. The other dummy variables in table A-4 are interpreted similarly. The "missing variable" has the following interpretation. Recall that the coefficient of the missing variable is the covariance (σ_{12}) between the disturbance term in the earnings equation (equation 1) and the disturbance term in the active-versus-withdraw decision equation (equation 2). Because the disturbance term in the decision equation was written with a minus sign, a negative covariance means that individuals who have a higher (lower) than expected market wage rate (B_2X_2) also have a higher (lower) than expected chance ($F(B_1'X_1)$) of taking a full-time job. Thus, the expected market wage rate of those who choose to work full time is greater than B_2X_2, and the expected market wage of those who don't choose to work full time is less than B_2X_2. In terms of expectations, if σ_{12} is negative, then

$$E(Y|IW = 1) > E(Y|IW = 0).$$

In other words, table A-4 suggests that women who do not work have, on average, lower market wages than women who do work. For men, the reverse is true, but the result is not statistically significant.

Using the results presented in table A-4, we can predict market earnings for all workers with zero or low earnings. We then calculate losses using a method similar to the one discussed in the main text.* These losses are presented in tables A-5 and A-6 for females and males, respectively. The figures in tables A-5 and A-6 represent an average of the losses for both apparently full-time workers and labor force withdrawals.

The losses presented in tables A-5 (females) and A-6 (males) are given as an absolute dollar loss (in constant 1970 dollars) and as a percent of mean 1970 income. (A number in parentheses indicates a gain.) For example, table A-6 shows that for the 304 males working in the glass industry, the average loss in 1970 dollars was $3,096 in 1972 (the first full calendar year after the plant closing). This

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* This method differs from the approach used in the main text in four respects. First, we only calculate the percent $\bar{P}$ above or below mean industrial earnings for the first year (rather than three years) prior to closing. Second, we do not make age adjustments to $\bar{P}$. Third, we do not adjust losses for changes in the unemployment rate. Fourth, we only calculate losses for individuals who were under the age of 61 at the time of the closing.

TABLE A-5

FEMALE LOSSES (GAINS) USING METHOD 1
(In Constant 1970 Dollars)

	1972 Losses[a]	Losses as a % of 1970 Earnings
Weaving & textiles	2415 (n=407)	53.7
Men's clothing	2102 (n=100)	51.0
Industrial chemicals	1516 (n=54)	23.4
Rubber shoes	105 (n=110)	2.2
Shoes	1655 (n=141)	35.9
Glass	647 (n=12)	8.5
Radio & TV	2815 (n=363)	57.9
Auto	1427 (n=14)	22.0
Total	2140 (n=1201)	44.9

[a]These estimates are based on a sample of individuals between the ages of 18 and 61, inclusively, in 1972. The losses presented here are a weighted average of the losses of full-time and part-time workers.

TABLE A-6

MALE LOSSES (GAINS) USING METHOD 1
(In Constant 1970 Dollars)

	1972 Losses[a]	Losses as a % of 1970 Earnings
Weaving & textiles	40 (n=670)	0.7
Men's clothing	224 (n=38)	3.8
Industrial chemicals	1192 (n=596)	14.8
Rubber shoes	(60) (n=12)	(1.0)
Shoes	(929) (n=172)	(13.2)
Glass	3096 (n=304)	32.0
Radio & TV	(396) (n=305)	(4.5)
Auto	1137 (n=584)	14.9
Total	753 (n=2726)	9.9

[a]See table A-5.

amounted to a 32.0 percent reduction in their mean 1970 income. A similar interpretation holds for table A-5. What table A-6 tells us is that for males it is generally the high-wage industries such as industrial chemicals, glass, and autos that have higher percent losses.

Table A-5 presents the losses for females. Unlike for males, table A-5 tells us that for females it is generally in the lower wage industries such as weaving and textiles, men's clothing, and shoes where the percent losses are greatest.

Finally, while tables A-5 and A-6 give some idea of the average losses of all individuals, they do not tell us which groups of individuals lose the most. For example, tables A-5 and A-6 do not tell us whether older workers lose more than younger workers, whether blacks lose more than whites, and so forth. These comparisons are made in table A-7 which presents the results of OLS regressions. The dependent variable in each of these tables is losses calculated by method 1 in this appendix. Since losses are entered as positive numbers, positive coefficients indicate larger losses. Therefore, the results indicate that older workers lose more than younger workers. The other coefficients are interpreted similarly.

METHOD 2: USING ORDINARY LEAST SQUARES

In method 1 described above, we used a two-stage procedure to predict potential post-closing earnings for workers who were not fully active in the labor force during the first year following a plant closing. A worker was termed inactive if he or she earned less than minimum wages in the first year following the closing. Losses for positive earners were calculated by subtracting actual post-closing earnings from control earnings. Losses for zero earners were calculated by subtracting predicted potential post-closing earnings from control earnings. Overall average losses for any given industry are calculated as a weighted average of the positive and zero-earner losses in that industry.

In method 2, workers are termed inactive in any given year following the closing if they earn less than $50 for that year. Predicted potential post-closing earnings for these inactive workers are based on a set of regression coefficients that relate potential earnings to age, age-square, race, industry, region and actual earnings in the three years prior to the closing. These regression coefficients are estimated with the sample of all positive earners. Unlike method 1, method 2 uses ordinary least squares (OLS) rather than a two-stage procedure to estimate these coefficients. We estimate these coefficients separately for males and females for each year following the closing. The estimates are based on the sample of all workers who have positive earnings for that particular year.

TABLE A-7

REGRESSION COEFFICIENTS[a] SHOWING THE EFFECT OF EXOGENOUS VARIABLES ON FIRST YEAR LOSSES (Calculated with Method 1)

Dependent Variable = 1972 Losses (In Constant 1970 Dollars) Calculated with Method 1

	Females	Males
Log Age	922.35 (4.10)	1629.24 (8.05)
Dummy white	-37.50 (0.22)	122.42 (0.72)
Dummy SIC 221	628.70 (2.86)	575.94 (2.25)
Dummy SIC 371	-598.72 (0.81)	2586.14 (6.48)
Dummy SIC 231	468.78 (1.53)	1969.71 (3.63)
Dummy SIC 367	1247.63 (5.79)	809.16 (3.03)
Dummy SIC 321	-1118.70 (1.84)	2790.14 (8.86)
Dummy SIC 281	-196.09 (0.60)	1957.36 (7.30)
Dummy SIC 302	-2330.47 (2.24)	685.52 (0.77)
Dummy Region 2	998.99 (0.99)	463.93 (1.51)
Dummy Region 3	358.42 (1.76)	1358.60 (6.55)
Dummy Region 4	305.50 (1.93)	-18.37 (0.11)
Dummy Region 5	478.94 (1.20)	-593.52 (1.57)
Intercept	-1929.44	-7236.02
R^2	0.1427	0.1643
Standard errors	1967.49	2827.76
Number of observations	1201.	2726.

[a]Since losses are entered as a positive number, a positive coefficient indicates that the variable has a positive impact on losses.

A summary of method 2 is as follows. For positive earners we calculate losses by subtracting actual earnings from control earnings, as in the main body of this report. For zero earners we calculate losses by subtracting predicted earnings from the control earnings. Overall average losses in each year are then calculated as a weighted average of the positive and zero-earner losses.

RESULTS USING METHOD 2

In this section we present the losses estimated with method 2. To calculate these losses we had to predict the potential post-closing earnings of inactive workers. These predictions were based on the set of regression coefficients presented in table A-8. The estimates in table A-8 were obtained by regressing the log of earnings on a set of exogenous variables that included three years of prior earnings (LNIM1 is the natural logarithm of earnings in the first year prior to closing, LNIM2 the earnings in the second year prior to closing and LNIM3 the earnings in the third year prior to closing). (t-statistics are in parentheses.) These estimates are based on the sub-sample of workers who were active* in the labor force in any given year following the closing. Once we predict the potential post-closing earnings of inactive workers, losses are calculated using the same procedure described in the main body of the text. These losses are presented in tables A-9 and A-10 for males and tables A-11 and A-12 for females. The losses shown in tables A-9 to A-12 tell us that when inactive workers are included in the analysis and losses are estimated with method 2, losses are generally higher.

Finally, while tables A-9 to A-12 give us some idea of the average losses of individuals by sex and by industry (when these losses are calculated with method 2), they do not distinguish losses by other characteristics. To do so, tables A-13 and A-14 present the results of OLS regressions. The dependent variable in each of these tables is losses calculated by method 2, and the independent variables are those presented in tables 11 and 12 of the main text. Since losses are entered as positive numbers, a positive coefficient indicates larger losses. For example, the positive coefficients on the unemployment variables in the first-year loss regressions indicate that first-year losses are higher when the unemployment rate is high. As noted in the main text, these positive unemployment coefficients in the two first-year loss equations lead to the intuitively appealing conclusion that individuals who are laid off during** or just prior to periods of high unemployment suffer larger earnings losses than workers who are laid off

* Here the term active means they earned more than $50 in that year.
** Recall that the unemployment variable in year i measures the national unemployment rate in year i. It is <u>not</u> the unemployment rate in the year of the plant closing.

TABLE A-8

REGRESSION RESULTS USED IN METHOD 2 TO
PREDICT POST-CLOSING EARNINGS FOR ZERO EARNERS IN YEAR i

[Dependent variable = Log (Earnings) in year i]

	Year 1		Year 2		Year 3	
	Males	Females	Males	Females	Male	Females
Age	.0747 (8.94)	.0764 (6.77)	.0700 (9.87)	.0715 (6.92)	.0776 (10.99)	.6193 (6.36)
AgeSQ	-.0011 (11.43)	-.0010 (7.43)	-.0011 (12.26)	-.0010 (7.34)	-.0012 (13.46)	-.0008 (6.83)
DSIC 221	.3259 (5.27)	-.4581 (4.55)	.1229 (2.25)	.0436 (.47)	.4371 (.82)	-.5130 (.06)
DSIC 231	.1999 (1.90)	-.2068 (2.21)	.2936 (3.19)	.2098 (2.48)	.2298 (2.57)	.4791 (.61)
DSIC 281	.1090 (1.59)	.5341 (3.11)	-.0127 (.21)	.3456 (2.29)	-.0272 (.46)	.1851 (1.35)
DSIC 302	.0788 (.54)	-.1963 (1.97)	.0544 (.43)	-.0656 (.79)	.0833 (.6841)	.0988 (1.2849)
DSIC 321	-.2964 (4.48)	.2790 (.85)	.7535 (1.29)	.1632 (.59)	.2102 (3.69)	.4840 (1.92)
DSIC 367	.2930 (4.30)	-.2283 (2.53)	.2160 (3.61)	.0878 (1.10)	.1832 (3.14)	.0697 (.93)
DSIC 371	.2888 (3.5)	.4112 (2.02)	.4300 (6.03)	.6896 (3.71)	.3275 (4.72)	.0882 (.55)
DSIC 393	-.6447 (4.55)	-.9633 (1.78)	-.2469 (1.91)	-1.3130 (2.64)	-.0118 (.10)	-.6002 (1.34)
DCLYR 69	-.6191 (7.01)	-.4005 (.79)	-.2639 (3.37)	-.7883 (1.71)	.1277 (1.66)	-.1324 (.32)
DCLYR 70	-1.0271 (10.08)	-.6879 (1.35)	-.4530 (5.00)	.9726 (2.12)	.0836 (.94)	-.1409 (.34)
DCLYR 71	-.9163 (10.29)	-.4061 (.81)	-.3063 (3.85)	.6828 (1.50)	.0942 (1.20)	-.0649 (.16)
DWHITE	.2512 (5.03)	.0113 (.16)	.1937 (4.39)	.0487 (.81)	.1338 (3.11)	.0021 (.03)
DREG 1	.5420 (5.65)	.3211 (2.33)	.4445 (5.25)	.3793 (2.98)	.3986 (4.84)	.3595 (3.03)
DREG 2	.4128 (5.49)	.4318 (2.70)	.2886 (4.33)	.5073 (3.55)	.3440 (5.34)	.4111 (3.10)
DREG 3	.0234 (.23)	.2625 (1.57)	.1521 (1.65)	.0497 (.32)	.2666 (2.97)	.2588 (1.81)
DREG	.4657 (4.81)	-.0645 (.49)	.3961 (4.66)	.1577 (1.32)	.3825 (4.63)	.2480 (2.22)
LNIM1	.2309 (9.94)	.1200 (5.90)	.2221 (10.97)	.1272 (7.23)	.2390 (12.32)	.1464 (8.90)
LNIM2	.0270 (1.44)	-.0057 (.31)	.0342 (2.17)	-.0113 (.70)	.0209 (1.37)	.1464 (8.90)
LNIM3	.0236 (1.62)	.2065 (1.44)	-.0017 (.16)	.0283 (2.23)	.0037 (.35)	.0316 (2.67)
Constant	5.0431	5.4727	4.9440	5.7469	4.4562	5.4025
R^2	.20	.09	.19	.09	.20	.08
SE	.98	1.17	.86	1.04	.82	.96

TABLE A-8 (Cont'd)

	Year 4		Year 5		Year 6	
	Males	Females	Males	Females	Male	Females
Age	.0784 (10.10)	.0987 (9.36)	.0360 (2.21)	.0738 (3.79)	.0003 (0.1)	.0751 (2.41)
AgeSQ	-.0012 (12.18)	-.0013 (10.05)	-.0007 (3.33)	-.0011 (4.33)	-.0003 (.63)	-.0010 (2.27)
DSIC 221	.0089 (.16)	-.2022 (2.16)				
DSIC 231	.2201 (2.40)	.1362 (1.61)	-.4546 (2.48)	.0923 (.55)		
DSIC 281	.0295 (.47)	.2164 (1.47)				
DSIC 302	.0323 (.26)	.0055 (.07)				
DSIC 321	.1802 (3.02)	.3912 (1.49)	-.5965 (2.62)	.2895 (1.16)	-.2880 (2.56)	
DSIC 367	.2767 (4.49)	.0531 (.66)				
DSIC 371	.3256 (4.52)	.3595 (2.07)	.4741 (4.75)			
DCLYR 69	.2365 (4.23)	-.0631 (.77)	.2423 (1.46)	.2173 (1.01)		
DCLYR 70	.0982 (2.03)	-.1283 (2.19)				
DWHITE	.0948 (2.09)	-.0159 (.27)	.0166 (.15)	.1378 (1.06)	-.3724 (.48)	.1530 (.25)
DREG 1	.3266 (3.83)	.4108 (3.22)	-.6588 (3.14)	-.2225 (.92)		
DREG 2	.2771 (4.14)	.5401 (3.82)	-.7113 (4.21)	.0206 (.14)		
DREG 3	.2120 (2.27)	.4770 (3.11)				
DREG 4	.3693 (4.31)	.3461 (2.92)				
LNIM1	.1816 (8.95)	.1167 (6.88)	.0991 (2.72)	.0497 (1.57)	-.0503 (.78)	-.1010 (2.18)
LNIM2	.0192 (1.19)	-.0282 (1.79)	.0196 (.5675)	.0381 (1.35)	.1126 (1.73)	-.1061 (2.41)
LNIM3	-.0065 (.58)	.0301 (2.43)	.0470 (.198)	.0092 (.44)	.0893 (1.85)	.0829 (2.54)
Constant	5.0901	4.8795	7.0939	5.6959	7.6712	5.6134
R^2	.18	.09	.16	.05	.08	.09
SE	.83	.99	.83	1.08	1.03	1.04

TABLE A-9

MALE LOSSES[a] (GAINS) USING METHOD 2

Industry	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Weaving & textiles	717 (990)	428 (990)	144 (990)	171 (990)	NA	NA
Men's clothing	1531 (134)	913 (134)	334 (134)	(169) (134)	1548 (89)	NA
Industrial chemicals	2313 (738)	2088 (738)	1794 (738)	1752 (738)	NA	NA
Rubber shoes	1792 (70)	(185) (70)	(757) (70)	(452) (70)	NA	NA
Shoes	1010 (896)	812 (896)	608 (896)	416 (896)	1008 (595)	651 (265)
Glass	2560 (896)	1729 (896)	1284 (896)	1642 (641)	1667 (239)	2678 (239)
Radio & TV	624 (494)	153 (494)	(150) (494)	(106) (494)	NA	NA
Auto	2540 (1087)	1892 (1087)	1098 (1087)	826 (1087)	1437 (376)	NA
Musical instruments	1834 (165)	2012 (165)	1820 (165)	NA	NA	NA
Avg. loss	1718 (5470)	1246 (5470)	836 (5470)	723 (5050)	1305 (1299)	1613 (504)

[a]Numbers in parentheses below losses are the number of observations.

TABLE A-10

MALE PERCENT[a] LOSSES (GAINS) USING METHOD 2

Industry	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Weaving & textiles	16.4 (990)	9.8 (990)	3.3 (990)	3.9 (990)	NA	NA
Men's clothing	22.7 (134)	13.5 (134)	4.9 (134)	(2.5) (134)	19.6 (134)	NA
Industrial chemicals	33.8 (738)	30.5 (738)	26.2 (738)	25.6 (738)	NA	NA
Rubber shoes	30.3 (70)	(3.1) (70)	(13.0) (70)	(7.6) (70)	NA	NA
Shoes	21.2 (896)	15.7 (896)	11.7 (896)	8.0 (896)	20.1 (595)	12.5 (265)
Glass	35.5 (896)	24.0 (896)	17.8 (896)	22.5 (641)	26.1 (239)	41.9 (239)
Radio & TV	9.3 (494)	2.3 (494)	(2.2) (494)	(1.5) (494)	NA	NA
Auto	38.3 (1087)	28.5 (1087)	16.5 (1087)	12.4 (1087)	19.9 (376)	NA
Musical instruments	25.7 (165)	28.2 (165)	25.5 (165)	NA	NA	NA
Avg. loss	28.0 (5470)	20.3 (5470)	13.6 (5470)	12.0 (5050)	21.1 (1299)	27.9 (504)

[a]Taken as a percentage of average income for the 3 years prior to closing.

TABLE A-11

FEMALE LOSSES[a] (GAINS) USING METHOD 2

Industry	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Weaving & textiles	1436 (645)	908 (645)	570 (645)	504 (645)	NA	NA
Men's clothing	1485 (519)	792 (519)	599 (519)	(320) (519)	598 (295)	NA
Industrial chemicals	885 (73)	626 (73)	773 (73)	504 (73)	NA	NA
Rubber shoes	336 (317)	(481) (317)	(1106) (317)	(998) (317)	NA	NA
Shoes	753 (1725)	512 (1725)	266 (1725)	267 (1725)	222 (1307)	(164) (488)
Glass	1233 (27)	1576 (27)	905 (27)	993 (18)	NA	NA
Radio & TV	1667 (602)	732 (602)	298 (602)	229 (602)	NA	NA
Auto	1295 (47)	1060 (47)	1425 (47)	661 (47)	1081 (27)	NA
Musical instruments	2961 (54)	2717 (54)	2295 (54)	NA	NA	NA
Avg. loss	1103 (4009)	612 (4009)	309 (4009)	218 (3946)	304 (1629)	(164) (488)

[a]Numbers in parentheses below losses are the number of observations.

TABLE A-12

FEMALE PERCENT[a] LOSSES (GAINS) USING METHOD 2

Industry	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Weaving & textiles	44.6 (645)	28.1 (645)	17.7 (645)	15.7 (645)	NA	NA
Men's clothing	44.4 (519)	23.7 (519)	17.9 (519)	9.6 (519)	14.8 (295)	NA
Industrial chemicals	18.1 (73)	12.8 (73)	15.8 (73)	10.3 (73)	NA	NA
Rubber shoes	11.1 (317)	(15.2) (317)	(36.5) (317)	(33.0) (317)	NA	NA
Shoes	25.3 (1725)	18.2 (1725)	8.9 (1725)	9.0 (1725)	7.6 (1307)	(6.2) (488)
Glass	21.9 (27)	27.9 (27)	16.0 (27)	18.2 (18)	NA	NA
Radio & TV	45.9 (602)	20.1 (602)	5.9 (602)	6.3 (602)	NA	NA
Auto	27.5 (47)	22.5 (47)	30.3 (47)	14.0 (47)	22.1 (27)	NA
Musical instruments	58.3 (54)	53.5 (54)	45.2 (54)	NA	NA	NA
Avg. loss	33.8 (4009)	18.7 (4009)	9.5 (4009)	6.7 (3946)	9.6 (1629)	(6.2) (488)

[a]Taken as a percentage of average income for the 3 years prior to closing.

TABLE A-13

LOSS REGRESSIONS FOR FEMALES[a] SHOWING THE EFFECT OF EXOGENOUS VARIABLES ON YEARLY LOSSES (CALCULATED WITH METHOD 2)

(Dependent variable[b] = Loss in Year i Following a Closing)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Age	0.26 (0.0)	-29.70 (6.27)	-21.84 (3.32)	-71.90 (37.21)	-45.77 (7.37)	-28.70 (1.26)
AgeSq	0.51 (12.60)	0.89 (38.65)	0.80 (30.78)	1.50 (111.80)	1.14 (31.45)	0.72 (5.05)
DSIC 221	504.42 (21.37)	777.69 (42.85)	653.20 (36.59)	950.93 (65.49)		
DSIC 231	647.58 (31.75)	754.18 (49.89)	632.09 (31.78)	649.89 (37.90)	977.62 (22.11)	
DSIC 281	-145.37 (0.53)	495.53 (5.84)	783.09 (15.16)	868.50 (18.38)		
DSIC 302	-62.75 (0.35)	-400.50 (12.89)	-823.60 (58.92)	-494.11 (20.09)		
DSIC 321	702.57 (4.74)	1561.21 (23.24)	1701.46 (24.66)	1538.55 (15.19)		
DSIC 367	871.91 (83.17)	850.63 (71.50)	515.21 (32.05)	811.05 (67.66)		
DSIC 371	1153.59 (21.69)	1204.95 (23.88)	1804.94 (52.70)	1165.22 (22.83)	1057.64 (12.02)	
DSIC 393	3467.92 (192.88)	2380.02 (105.66)	4476.62 (122.13)	NA		
DWHITE	205.01 (5.96)	222.35 (7.04)	277.66 (10.81)	329.63 (15.81)	-96.18 (0.38)	-436.57 (0.40)
DREG 1	748.38 (19.99)	390.59 (4.83)	355.88 (4.20)	95.29 (0.29)	284.57 (1.06)	
DREG 2	100.39 (0.29)	531.61 (8.08)	-4.42 (0.0)	-39.38 (0.04)	577.85 (10.09)	
DREG 3	731.78 (12.61)	680.30 (10.28)	183.07 (0.74)	-171.73 (0.66)		
DREG 4	1121.34 (48.57)	909.93 (30.46)	510.13 (9.26)	243.29 (2.20)		
UNEMP	1038.38 (98.03)	477.24 (30.64)	-615.85 (41.06)	-137.74 (38.48)	-33.41 (0.18)	
Constant	-6856.97	-3498.36	2205.25	586.91	-231.47	120.86
NOB	4009.	4009.	4009.	3946.	1629.	488.
R square	0.21	0.18	0.20	0.22	0.19	0.08
Standard error	1629.74	1624.08	1638.15	1606.37	1537.44	1530.17

[a]F-statistics in parentheses.
[b]Losses are entered as a positive number and gains as a negative.

TABLE A-14

LOSS REGRESSIONS FOR MALES[a] SHOWING THE EFFECT OF EXOGENOUS VARIABLES ON YEARLY LOSSES (CALCULATED WITH METHOD 2)

(Dependent Variable[b] = Loss in Year 1 Following a Closing)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Age	54.37 (10.37)	17.26 (.99)	-27.58 (2.60)	-18.67 (1.10)	72.92 (13.39)	275.55 (23.88)
AgeSQ	.22 (1.34)	0.78 (14.09)	1.29 (39.54)	1.16 (29.34)	0.30 (0.40)	-2.52 (12.91)
DSIC 221	-1324.57 (85.69)	-1045.02 (43.49)	-624.75 (17.84)	-584.45 (12.83)		
DSIC 231	318.09 (1.41)	521.49 (3.84)	436.74 (2.77)	52.18 (0.04)	2636.98 (17.78)	
DSIC 281	668.13 (19.57)	917.65 (28.02)	1279.42 (68.15)	1199.50 (45.88)		
DSIC 302	556.09 (2.61)	-812.41 (5.50)	-1106.93 (10.42)	-619.17 (3.16)		
DSIC 321	897.10 (36.74)	460.05 (9.97)	613.38 (13.05)	1017.74 (35.60)	2890.29 (14.40)	2247.41 (56.22)
DSIC 367	-131.90 (0.64)	-16.19 (0.01)	-53.73 (0.11)	14.27 (0.01)		
DSIC 371	1166.93 (34.25)	1019.76 (24.83)	983.87 (24.12)	706.36 (11.77)	881.43 (6.96)	
DSIC 393	711.83 (5.73)	632.41 (5.21)	1165.41 (9.98)			
DWHITE	8.55 (0.01)	14.26 (0.01)	34.87 (0.07)	182.90 (1.92)	-611.79 (1.48)	1934.87 (0.79)
DREG 1	-1174.40 (24.74)	-996.94 (16.06)	-408.67 (2.92)	-619.55 (6.12)	1517.33 (4.66)	
DREG 2	-667.67 (14.42)	-202.92 (1.17)	-293.41 (2.72)	-539.98 (8.03)	1691.02 (8.35)	
DREG 3	1481.33 (32.10)	1426.62 (28.56)	963.12 (12.90)	623.32 (5.25)		
DREG 4	-631.17 (7.23)	-641.66 (6.65)	564.05 (5.48)	-788.57 (9.77)		
UNEMP	682.13 (15.39)	-149.67 (1.21)	3.97 (0.00)	103.34 (8.08)	-253.60 (2.04)	
Constant	-4504.78	-114.10	-745.82	-1588.90	-1916.35	-7570.75
NOB	5470.	5470.	5470.	5050.	1299.	504.
R square	0.23	0.22	0.19	0.19	0.15	0.20
Standard error	2698.63	2774.09	2738.17	2787.49	3325.49	3064.89

[a] F-statistic in parentheses.
[b] Losses are entered as a positive number and gains as a negative.

when unemployment is low. Concerning the loss regressions beyond the first year, for males the unemployment coefficients are never significant. For females, the unemployment coefficient is positive and significant in the second year after closing and negative and significant in the third and fourth years after closing. These negative coefficients are hard to justify and we offer no explanation here.

As noted in the main text, to measure the partial effect of age on losses we must look at both the age and age^2 coefficients.* When this partial effect is evaluated at 40 years of age, the impact of age on losses is positive in all the regressions. That is, the dollar losses of older workers are greater than the dollar losses of younger workers.

The remaining coefficients presented in tables A-13 and A-14 are coefficients on dummy variables. There is nothing very enlightening to be learned from the size and significance of these coefficients, although it is interesting to note that white females have higher losses than similar non-whites.

COMPARISON OF LOSS ESTIMATES

The first-year percentage losses estimated in the main text and in the appendix are summarized in tables A-15 and A-16. These two summary tables give a comparison of first-year percentage losses when these losses are calculated with three different methods: (1) the method used in the main text which does not include labor force withdrawals, (2) a method that includes labor force withdrawals and also takes account of self-selectivity bias (method 1, as described in this appendix), and, (3) a method that includes labor force withdrawals without taking account of possible self-selectivity bias (method 2, as described in this appendix).

Tables A-15 and A-16 indicate that when labor force withdrawals are included in the analysis and their losses are calculated with method 2, the average losses in each industry are uniformly higher than the losses presented in the main text. (The only exception to this is for females in the musical instrument industry.) Comparing methods 1 and 2, we see that for males the losses using method 2 are uniformly higher. For females, sometimes the method 1 losses are higher and sometimes the method 2 losses are higher.

Looking at table A-15, we see that for females first year estimated losses are generally lowest with the approaches that exclude labor force withdrawals (the two exceptions being the glass industry and musical instrument industry). Of the two methods that include labor force withdrawals, the approach described as method 2 generally has the lower

* If the estimated equation is $a(Age) + b(Age)^2$, then the effect of age on losses is $a + (2)(b)(Age)$.

TABLE A-15

COMPARISON OF FEMALE FIRST-YEAR PERCENT LOSSES (GAINS)
USING THREE DIFFERENT APPROACHES

Industry	First-Year Percent Losses		
	Excluding Labor Force Withdrawals[a] (Main Text Losses)	Including Labor Force Withdrawals[b] with Method 1	Including Labor Force Withdrawals[c] with Method 2
Weaving and textiles	38.2	53.7	44.6
Men's clothing	38.9	51.0	44.4
Industrial chemicals	17.6	23.4	18.1
Rubber shoes	(5.0)	2.2	11.1
Shoes	17.4	35.9	25.3
Glass	20.4	8.5	21.9
Radio & TV	37.8	57.9	45.9
Auto	14.7	22.0	27.5
Musical instruments	59.1	NA	58.3
Avg. loss	26.7	44.9	33.8

[a] From table 8.
[b] From table A-5.
[c] From table A-12.

TABLE A-16

COMPARISON OF MALE FIRST-YEAR PERCENT LOSSES (GAINS)
USING THREE DIFFERENT APPROACHES

Industry	First-Year Percent: Excluding Labor Force Withdrawals[a] (Main Text Losses)	Including Labor Force Withdrawals[b] with Method 1	Including Labor Force Withdrawals[c] with Method 2
Weaving and textiles	13.9	.7	16.4
Men's clothing	18.1	3.8	22.7
Industrial chemicals	28.9	14.8	33.8
Rubber shoes	27.8	(1.0)	30.3
Shoes	15.2	(13.2)	21.2
Glass	32.2	32.0	35.5
Radio & TV	7.5	(4.5)	9.3
Auto	33.8	14.9	38.3
Musical instruments	23.7	NA	25.7
Avg. loss	24.1	9.9	28.0

[a]From table 10.
[b]From table A-6.
[c]From table A-10.

estimated losses for females. Overall average first year losses are estimated to be 26.7 percent when these losses are calculated without including labor force withdrawals; and 44.9 percent and 33.8 percent when these losses are calculated with methods 1 and 2, respectively.

In table A-16 we see that for males estimated first-year losses are always lowest with method 1. It is interesting to note that method 2 and the approach that excludes labor force withdrawals yield similar estimated first-year losses for males, although the method 2 losses are always slightly higher. Overall average first year losses for males are estimated to be 24.1 percent when these losses are calculated without including labor force withdrawals, and 9.9 and 28.0 percent when these losses are calculated with methods 1 and 2 respectively.

SUMMARY AND CONCLUSIONS

This appendix extended the methodology presented in the main body of the text by including in the analysis workers who withdraw from the labor force. It presented and applied two methods of calculating the losses of workers who withdraw.

Our main purpose here was to demonstrate two methods of calculating the losses of workers who withdraw from the labor force. The method in the main text does not include withdrawals. Methods 1 and 2 in this appendix include withdrawals but define "withdrawal" differently. Also, method 1 uses only the subsample of plants that closed in 1971. Method 1 does not include an "unemployment adjustment" while the other approaches do. Method 1 calculates $\bar{P}$ using only the previous year's earnings while the other two methods use three years' earnings. Method 1 does not make an "age adjustment" to $\bar{P}$ while the other methods do. Method 1 takes account of selectivity bias while the other two methods do not. Method 1 excludes workers over the age of 61 while the other methods do not.

Using both the methods presented in the appendix (and that of the main text) we find that older workers have larger earnings losses than younger workers. Also, we estimate that individuals who are laid off during or just prior to periods of high unemployment are likely to suffer larger first year losses than similar workers laid off when unemployment is low. Finally, we find that workers who withdraw from the labor force are more likely to be female, non-white and older than workers who do not withdraw.

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