Appendix for Web Publication

A. Data Construction of Matched Wage and Firm Information

The combined individual and firm level data used in the study are constructed by combining Connecticut Unemployment Insurance (UI) tax reports and the state QCEW data on employment of firms. The UI report includes quarterly earnings for each employee and identifies their employers with an Employer Identification Number (EIN). The earnings data are top-coded for this study at the level of $155,000 2000 dollars. The age and gender information used in the study is obtained from matches to State of Connecticut Department of Motor Vehicle records. Those matches are described in section E.

Components of the QCEW data provide information on employment of firms used to calculate the Bureau of Labor Statistics (BLS) employment and earnings reports. These QCEW data contain the EIN that can be used to attach information regarding the firm to the individual level UI file. After this merge, the analysis file contains information on quarterly earnings from 1993 through 2004, the principal employers' EIN each quarter, their employers' six-digit NAICS code, and employment level of the principal firm.

B. Dating Worker Separations

In the UI file, an Employer Identification Number is attached to each earnings source. Changes in this EIN for individuals over time are used to track employment changes for individuals in the file. These EIN may change for administrative reasons, and making certain that the changes observed were genuine was important to the analysis. Fortunately, the Connecticut DOL maintains files that detail the nature of the change of

identification numbers when they occur. These files are usually referred to as predecessor-successor files. The identifiers for employers were coded using these sources of information so that they would be consistent over time. In order to avoid spurious movements of large numbers of workers from one EIN to another in cases of mergers and divestitures, we coded the distinct parts as a single firm, even in years in which they were considered separate.

Changes in the EIN from one quarter to the next along with earnings information from different employers were used to date separations from firms. There were two basic rules followed. First, if an employee had a principal employer this quarter but not the next and their recorded earnings from the original employer stop this quarter, then the separation is dated as occurring this quarter. Second, in cases where earnings from multiple employers overlap, the date of the separation is the quarter when the person last receives earnings from the previous employer.

This dating procedure may miss the timing of separations, for example, in the case where a person receives severance payments several quarters after employment ends. Also, a worker might have had a continuous job with a third employer. This dating procedure does not account for such circumstances. To the extent that the dating procedure is incorrect, it will contribute to earnings declines prior to separation. The graph in this Appendix (Section F) tracing the evolution of earnings for separators demonstrates that this is not a large problem. The earnings of separators trend upwards with those of the continuously employed prior to separation. Also, there is no sign of significant earnings loss among the separators in the figures presented in the text prior to job loss. This is also reflected in Figures 1 through 3 in the text where adjusted earnings

of the non-mass layoff and mass layoff samples are also essentially equal to those of the continuously employed prior to job separation.

C. Sample Restrictions

The sample was restricted to workers born between 1949 and 1979. They had to have six years of continuous employment with the same employer from 1993 through the end of 1998. They had to report some positive earnings in each year of the panel from 1993 through 2004. Individuals were only included in the analysis if information regarding age and gender were available for them. For small firms, minor changes in employment might result in a firm appearing to have a large percentage layoff. For this reason, employees of firms with less than 50 employees were omitted from the analysis. Finally, the sample restrictions imply that anyone who separated and subsequently did not have earnings would be removed from the analysis. Information is contained later in this appendix on how many observations are lost both from no additional reports of earnings after job loss as well as intermittent years of zero reported earnings.

D. Local Labor Market Conditions

The state of Connecticut maintains files on Local Area Unemployment Statistics (LAUS). These LAUS data have geographic identifiers that match firm locations in the employer records. The LAUS data on area resident employment and unemployment rates were attached to the analysis file using the location identifiers. Wherever a match was not possible, the state average was attached to that location.

The unemployment rate was attached as an analysis variable. The trend of the employment rate by location was calculated along with the deviation from that trend. These variables were included to control for local labor market conditions.

E. Matching on DMV Records to obtain demographic information

One of the drawbacks of administrative data drawn from state Departments of Labor is that demographic information is typically not available unless an individual has made use of the state's employment services in searching for a job or when filing an Unemployment Insurance claim. One would naturally be concerned that using a sample built on that basis would result in a highly selected analysis sample. In the original JLS study the UI wage files were matched by the State of Pennsylvania to the social security master file in the second year of their sample (1976) to obtain information on date of birth and gender. This would give them good coverage of most individuals at the beginning of their study period. The file would be limited in its research uses as individuals who entered the wage file at a later date would not have matching demographic information.

An alternative method of obtaining demographic data is to match to Department of Motor Vehicle records. In the State of Connecticut, procedures for obtaining motor vehicle operators licenses were altered effective July of 2002. Those procedures required that social security numbers be obtained and verified as part of the licensing process. The normal life cycle for a Connecticut license is six years, and one would expect that expiration would occur on a roughly random basis except for those who move into the state. For this study, a file which cumulatively covers 70.1 percent of license numbers in the state is used to match to the UI wage records. The match covers 63 percent of all wage records in 2004, the last year of the study. This represents an effective match rate of 90 percent in 2004. In raw numbers, this process yields 1,180,053 workers with demographic information.

If the data from the UI wage file are instead screened to meet the sample criteria that there are both positive earnings in the first quarter of the sample and some positive earnings every year, 1,009,876 individuals pass that screen. Of them, 615,973 successful matches are made to the DMV file for demographic information. This gives 60.99% coverage of the relevant records. Again, if the matches were proportionate to the proportion of DMV records for which validated SSNs are available, 70.1 percent coverage would be expected. Thus, the effective match rate for those who could possibly be included in the study is 87 percent. This compares well with match rates for individual states using the social security master file. For example, Lengermann and Vilhuber (2002), based on data in their paper (pp. 5-6) report an 89 percent match rate between UI records and the social security file for Maryland.

In this study as well as in the original research by JLS, all individuals are required to have positive earnings information in each year. Thus, whether demographic information is matched at the beginning or end of the study period does not matter for any of the core calculations in the analysis. The question that remains is how well do the individuals for whom demographic information is obtained represent the wage file in Connecticut?

Table 1 presents the quarterly distribution of employment at the 2-digit NAICS level for the sample used in the analysis relative to the entire wage file at the point the sample is drawn, 1993:1. The distribution of employment at the 2-digit level is very similar between those for whom demographic information is obtained and the entire set of wage records. The largest exception is in manufacturing where the file constructed for

this study will under-represent employment in that sector by one percentage point or 5.7 percent.

Table 1: Percent Distribution of Employment 1993:1 in Connecticut

Sector		UI File	DMV Matches
11	Agriculture, Forestry, Fishing, Hunting	.2	.2
21	Mining	.0	.0
22	Utilities	.4	.4
23	Construction	3.2	3.5
31	Manufacturing	17.4	16.4
42	Wholesale Trade	4.1	3.9
44	Retail Trade	11.2	11.9
48	Transportation and Warehousing	2.5	2.9
51	Information	2.7	2.6
52	Finance and Insurance	7.5	7.1
53	Real Estate and Rental and Leasing	1.3	1.3
54	Professional, Sceintific, and Technical	5.3	4.9
55	Management of Companies & Ent.	2.4	2.3
56	Admin., Support, Waste Mgmt., Remed.	5.1	5.2
61	Education Services	8.9	8.7
62	Health Care and Social Assistance	12.1	12.2
71	Arts, Entertainment, and Recreation	1.5	1.5
72	Accommodation and Food Services	6.7	6.7
81	Other Services (except Public Admin)	4.2	4.0
92	Public Administration	3.6	4.0
99	Unclassified Establishments	.1	.1

Overall, the employment distributions among individuals for whom demographic information was obtained provide a fairly accurate picture of the distribution of employment in 1993. Of the 21 categories of employment considered, 14 of the categories differ by 2 tenths of a percentage point or less across the entire wage file and those for whom matches were obtained.

Unemployment Insurance records contain information on payroll for everyone who works in a state. Relative to DMV records, citizens who have always worked in another state cannot be matched, nor can out-of-state residents who work in Connecticut. This is consistent with the definition of the resident worker population of Connecticut, those who both live and work in the state.

Census data allow one to obtain information on the resident worker population by using cross border migrant data to construct the population of individuals who both live and work in Connecticut. Further, they can be compared to those who commute from another state to work in Connecticut. Generally, 2000 Decennial Census data show that approximately 3.5 percent of the workforce of the State of Connecticut at any point in time is represented by commuters from surrounding states. Commuting workers typically have significantly higher incomes. This shows up when one considers the distribution of earnings in 1993 for those for whom demographic information is obtained relative to the entire wage file.

Table 2 shows the mean, median, and various percentiles of the wage distribution from the UI file as a whole relative to those who could be matched to the DMV files for demographic data. For example, in 1993:1, average earnings for the entire file of wage earners is $390 higher than for the sample containing demographic information.

Similarly, median earnings for the entire file are $265 higher than for the subset for which demographic information is available. The columns in table 2 such as P-10 refer to the dollar value equivalent to the 10^{th} percentile of the distribution.

Table 2: Reported Quarterly Wage Distribution in Connecticut 1993:1

	Median	Mean	P-10	P-25	P-75	P-90	
UI File	$5,110	$6,665	$494	$1,813	$8,848	$13,225	
DMV Matches	$4,845	$6,280	$450	$1,657	$8,456	$12,600	

Table 3 reports the percentage distribution of employment by 2 digit industry code in Connecticut in 1993:1 for those individuals who met the major screening criteria of the analysis sample that positive wages be reported that quarter and that some wages have to be reported every quarter. Again, in 14 of the 21 employment categories considered, the deviation in the percentage distribution of employment among those with demographic data and the entire file who meet major screening criteria of the study is two tenths of a percentage point or less. The overall distributions are fairly similar with the one outlier being manufacturing. Manufacturing workers are under-represented in the sample by 7 percent.

Similarly, table 4 provides information regarding the distribution of reported wages from the entire UI wage file relative to those who meet the same major screening criteria for the analytical sample. Mean earnings differ across the two samples by $405 and median earnings differ by $359. More detail on percentiles can be found in the table

Table 3: Percent Distribution of Employment for those meeting sample screening criteria in 1993:1 in Connecticut

Sector		UI File	DMV Matches
11	Agriculture, Forestry, Fishing, Hunting	0.2	0.2
21	Mining	0.0	0.1
22	Utilities	0.4	0.5
23	Construction	3.1	3.3
31	Manufacturing	18.2	16.9
42	Wholesale Trade	3.9	3.8
44	Retail Trade	10.7	11.4
48	Transportation and Warehousing	2.4	2.9
51	Information	2.7	2.6
52	Finance and Insurance	7.7	7.2
53	Real Estate and Rental and Leasing	1.2	1.2
54	Professional, Sceintific, and Technical	4.9	4.7
55	Management of Companies & Ent.	2.4	2.3
56	Admin., Support, Waste Mgmt., Remed.	4.4	4.7
61	Education Services	9.4	9.0
62	Health Care and Social Assistance	12.9	12.7
71	Arts, Entertainment, and Recreation	1.4	1.5
72	Accommodation and Food Services	5.4	6.1
81	Other Services (except Public Admin)	3.9	3.8
92	Public Administration	4.1	4.3
99	Unclassified Establishments	0.8	0.8

Table 4: Reported Quarterly Wage Distribution in Connecticut 1993:1
for those meeting sample screening criteria

	Median	Mean	P-10	P-25	P-75	P-90	
UI File	$5,595	$6,958	$646	$2,315	$9,213	$13,314	
DMV Matches	$5,236	$6,553	$551	$2,000	$8,785	$12,777	

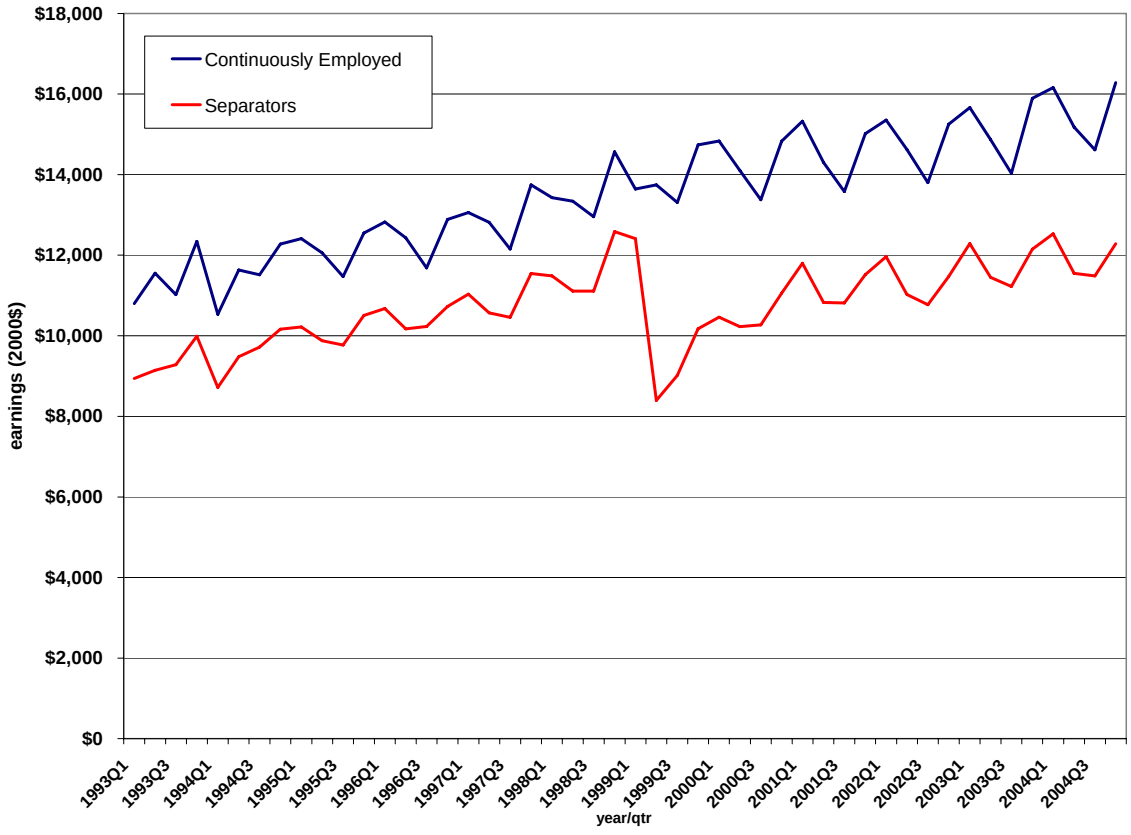
While the earnings and employment distributions for the analysis file match the total wage file fairly well, a further question worth considering is attrition in the sample. In the original JLS study, they report that they lose 25 percent of the mass layoff group because of workers who do not report positive earnings beyond the point where they lose their jobs. Similar calculations are performed on the DMV matched analysis file here. A total of 2,751 people drop out of the mass layoff sample beyond the point where a job is lost because of failure to report some positive earnings in at least one of the years examined. A person could enter this total because they had just one calendar year where they did not report earnings. 397 of the 2,751 people never report any positive earnings beyond the point of job loss.

If the 2,751 people who do not meet this criterion but otherwise would be in the study are added to the total sample of mass layoffs reported in the table in the next section of this appendix, the total available number of individuals who experienced mass layoff would be 18,606. Thus, attrition because of unreported earnings in the mass layoff sample is 14.8 percent. It is likely this number somewhat understates the true degree of attrition since matches are obtained based on information available at the end of the

sample period. Nonetheless, like JLS, when the earnings losses presented in the paper are recalculated and zero earnings are assigned to these individuals, the earnings losses (as a percentage) using the fixed-effects and time-trend estimators are 30 and 33 percent respectively in the last year of the sample. Including individuals with intermittent earnings reports following displacement more than doubles the largest estimated earnings loss presented in the body of the paper.

Section F. Table of Sample Characteristics and Wage Paths for Separators in 1999:1 Relative to the Continuously Employed

Figure 1: Wages of Workers Who Separate in 1999:1



The figure presented here is equivalent to figure 1 in the original JLS study. It shows the earnings path of individuals who separate from employment in 1999:1 relative to the group of continuously employed workers. It is notable that both before and after job

separation, earnings trend similarly relative to each other. There appears to be a simple intercept difference in the starting point of the wage paths of the continuously employed and separators at the start of the sample period. Thus, estimators such as the fixed-effect and time trend estimators used in the paper which control for individual specific intercepts would be expected to effectively equalize earnings prior to job separation. This turns out to be true as can be seen in Figures 1 and 2 in the text.

Table 1 presents demographic and industry characteristics for the sample. This is a replicate of table 1 in JLS (1993a) and is discussed in the text.

Table 1: Sample Characteristics

Workers	Observations	Mean	Std. Dev.	Median	10th %tile	90th %tile
A. Age in 1998						
Entire Sample:	95,126	39.74	6.11	40	31	48
Separators:						
All	34,456	38.92	6.45	39	30	47
Males	16,883	39.02	6.36	39	30	47
Females	17,573	38.83	6.54	39	30	47
Non-manufacturing	25,511	38.75	6.59	39	30	47
Manufacturing	8,945	39.42	6.02	40	31	47
Non-mass layoffs	18,601	38.82	6.60	39	30	47
Mass layoffs	15,855	39.04	6.27	39	30	47
Continuously employed:	60,670	40.20	5.86	41	32	48
B. 1998 Earnings						
Entire Sample:	95,126	$14,077.88	$9,856.99	$12,457.00	$6,580.00	$21,313.30
Separators:						
All	34,456	$13,198.82	$9,636.61	$11,454.50	$5,829.00	$20,778.90
Males	16,883	15,314.29	11,112.95	13,167.00	7,443.00	23,160.40
Females	17,573	11,166.41	7,416.77	9,843.00	4,918.80	18,100.60
Non-manufacturing	25,511	13,003.37	9,559.89	11,255.00	5,476.00	20,782.60
Manufacturing	8,945	13,756.22	9,831.38	11,941.00	6,808.00	20,769.40
Non-mass layoffs	18,601	13,173.99	9,450.16	11,510.00	5,783.00	20,720.60
Mass layoffs	15,855	13,227.94	9,851.08	11,393.00	5,894.00	20,854.80
Continuously employed:	60,670	14,577.12	9,945.52	13,026.00	7,097.00	21,548.00

Section G. Earnings Loss Estimates for Demographic and Industrial Characteristics

Estimates of Equation (2.) Using Splines Defined as in Jacobson, LaLonde, and Sullivan (1993b)

Group	Number of Displaced	Without other controls: Pre	During	Post	5th Year Diff	5th Year Loss	With other controls: Pre	During	Post	5th Year Diff	5th Year Loss
Overall:	15,855	*****	*****	*****	*****	*****	94.96	(2,863.86)	(16.11)	*****	(8,052.21)
							[1.72]	[42.18]	[0.84]		[11.56]
Gender:											
Male	8,181	(21.12)	(501.23)	8.34	(1,587.51)	(8,744.69)	(11.99)	(337.73)	14.17	(642.30)	(8,694.51)
		[6.62]	[12.07]	[1.38]	[6.23]	[16.54]	[3.50]	[7.41]	[2.24]	[2.30]	[11.23]
Female	7,674	22.52	534.37	(8.90)	1,692.47	(5,464.70)	12.78	360.06	-15.1	684.76	(7,367.45)
		[6.62]	[12.07]	[1.38]	[6.23]	[11.39]	[3.50]	[7.41]	[2.24]	[2.30]	[10.06]
Decade of Birth:											
1950's	7,848	(3.82)	(536.33)	2.82	(2,003.86)	(9,237.34)	(1.83)	(509.85)	(2.67)	(2,173.11)	(10,225.33)
		[1.14]	[14.16]	[0.45]	[7.83]	[17.74]	[0.45]	[12.88]	[0.42]	[8.17]	[13.74]
1960's	6,786	8.38	448.77	(3.22)	1,633.60	(5,599.87)	6.44	440.21	0.82	1,802.03	(6,250.18)
		[2.22]	[10.21]	[0.49]	[5.60]	[15.71]	[1.44]	[10.63]	[0.12]	[6.08]	[8.06]
1970's	1,221	(22.04)	953.42	(0.24)	3,801.66	(3,431.81)	(24.04)	830.76	12.60	3,953.50	(4,098.71)
		[3.59]	[10.85]	[0.02]	[7.32]	[5.55]	[3.55]	[9.88]	[0.86]	[6.75]	[4.95]
Industry:											
Manufacturing	5,359	(38.49)	(690.04)	(6.21)	(3,070.78)	(10,028.88)	(32.96)	(527.82)	(18.89)	(3,055.98)	(11,108.20)
		[9.24]	[16.05]	[0.76]	[9.97]	[18.53]	[7.98]	[9.96]	[2.13]	[8.44]	[13.97]
Trade	2,410	(25.43)	310.40	52.52	3,868.04	(3,090.05)	(19.37)	301.35	66.96	4,553.50	(3,498.71)
		[3.87]	[3.89]	[4.67]	[9.09]	[6.02]	[2.93]	[4.11]	[5.90]	[10.65]	[4.34]
Financial/Real Estate	1,569	165.30	534.82	(98.33)	(2,777.67)	(9,735.77)	159.14	(136.83)	(97.02)	(5,398.35)	(13,450.57)
		[10.63]	[4.56]	[4.50]	[3.12]	[10.30]	[9.70]	[0.95]	[3.83]	[5.72]	[10.71]
Prof./Business Services	1,570	69.06	(606.40)	(58.44)	(5,347.97)	(12,306.08)	66.74	(528.51)	(38.53)	(4,040.86)	(12,093.08)
		[5.15]	[4.60]	[2.55]	[6.16]	[13.59]	[4.75]	[3.55]	[1.49]	[4.22]	[9.95]
Edu./Health Services	2,426	(23.31)	1,380.66	80.72	9,558.78	2,600.68	(36.69)	1,465.72	84.21	10,073.55	2,021.33
		[3.56]	[19.42]	[6.29]	[19.22]	[4.17]	[5.80]	[20.92]	[6.42]	[19.93]	[2.33]
All Other Industries	2,521	(6.99)	189.14	(15.49)	(18.33)	(6,976.43)	(8.06)	42.38	(14.91)	(576.37)	(8,628.58)
		[0.99]	[2.18]	[0.98]	[0.03]	[10.61]	[0.94]	[0.42]	[0.91]	[0.97]	[10.58]
Firm Size:											
Emp Level 1: 50-500	6,215	(25.23)	(369.87)	1.10	(1,424.32)	(8,712.62)	(14.91)	(4.73)	(8.22)	(1,524.09)	(9,576.30)
		[5.49]	[8.31]	[0.12]	[3.85]	[16.02]	[4.54]	[5.26]	[0.85]	[4.21]	[12.11]
Emp Level 2: 501 to 2,000	5,169	11.79	216.01	3.86	1,057.51	(6,230.78)	(21.88)	(278.27)	(6.03)	174.77	(7,877.44)
		[2.47]	[4.93]	[0.48]	[3.18]	[14.64]	[4.36]	[2.02]	[0.64]	[0.46]	[10.40]
Emp Level 3: 2,001 to 5,000	2,204	2.21	(147.83)	(7.25)	(953.90)	(8,242.20)	20.65	(455.76)	(10.93)	(2,369.62)	(10,421.84)
		[0.29]	[1.97]	[0.33]	[1.00]	[7.61]	[2.02]	[5.04]	[0.59]	[2.84]	[8.77]
Emp Level 4: > 5,000	2,267	40.40	669.85	(4.83)	2,437.88	(4,850.41)	18.10	940.69	47.25	6,125.68	(1,926.53)
		[4.16]	[7.19]	[0.29]	[3.51]	[6.50]	[0.53]	[8.94]	[2.68]	[8.44]	[2.05]
Local Labor Market:											
Trend	15,855	(16.44)	(474.60)	(14.43)	(2,620.40)	*****	(36.85)	(1,024.14)	31.41	(2,525.73)	*****
		[2.66]	[9.18]	[1.87]	[8.34]		[2.71]	[8.64]	[1.22]		
Deviation	15,855	11.03	218.56	16.92	1,720.66	*****	(10.16)	(641.79)	(2.92)	(2713.26)	*****
		[2.47]	[5.00]	[2.25]	[5.53]		[0.97]	[5.71]	[0.12]		
Unemployment Rate	15,855	13.24	(221.35)	34.74	852.02	*****	15.23	(182.83)	32.42	890.04	*****
		[5.42]	[9.08]	[7.52]	[4.16]		[5.26]	[6.66]	[6.88]		

Note: Parameter estimates in parentheses are negative in value. T-Statistics are in brackets and are calculated using bootstrapped standard errors obtained using a 20 percent sample of the primary analysis file. The Trend, Deviation, and Unemployment Rate Variables are expressed relative to the average for the mass layoff sample.

H. Estimates of Earnings Losses and Re-Employment in Other Sectors

Table 3
New job in same sector

Qtrs since separation	Same NAICS	Different NAICS	New job in other sector
A. Displaced Manufacturing Sector Workers			
-12	269.99	(138.01)	(377.20)
	[1.66]	[3.55]	[5.63]
-8	(1,127.74)	(228.79)	(474.53)
	6.40]	[2.72]	[4.84]
-4	(331.91)	(483.63)	(612.27)
	4.27]	[3.46]	[5.75]
8	120.97	(1,786.50)	(2,952.68)
	[3.06]	[11.58]	[18.17]
12	(865.40)	(2,294.62)	(3,180.75)
	[5.57]	[11.27]	[17.91]
16	(1,273.85)	(2,347.24)	(2,910.10)
	[3.92]	[11.24]	[12.90]
20	(1,414.53)	(2,371.36)	(2,835.75)
	[5.19]	[13.61]	[13.88]
B. Displaced Non-Manufacturing Sector Workers			
-12	613.16	378.03	327.49
	[3.51]	[1.57]	[2.25]
-8	513.25	267.95	104.08
	[3.31]	[1.27]	[2.50]
-4	577.68	246.69	435.76
	[3.12]	[1.43]	[2.87]
8	403.39	(1,322.32)	(441.17)
	[1.35]	[7.02]	[2.14]
12	428.47	(1,157.23)	(1,377.26)
	[2.00]	[7.97]	[3.17]
16	674.51	(1,075.97)	(1,318.22)
	[2.85]	[7.82]	[5.64]
20	165.47	(746.35)	(1,593.67)
	[0.79]	[7.22]	[7.35]

Note: Parameter estimates entered in parentheses are negative in value. The terms in brackets are t-statistics calculated using Huber-White standard errors based on one fifth of the sample used for the estimates.

I. Propensity Score Estimates

The propensity score estimators used in the paper draw primarily from the research of Dehejia and Wahba (1999 and 2002), Dehejia (2005), Heckman, Ichimura, and Todd (1997 and 1998), Heckman, Ichimura, Smith, and Todd (1998), and Smith and Todd (2005).

The first step of the applied modeling procedure is to estimate models of the likelihood of experiencing a job separation prior to the event. Like much of the rest of this literature, a logit was used for this purpose. Models were estimated for both the mass layoff and non-mass layoff sample. The logits use data from both the group of separators (mass layoff or non-mass layoff) and the continuously employed.

Given how trended earnings are in the samples used in the analysis (see chart 1 in this Appendix), prior to beginning these estimations, it appeared that it would not be necessary to control heavily for earnings paths in order to effectively equalize them across those who separated and selected controls. The basic thought was that as long as you could pin down the earnings across separators and their comparisons at one point in time, it would likely equalize their earnings fairly well over the pre-separation period.

To operationalize this, earnings were annualized in 1995 (a time well before separation) and included as a regressor in a logit model. Earnings were the only continuous variable included in the estimations. The logits were estimated using programs available as routines in STATA that were written by Becker and Ichino (2002). Those programs include routines to check the balancing properties of the model. This is a technical requirement that those who later experience job loss and those that do not who

have similar propensity scores must have observed characteristics that are not statistically different from each other.

When earnings did not satisfy this property, it was dichotomized into categories. This has the practical impact of forcing those who separate and their comparisons to be within the same percentile band in the earnings distribution. For other variables included in the estimations, if they did not satisfy the balancing tests, they were interacted with the set of variables that simultaneously failed the balancing test. For example, if gender was introduced after the balancing property was satisfied for earnings and it was found that both then failed the balancing tests, they were fully interacted with each other. If the variables were fully interacted with the other variables yet still did not satisfy the balancing property, they were excluded from the analysis.

A model which satisfied the balancing property for the mass layoff sample and which also satisfied it for the non-mass layoff sample with small adjustments is reported in table 5. These were the first models found for each sample which satisfied the balancing property.

Table 5: Logit Parameters for the Propensity Scoring Model

	Mass Layoff		Non-Mass Layoff	
Variable	Parameter	T-Statistic	Parameter	T-Statistic
Female (0,1)	-.042	-1.02	.18	5.17
P1 (0,1)	.49	13.57	.61	14.58
P2 (0,1)	.37	11.68	.43	11.03
P3 (0,1)	.23	7.85	.27	7.06
P4 (0,1)	.11	3.91	.17	4.50
P5 (0,1)	.09	3.23	.06	1.69

P6 (0,1)	-.02	0.90	-.03	0.69
P7 (0,1)	-.05	1.89	-.09	2.25
P8 (0,1)	-.10	3.53	*****	*****
Female*P1	-.08	1.49	-.22	4.65
Female*P2	-.18	3.43	-.21	4.46
Female*P3	-.05	0.97	-.14	3.00
Female*P4	.08	1.56	-.05	1.05
Female*P5	.01	0.18	.02	0.41
Female*P6	.07	1.24	.06	1.18
Female*P7	-.03	0.60	.05	1.12
Female*P8	-.08	1.37	*****	*****
FIRE (0,1)	.04	1.06	.04	1.19
Female*Fire	.094	1.44	-.29	3.36
Female*Fire*P1	-.27	2.67	.08	0.80
Female*Fire*P2	-.17	1.83	.13	1.45
Female*Fire*P3	-.21	2.25	.04	0.46
Female*Fire*P4	-.21	2.13	-.04	0.45
Female*Fire*P5	-.16	1.60	-.15	1.35
Female*Fire*P6	-.03	0.32	-.08	0.75
Female*Fire*P7	.03	0.27	-.24	2.00
Female*Fire*P8	.17	1.50	*****	*****
Decade50 (0,1)	-.14	13.06	-.07	2.18
Decade50*Fire	.11	3.07	*****	*****
Decade50*P1	*****	*****	-.24	5.60
Decade50*P2	*****	*****	-.19	4.33
Decade50*P3	*****	*****	-.16	3.65
Decade50*P4	*****	*****	-.12	2.83

Decade50*P5	*****	*****	-.06	1.47
Decade50*P6	*****	*****	.01	0.06
Decade50*P7	*****	*****	.07	1.45
Constant	-.80	40.02	-.86	28.32

The categories for the earnings variable were dichotomous variables for an individual being within a band of percentiles. For the Mass Layoff sample 9 categories were used and for the Non-Mass Layoff Sample, eight categories were used. The categories P1, P2, etc. refer to the percentile bands. The last percentile category in each regression was omitted and absorbed into the constant. The other variables are also categorical with 0 indicating other categories. A value of 1 for the variable Female indicates the person is a woman. The value of 1 for the variable FIRE indicates employment in 1998 in the Finance, Insurance, and Real Estate sectors. A value of 1 for the Decade50 variable denotes birth prior to 1960. Interactions between the variables that were included in the estimations are also denoted in the table. For example, Female*P1 is an interaction capturing women in the lowest earnings grouping in 1995 relative to the omitted category. The proportions of the sample that are female, in various earnings groupings, etc. as well as those represented by the various interactions can be seen in the table of variable means below.

Table 6

Variable Means for the Propensity Scoring Model

	Mass Layoff	Non-Mass Layof
Variable	Mean	Mean
Ever Displaced | Ever Separated	.217	.237

Female (0,1)	.466	.479
P1 (0,1)	.11	.125
P2 (0,1)	.11	.125
P3 (0,1)	.11	.125
P4 (0,1)	.11	.125
P5 (0,1)	.11	.125
P6 (0,1)	.11	.125
P7 (0,1)	.11	.125
P8 (0,1)	.11	*****
Female*P1	.088	.098
Female*P2	.077	.005
Female*P3	.064	.070
Female*P4	.054	.057
Female*P5	.045	.047
Female*P6	.038	.042
Female*P7	.035	.044
Female*P8	.037	*****
FIRE (0,1)	.099	.093
Female*Fire	.067	.063
Female*Fire*P1	.088	.008
Female*Fire*P2	.077	.012
Female*Fire*P3	.064	.011
Female*Fire*P4	.054	.009
Female*Fire*P5	.045	.006
Female*Fire*P6	.038	.005
Female*Fire*P7	.035	.004
Female*Fire*P8	.037	.005

Decade50 (0,1)	.556	.552
Decade50*Fire	.046	*****
Decade50*P1	*****	.092
Decade50*P2	*****	.093
Decade50*P3	*****	.105
Decade50*P4	*****	.121
Decade50*P5	*****	.087
Decade50*P6	*****	.090
Decade50*P7	*****	.105
Sample Size	76,527	78,479

The interactions between the earnings percentile indicators and the variable indicating that the decade of birth was the 1950s was added for the non-mass layoff sample because both the Decade50 variable and several of the earnings percentile variables failed the balancing test without them. The balancing tests require t-tests to be performed across levels of all the variables shown for separators and continuously employed workers with similar predicted probabilities of subsequent job separation. The output is voluminous and is available from the authors as an electronic file on request. The specifications above satisfy the balancing property.

For the mass layoff sample, the estimated range of probability of job separation after the six initial screening years of the sample is from .12 to .39 with an average probability of .22. For the non-mass layoff sample, the estimated range of the probability is from .11 to .42 with an average of .24.

When those who separated from their jobs (in both the mass layoff and non-mass layoff samples) are matched with those who are continuously employed based on their

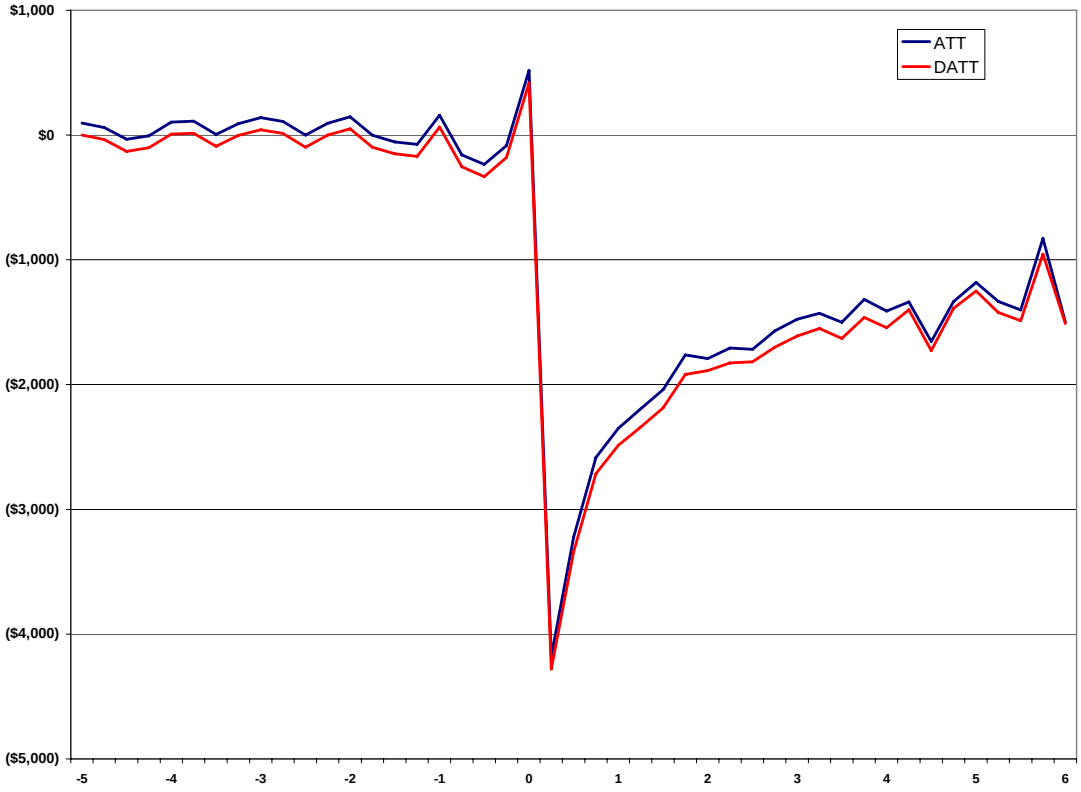
predicted probabilities, there are never less than 6 exact matches and often they number more than two thousand. The probabilities were matched carrying eight digits to the right of the decimal place for the predicted probabilities. Since exact matches are available for every separator, weighting procedures that make use of those with close probabilities that do not match exactly are not employed. Instead, a random draw of the exact matches is made to be used in the estimations. This is consistent with a nearest neighbor matching procedure employing a random draw to break ties.

As described in the text, the ATT calculation simply takes this randomly chosen exact match for a given separator and calculates the differences in earnings for the pair in each pre- and post-separation period. The average of all of these paired differences is then taken in each time period. This is consistent with the calculation of the Average Treatment on the Treated (ATT) found in the literature.

The same matched pairs are also used to calculate the difference in the differences of earnings paths. In this calculation, the separator and their matched pair each have the difference in their current period earnings taken relative to the first quarter of the sample. Then, the differences in those changes across people are calculated for periods before and after job loss – each period of the sample. This is referred to in the text as Differenced Average Treatment on the Treated or DATT.

Estimates from these two estimators for the mass layoff sample are presented in the text. Appendix Figure 2 presents the same information for the separators.

Figure 2: Earnings Losses for Separators: Non-Mass Layoff Sample



For the separators in figure 2, in the last year of the sample, the average quarterly earnings loss using the ATT estimator is $1,265 and $1,343 using the DATT estimator. These are earnings losses of 9.6 and 10 percent respectively which are slightly larger than those presented in the text using the fixed-effect and time trend estimators.

J. Drops in Employment Relative to the 1998:4 level

In choosing how to identify who from among the separators will be included in the mass layoff portion of the sample, a decision must be made regarding how large of an employment reduction must be observed and how quickly it must occur. In estimates contained in the body of the paper, those who were included in the mass layoff sample separated from firms which had employment losses of 30 percent or more relative to the

maximum observed in the screening period for continuous employment, 1993:1 to 1998:4.

Other possible rules for determining who would be included in the mass layoff sample were examined. One variant that resulted in larger earnings losses than those reported in the body of the paper was to examine declines in employment relative to the last quarter of the screening period for continuous employment, 1998:4. Using this rule, earnings losses after six years are 16 percent with the fixed-effects estimator and 19 percent with the time trend estimator. In the next section of this Appendix, parameter estimates and standard errors associated with this graph are presented along with those from the primary sample used in the paper where the mass-layoff sample was chosen using percentage declines in employment relative to the maximum prior to 1999. Comparing the parameter estimates across the two sample selection methods relative to their standard errors indicate that the estimates are not meaningfully different from each other. This is primarily because the standard errors for this alternative sample selection rule become much larger than in the primary sample because it groups roughly one-third fewer workers into the mass layoff sample.

K. Parameter Estimates and Standard Errors

The parameter estimates presented in this section are provided as a reference for the reader as well as other researchers who work in this area. FE or TT in the table heading indicates that the estimation method was Fixed-Effects or Time Trend corresponding to equations (1.) or (2.) used in the text. ATT refers to Average Treatment on the Treated (equation (4.)) and DATT refers to Differenced Average Treatment on the Treated (equation (5.)). SE refers to standard errors. SEP indicates that estimates are for the Non-Mass Layoff sample. Disp indicates the estimates are for the Mass Layoff sample. The estimates for UI Claimants and Non-Claimants correspond to figure 4 in the text. Those with 1998 in the heading refer to the figure in section J of this Appendix.

All of the standard errors are robust estimates except in the case of the ATT and DATT where they are bootstrapped. Although the standard errors for the ATT and DATT are smaller than for the other estimators, it is known that the bootstrapped

standard errors will overstate analytically correct standard errors for the matching estimators. However, the comparisons of most interest for these estimators would be to the fixed-effects and time trend estimators for the mass layoff sample. If one makes standard calculations to gauge the differences in these estimates, this would involve taking the difference in the parameter estimates for a period and dividing by the square root of the sum of the two variances (the sum of the two standard errors, squaring each). This ignores the covariance term. In comparing the ATT and DATT estimates to the fixed-effects and time trend estimators, it can be seen that even ignoring the standard errors from the matching estimators in calculations such as those described here yields the inference that estimates are not meaningfully different across methods. For example, the parameter estimate for the DATT method the 20^{th} quarter after job loss is $1,549 while those for the fixed-effects estimator is $1,687 with the difference being $138. The standard error for the fixed-effects estimate is $149. Thus, ignoring the standard error of the matching estimator still yields the inference that the estimates across the DATT estimator and the fixed-effects estimator are not meaningfully different 20 quarters after separation since the implied t-statistic is already less than 1. The parameter estimates and standard errors as described follow.

pre/post	FE SEP	FE SEP SE	TT SEP	TT SEP SE	FE Disp	FE Disp SE	TT Disp	TT Disp SE
-20	143.82	121.02	122.71	39.51	20.47	109.69	112.54	33.42
-19	23.09	115.77	2.21	34.14	(189.11)	105.55	(98.20)	29.78
-18	91.51	122.29	72.55	39.48	(113.06)	106.48	(23.41)	33.86
-17	19.75	124.91	6.22	38.87	(152.42)	106.82	(60.34)	32.61
-16	112.37	119.46	104.31	41.41	(37.76)	106.36	55.30	35.51
-15	(5.99)	115.81	(14.08)	38.92	(175.26)	106.68	(83.58)	36.27
-14	32.07	122.38	29.94	43.45	(187.21)	107.26	(94.16)	36.77
-13	66.05	122.53	65.73	42.35	(173.54)	107.40	(80.68)	35.90
-12	132.83	120.07	141.97	43.53	(44.03)	107.26	52.27	38.16
-11	(49.22)	117.46	(47.05)	42.14	(301.51)	108.16	(211.81)	39.31
-10	25.20	124.09	31.79	47.15	(233.44)	107.23	(144.07)	40.02
-9	9.50	127.31	19.80	46.37	(265.16)	111.23	(174.93)	40.32
-8	58.04	122.91	68.36	50.09	(276.14)	109.99	(189.54)	44.23
-7	(114.96)	121.66	(99.35)	51.99	(434.15)	108.92	(346.10)	44.59
-6	(50.05)	123.20	(32.81)	55.38	(304.27)	111.66	(219.52)	47.38
-5	(177.68)	125.19	(154.24)	53.21	(375.50)	113.71	(288.78)	51.95
-4	100.58	125.49	130.38	64.82	(266.51)	111.28	(178.82)	51.87
-3	(221.63)	123.42	(189.31)	60.88	(408.80)	113.02	(322.98)	57.22
-2	(224.48)	125.31	(200.55)	63.09	(315.43)	116.20	(237.91)	57.98
-1	(79.89)	130.41	(135.86)	69.44	(152.43)	117.86	(135.11)	65.83
0	482.51	154.02	481.21	109.58	942.60	147.43	956.52	103.29
1	(4184.61)	129.84	(4360.93)	85.06	(4254.33)	119.50	(4340.92)	75.24
2	(3306.69)	127.24	(3479.46)	80.65	(3445.80)	117.34	(3545.25)	75.64
3	(2688.41)	126.63	(2813.80)	82.63	(2916.08)	121.19	(2990.67)	75.22
4	(2400.71)	133.86	(2384.16)	87.05	(2422.98)	113.97	(2411.38)	72.99
5	(2325.87)	124.41	(2244.08)	84.15	(2373.65)	121.02	(2300.47)	76.74
6	(2155.86)	124.12	(2047.71)	87.47	(2118.63)	114.61	(2050.80)	73.83
7	(1913.00)	130.26	(1783.31)	89.84	(1975.76)	118.91	(1914.27)	81.02
8	(1809.12)	137.67	(1664.43)	92.67	(1805.14)	120.08	(1761.28)	83.07
9	(1783.15)	125.75	(1631.75)	91.61	(1945.44)	123.82	(1906.10)	86.65
10	(1795.83)	124.96	(1623.26)	93.73	(1805.76)	116.66	(1781.84)	89.17
11	(1658.34)	137.72	(1457.36)	98.75	(1863.17)	124.73	(1811.94)	91.84
12	(1524.38)	138.25	(1296.50)	105.20	(1894.18)	123.22	(1838.48)	97.51
13	(1539.62)	128.05	(1276.22)	113.65	(1921.79)	127.58	(1840.94)	105.91
14	(1677.68)	125.81	(1436.06)	116.86	(1868.85)	128.82	(1803.85)	107.91
15	(1410.99)	146.48	(1128.73)	123.12	(1823.98)	125.05	(1764.10)	109.32
16	(1484.95)	139.03	(1195.72)	130.46	(1800.78)	138.87	(1796.61)	124.91
17	(1511.38)	143.94	(1169.35)	129.51	(1891.58)	141.08	(1936.44)	132.68
18	(1611.54)	130.89	(1261.83)	134.76	(1577.97)	152.26	(1646.86)	147.39
19	(1386.53)	149.57	(1045.08)	151.52	(1553.61)	143.39	(1653.80)	157.98
20	(1316.80)	178.20	(943.94)	175.53	(1687.85)	149.09	(1747.09)	174.69
21	(1399.55)	152.16	(970.57)	180.69	(1783.39)	178.14	(1899.67)	189.27
22	(1359.51)	149.18	(953.72)	231.10	(1699.79)	159.93	(1772.06)	218.22
23	(836.89)	177.48	(616.15)	286.74	(1553.49)	191.25	(1836.11)	270.48
24	(1217.90)	203.88	(1004.81)	364.20	(1759.81)	238.16	(2184.47)	381.89

pre/post	ATT	ATT SE	DATT	DATT SE	UI Claimant	UI SE	Non-Claimant	NC SE	1998 FE	1998 SE	1998 TT	1998 TT SE
-20	40.00	12.14	0.00	0.00	(110.59)	119.13	263.12	73.95	86.18	111.41	164.23	33.66
-19	(190.00)	10.83	(231.00)	13.14	(235.47)	116.27	61.60	74.67	(170.51)	108.19	(92.06)	28.60
-18	(78.00)	12.47	(119.00)	10.40	(162.32)	118.44	129.94	77.99	(83.34)	111.72	(4.37)	38.88
-17	(113.00)	15.84	(154.00)	14.97	(285.34)	122.47	140.58	73.91	(173.89)	109.84	(94.44)	34.96
-16	(32.00)	12.96	(73.00)	8.16	(245.82)	117.86	296.42	75.14	4.85	110.77	84.43	35.82
-15	(106.00)	11.84	(147.00)	11.30	(346.05)	122.84	155.25	75.03	(157.74)	110.57	(77.69)	36.33
-14	(146.00)	15.06	(187.00)	12.92	(302.36)	122.03	132.06	77.79	(131.57)	109.93	(51.44)	37.54
-13	(120.00)	16.84	(161.00)	14.38	(337.11)	121.53	203.08	75.15	(214.50)	110.31	(134.12)	35.89
-12	33.00	17.67	(7.00)	11.11	(306.00)	121.04	360.19	75.30	15.28	110.99	95.99	38.18
-11	(241.00)	13.98	(282.00)	12.25	(520.39)	117.84	130.84	75.39	(300.40)	109.81	(219.61)	36.89
-10	(190.00)	14.57	(230.00)	12.90	(439.89)	118.32	192.77	78.86	(214.98)	110.50	(134.12)	40.27
-9	(212.00)	16.68	(253.00)	12.68	(527.50)	121.61	223.36	75.70	(317.93)	113.78	(237.10)	47.26
-8	(180.00)	17.81	(220.00)	11.51	(518.83)	123.39	230.04	76.24	(293.41)	115.65	(212.73)	51.31
-7	(389.00)	19.29	(430.00)	11.21	(719.19)	122.06	97.92	78.85	(488.28)	113.37	(407.83)	48.16
-6	(259.00)	19.96	(300.00)	15.18	(645.19)	121.68	223.94	83.64	(282.53)	113.72	(202.43)	47.90
-5	(354.00)	22.33	(395.00)	17.83	(738.41)	128.27	131.68	84.00	(489.12)	119.92	(409.37)	61.11
-4	(179.00)	17.67	(220.00)	12.52	(721.49)	123.27	434.98	86.12	(251.98)	119.95	(172.55)	59.46
-3	(425.00)	18.42	(466.00)	13.02	(986.00)	123.75	260.70	84.42	(459.95)	116.40	(381.35)	56.94
-2	(281.00)	19.54	(311.00)	14.57	(836.29)	130.32	239.67	88.75	(351.08)	119.80	(284.56)	61.60
-1	(183.00)	21.80	(204.00)	19.14	(792.01)	129.57	490.20	87.31	(269.76)	129.14	(196.81)	76.21
0	964.00	58.41	958.00	18.70	(601.65)	158.04	1888.18	115.46	1097.19	160.15	1161.31	125.53
1	(4221.00)	198.27	(4237.00)	19.16	(6529.56)	129.21	(2373.44)	90.24	(4305.72)	125.90	(4234.58)	86.67
2	(3397.00)	165.00	(3433.00)	14.34	(5687.39)	131.55	(1545.64)	94.99	(3585.02)	121.93	(3548.32)	85.42
3	(2848.00)	135.58	(2866.00)	18.32	(4956.85)	127.50	(1095.93)	91.97	(3015.98)	129.04	(3003.90)	92.90
4	(2283.00)	110.77	(2302.00)	15.54	(4424.73)	126.27	(796.91)	88.01	(2472.36)	121.79	(2447.69)	87.55
5	(2309.00)	101.55	(2365.00)	14.80	(4292.12)	127.32	(800.03)	91.63	(2434.16)	122.76	(2386.46)	91.58
6	(1949.00)	89.99	(2020.00)	13.82	(4007.12)	127.04	(642.30)	88.54	(2157.97)	125.37	(2119.70)	97.80
7	(1904.00)	87.23	(1998.00)	22.35	(3970.84)	125.58	(332.33)	86.18	(2111.97)	135.51	(2095.79)	111.26
8	(1639.00)	76.18	(1728.00)	18.29	(3808.08)	124.26	(212.98)	94.65	(1819.87)	133.54	(1838.40)	11.54
9	(1831.00)	78.19	(1920.00)	15.34	(3900.60)	127.99	(276.77)	98.98	(2133.77)	132.91	(2183.20)	115.19
10	(1713.00)	74.62	(1808.00)	19.32	(3843.37)	128.61	(216.95)	96.88	(1921.22)	135.74	(1989.80)	125.14
11	(1699.00)	78.59	(1793.00)	21.64	(4000.00)	130.95	(76.16)	91.91	(2013.71)	102.52	(2034.57)	141.99
12	(1738.00)	80.34	(1797.00)	19.62	(4014.16)	131.79	(19.78)	96.62	(1974.14)	144.04	(1979.24)	149.42
13	(1937.00)	79.48	(1983.00)	22.65	(4103.66)	135.22	(7.78)	107.06	(2198.30)	139.12	(2161.94)	146.61
14	(1782.00)	82.07	(1842.00)	24.14	(4090.93)	138.47	(100.11)	105.99	(2023.16)	146.47	(2013.33)	159.23
15	(1713.00)	88.22	(1765.00)	35.16	(4157.89)	138.32	174.24	96.24	(2198.66)	145.80	(2200.22)	159.45
16	(1723.00)	82.89	(1787.00)	30.77	(4165.42)	143.61	116.97	103.20	(2099.16)	164.53	(2193.34)	183.03
17	(1938.00)	84.47	(1986.00)	27.58	(4229.52)	141.02	52.21	101.45	(2236.44)	153.99	(2450.11)	191.60
18	(1508.00)	63.76	(1576.00)	27.96	(4086.26)	137.81	191.41	119.57	(1826.14)	155.90	(2040.77)	207.90
19	(1570.00)	81.30	(1693.00)	51.45	(4197.19)	142.78	454.04	119.92	(1929.89)	167.24	(2207.49)	240.78
20	(1485.00)	74.01	(1577.00)	32.77	(4188.14)	155.89	343.11	129.99	(2184.78)	202.53	(2484.43)	304.22
21	(1668.00)	73.55	(1731.00)	34.08	(4293.00)	152.56	226.84	117.91	(2355.17)	196.29	(2665.63)	353.54
22	(1345.00)	81.13	(1402.00)	45.82	(4091.67)	187.98	206.34	128.74	(2131.98)	211.62	(2363.24)	398.15
23	(1563.00)	89.21	(1556.00)	47.76	(4176.73)	233.20	700.72	144.73	(1983.85)	275.83	(2408.13)	497.96
24	(1645.00)	102.73	(1549.00)	69.82	(4556.51)	322.87	356.84	146.23	(1957.84)	514.29	(2726.53)	876.06

L. Earnings Losses by Duration of UI Receipt