7-10-2013

Tracking the Transition of Michigan's Displaced Auto Workers During Significant Restructuring in the Auto Industry

Randall W. Eberts
W.E. Upjohn Institute for Employment Research, eberts@upjohn.org

Kenneth J. Kline
W.E. Upjohn Institute for Employment Research

Tracking the Transition of Michigan's Displaced Auto Workers During Significant Restructuring in the Auto Industry

Authors
Randall W. Eberts, *W.E. Upjohn Institute for Employment Research*
Kenneth J. Kline, *W.E. Upjohn Institute for Employment Research*

Upjohn Author(s) ORCID Identifier

https://orcid.org/0000-0002-9711-5466

https://orcid.org/0000-0002-0366-3390

Tracking the Transition of Michigan's Displaced Auto Workers During Significant Restructuring in the Auto Industry

Randall W. Eberts
Ken Kline

W.E. Upjohn Institute for Employment Research

4/23/2012

Results are preliminary and should not be cited without authors' permission.
The authors wish to thank Phyllis Molhoek for her assistance in preparing the paper.

I. Introduction

The nation's auto industry has undergone unprecedented restructuring during the past decade. To date, 600,000 jobs have been eliminated since June 2000 when auto employment peaked at 1.16 million workers. Michigan, claiming nearly 30 percent of auto jobs in 2000, has been hit harder than the rest of the country. Forty percent of the nation's auto job loss occurred in Michigan, reducing its auto employment by 73 percent. The impact on auto workers and the communities in which they live can be devastating. Yet, little is known about the whereabouts of displaced auto workers after they file for unemployment insurance benefits. The purpose, therefore, of this paper is to track the employment outcomes of those who were displaced by the auto industry.

The analysis documents the various paths that displaced workers follow, with particular emphasis on: 1) reemployment in the auto industry or in other industries (with other industries ranked by growth rates to determine the reallocation of labor resources from declining to growth industries); 2) comparing the earnings levels before and after displacement; and 3) examining the stability of employment after displacement, including the number of employers within a specific time period and the number of quarters with and without employment.

These outcomes are important from the perspective of workers, communities, and the state economy. From the workers' perspectives, the concern is to find jobs that maintain their living standards and provide for a stable employment path. From the perspective of local communities and the state's economy, the positive aspect of worker mobility is for displaced workers to provide the pool of skilled workers that can meet the growing needs of expanding industries.

The analysis is based on matched Unemployment Insurance wage records with state administrative workforce data. Data for Michigan (containing the NAICS codes) extend from 2001 through 2008. The UI wage records permit the construction of a longitudinal history of each worker so that employment patterns before and after displacement and before and after program participation can be tracked. In addition, the wage records contain detailed industry codes of workers and the capability of recording all the employers the person worked for during the quarter. The administrative records also include information regarding the time of registration and exit from the program, participation in the major service areas, and demographic information including barriers to employment and occupation codes of prior employment.

II. Trends in Michigan's Auto Industry

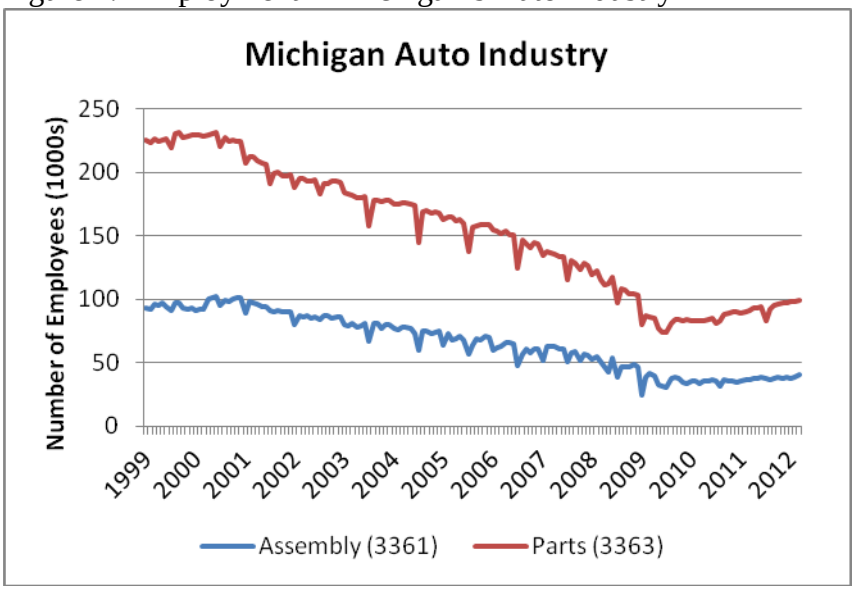
Although the nation's motor vehicle assemblers (e.g., General Motors, Ford, and Chrysler) make up only a small part of the industry's overall employment, they constitute the hub of a vast supplier network. In 2008, the Detroit Three along with foreign-based assemblers employed 190,700 workers nationwide, while the nation's motor vehicle parts manufacturers, primarily its first tier suppliers, employed 544,400 workers. Total

employment would be much larger if the full range of industries that supply the auto sector, including second and their tier suppliers of everything from plastics to electronics, were tallied.

During the 12-month period ending in January of 2009, the industry took a beating. National employment in the production of motor vehicles plunged by 41.3 percent, a loss of 84,400 jobs. During the same time period, the nation's auto parts manufacturers, again only the industry's tier 1 suppliers, cut 21.8 percent of their workforce, a reduction of 125,600 jobs. Job losses at the nation's tier 2 and tier 3 manufacturing are unknown.

Michigan has been hit harder than the rest of the country due to the overwhelming presence of the Detroit Three. From 2008 to 2009, employment at the state's motor vehicle assemblers plunged by 42.8 percent while its auto parts manufacturers cut 35.5 percent of their workers. At the beginning of the decade, Michigan's share of auto assemblers was around 33 percent; in 2009 it is below 25 percent. Auto parts employment in Michigan follows a similar trend: its share fell from 27 percent in 2000 to below 20 percent in 2009. Put more starkly, Michigan has lost more auto assembly and parts jobs from 2000 to the present than what currently remains, as shown in Figure 1.

Figure 1: Employment in Michigan's Auto Industry



Source: BLS

III. Reemployment Prospects of UI Applicants

Using administrative records from the UI system provides the opportunity to follow the reemployment outcomes of workers after they have lost their jobs and file for UI benefits. The analysis includes the experience of displaced auto workers from

2001:Q1 through 2008:Q1.[1] While the data include only the first quarter of the last recession (which NBER dates as beginning December 2007), examining the reemployment experience of auto workers during the decade is instructive. As shown in the previous section, Michigan's auto industry underwent significant downsizing during that time. From 2000 to 2008, Michigan lost over 100,000 auto jobs (assembly and parts suppliers), amounting to more than a 30 percent decline in its auto-related employment base. As many jobs were lost in 2001 as were lost in 2008. Consequently, the experience of auto workers during that time is useful in understanding the current situation.

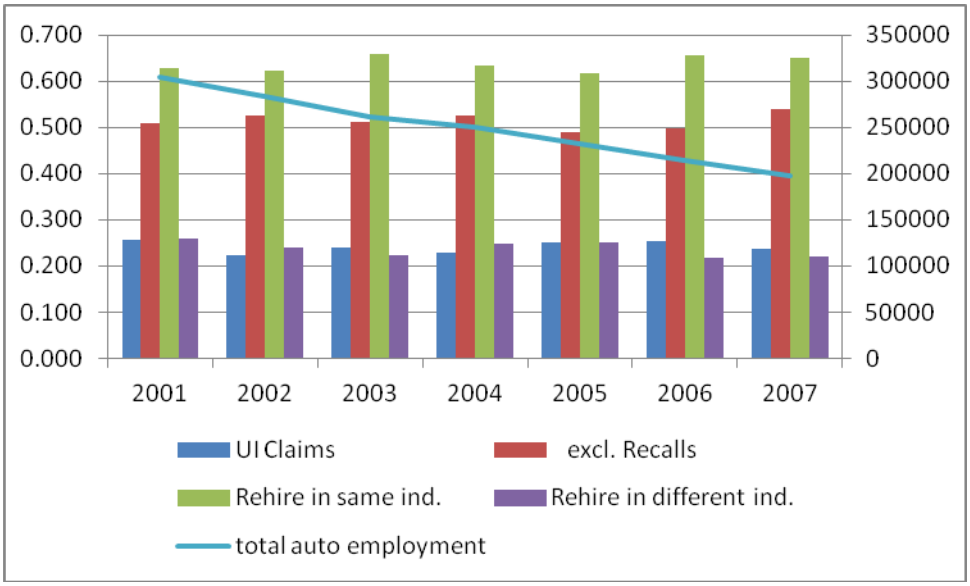
We examine workers from two sectors of the auto industry: motor vehicle manufacturing (3361) and motor vehicle parts manufacturing (3363). Employment in the motor vehicle parts manufacturing sector is twice the number of workers in motor vehicle manufacturing (assembly). Therefore, the lion's share of UI claim applications comes from workers in 3363 (73.7 percent in 2001) compared to 3361 (22.3 percent in 2001).[2] Non-auto workers are all Michigan workers (covered by UI) not in the two auto sectors.

UI claims by auto workers have declined during the period from 2001 through 2007. The total number of claims were the highest in 2001 (78,299) and steadily declined throughout the period, reaching 47,044 in 2007. The number of claims that were exempt from job search (because the worker was given a specific recall date) also declined during this period. Figure 1 shows the ratios between the total UI claims and total employment and between the total UI claims excluding recalls and total claims. Although the total number of auto workers declined by 35 percent, these ratios remain steady throughout the period. Even the ratio of return to employment relative to total UI claims, excluding recall, remains relatively constant over this period at a rate of roughly 0.87 of total UI non-exempt claims. Equally apparent is that the rate of hires to the same industry as the dislocated worker left is also constant through the period.

[1] Wage data are available from 1997:Q2 through 2008:Q3. Therefore, the full three years of history prior to application are available for all cohorts. The full four years of data subsequent to registration are available through the 2003 cohort. With wage data ending in 2008:Q3, wage data are available for all persons in the 2004 through 2008 cohorts for 15, 11, 7, 3 and 1 quarters after registration, respectively. The number of observations beyond the 15, 11, 7, 3 and 1 quarters for the respective cohorts declines as more current cohorts are considered.

[2] For a given cohort year, the client must have applied for UI in one of the four calendar quarters of that year. Industry classification (auto or all other) is based on the major industry of employment in the four quarters prior to application where "major" is the industry associated with the most wages reported for the registrant.

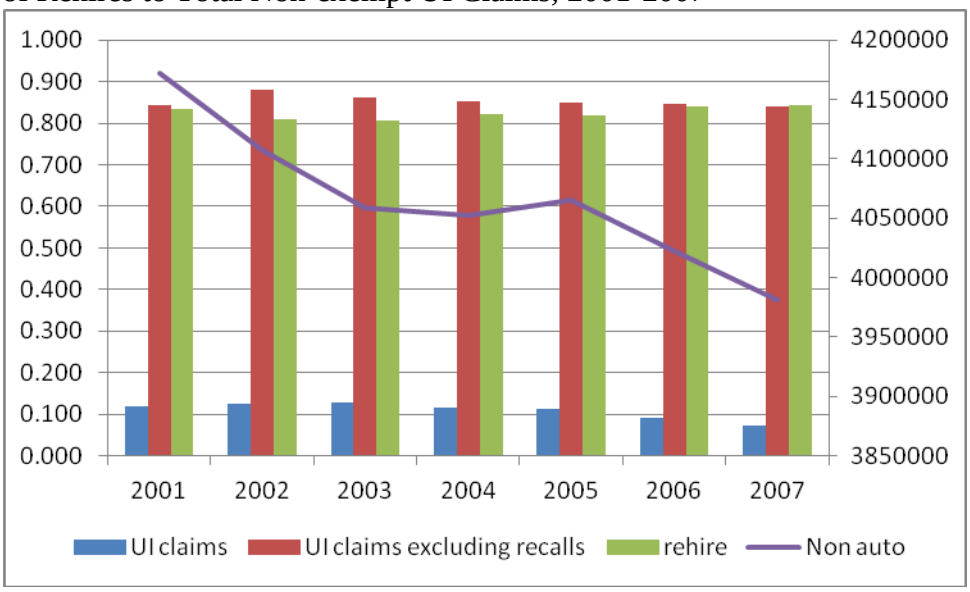
Figure 2: Ratio of UI Claims to Total Auto Employment in Michigan and Ratio of Return to Employment to UI Claims, 2001-2007



Source: Michigan UI Administrative Records and BLS

For non-auto workers, unlike for auto workers, the ratio of total UI claims to total employment tails off in the latter years of the 2001-2007 period. This could be a result of a change in the mix of industries in which displaced workers typically apply for UI. However, the success rate of returning to employment of UI non-auto worker claimants is fairly constant throughout this period, even though the total employment (excluding the auto industry) in the state fell by 4.5 percent, reducing the employment options of those looking for work. The state unemployment rate rose from 5.2 percent to 7.1 percent during this time. Also, the labor force shrank by 2 percent during this period, but less than half the fall in employment. Consequently, the attribution of the state's labor force, either from leaving the state or from no longer being employed and no longer actively searching for work, is not enough to account for the relatively constant ability of UI claimants from both the auto industry and all other industries in Michigan to return to work, even as employment falls and unemployment rates rise.

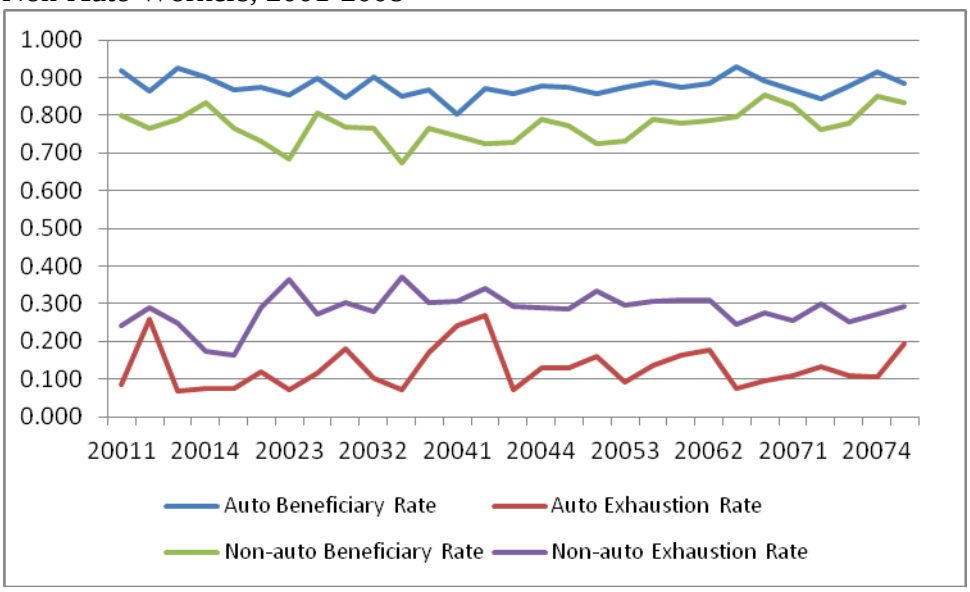
Figure 3: Ratio of Non-Auto UI Claims to Total Employment in Michigan and the Ratio of Rehires to Total Non-exempt UI Claims, 2001-2007



Source: Michigan UI Administrative Records and BLS

Another indication of the ability of displaced auto workers to find employment is the relative low UI exhaustion rate compared with displaced workers from all other Michigan industries. The exhaustion rate is the percentage of UI beneficiaries who do not find a job before their typical 26 weeks of regular UI benefits end. The exhaustion rate of displaced auto workers is nearly half the rate of non-auto workers. However, much of this difference is due to the high percentage of auto workers who are on recall, which usually specifies a date in which a worker will be recalled to their same job. About 50 percent of displaced auto workers are on recall compared with approximately 15 percent for non-auto workers. Even after factoring in this difference, however, the exhaustion rate of non-exempt auto workers is 10 percentage points less than non-exempt non-auto workers.

Figure 4: UI Beneficiary Rates and Exhaustion Rates for Michigan Auto Workers and Non-Auto Workers, 2001-2008



Source: Michigan UI Administrative data

A. Transition Probabilities

Figures 5-8 depict the various paths of reemployment for auto workers and non-auto workers for the years 2001 and 2006. Although data are available through 2008:Q1, the last year examined was 2006 in order to follow individuals for two years. For both auto workers and non-auto workers, we start with their job loss and their application for UI benefits. From there, we can follow those who are exempt from job search, which includes those who have a definite recall date, and those who are not exempt, which as with exempt workers includes those laid off due to lack of work as well as those who quit or were dismissed. The non-exempt group is more relevant for addressing the question of what happens to displaced workers, since there is a high probability that the exempt group will return to the same company that they left within a short period of time. For the group of non-exempt workers, we can determine what percentage find jobs and what percentage find jobs within the same industry they left. For auto workers, this means determining how many auto workers returned to the auto industry after separation. For non-auto workers, we tracked whether they returned to the same industry in which they were employed prior to applying for UI benefits.

Following the transition paths taken by displaced workers, we see a stronger attachment of auto workers to their industry than we find for workers from other industries. Compared with non-auto workers, auto workers are more likely to be exempt from job search, reflecting a definite recall date at the time of applying for UI benefits. We find from figure 5 that 49.2 percent of auto workers are exempt, whereas in figure 6 only 15.8 percent of workers from other industries are exempt. For those not exempt and thus without a recall date, the reemployment rate is slightly higher for workers in the auto industry than for workers in other industries (88.6 percent versus 83.4 percent). However, of those employed, a much higher percentage of auto workers are reemployed in the same

industry (autos) than are non-auto workers: 69.8 percent versus 49.4 percent. While most of the workers employed in the first year are also employed in the second year after filing. For auto workers, the percentage is 88.5; for non-auto workers, it is 78.0. However, workers from both the auto sector and non-auto sectors are less likely to remain in the same industry in subsequent years. For those employed the second year after filing, the percentage of auto workers in the same industry is 60.3 percent whereas the percentage of non-auto workers in the same industry is 39.1 percent.

Figure 5: Auto Worker Transition from Filing UI Claim to Re-employment, 2001

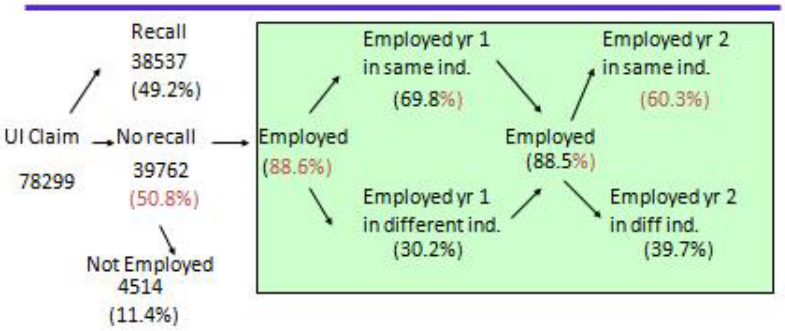


Figure 6: Non-auto Worker Transition from Filing UI Claim to Re-employment, 2001

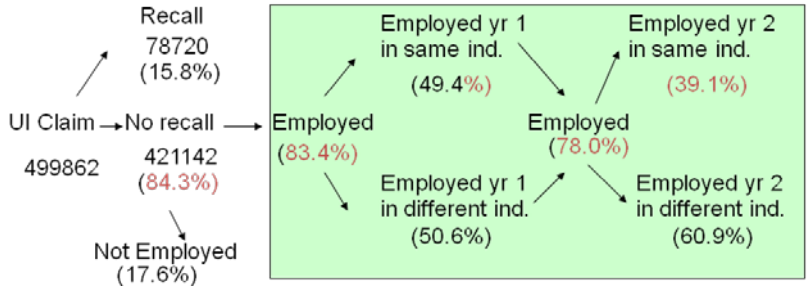


Figure 7: Auto Worker Transition from Filing UI Claim to Re-employment, 2006

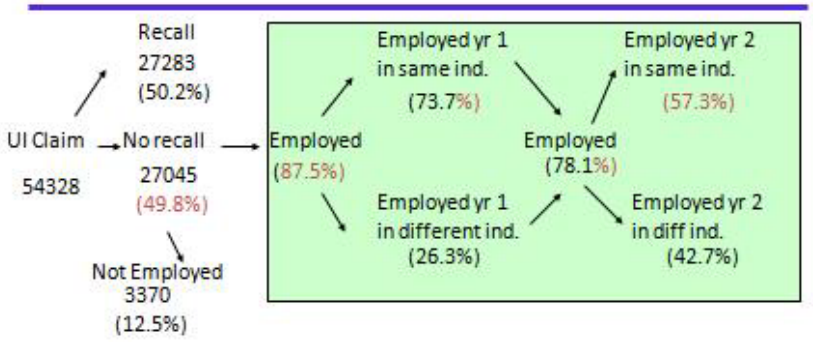
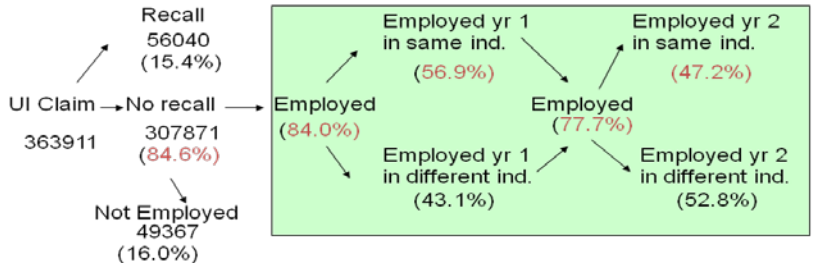


Figure 8: Non-auto Worker Transition from Filing UI Claim to Re-employment, 2006



Source: Michigan Unemployment Insurance Administrative records

The same transition probabilities are computed for auto and non-auto workers in 2006. The patterns are similar, with few exceptions. For both groups of workers, the percentage of those who are UI exempt (recall notice) is the same for both time periods. Also, the percentage of workers employed after filing for UI benefits is also about the same for both time periods for each group.

For those non-exempt auto workers who did not return to the auto industry the first year after displacement, the largest number found jobs in the employment services industry (NAICS 5613). Nearly 14 percent of displaced auto workers found jobs in employment services, which includes employment placement agencies and temporary help services. This is a broad industrial category in that workers in this industry can actually work for employers in a variety of industries. Presumably, many of the auto workers classified as employment service workers returned to the auto industry, but as temporary or contract workers and not as direct hires.

IV. Determinants of Transition Probabilities

We next consider determinants of the three key transition points: the probability of recall, the probability of reemployment, and the probability of retention. To do this, we use a linear probability model to estimate the marginal effects of personal characteristics and employment history on these three transition points. Separate models are estimated for auto workers and non-auto workers. Estimates are based on individual observations of UI claimants from 2001:Q1 through 2008:Q1. The means of these variables are found in Table 1. Estimates of the effects of personal characteristics and employment history on the three probabilities are displayed in Tables 5 through 8.[3]

A. Characteristics of UI Applicants

The characteristics of exempt and non-exempt auto workers are displayed in Table 1 for the 2001 cohort of UI applicants. The year 2001 is significant because Michigan's auto industry lost as many jobs in that year as it did in 2008—about 29,000. Consequently, it provides an interesting benchmark for considering the impact of job losses in the auto industry. It is also representative of the characteristics of auto workers from the more recent cohorts for which we currently have data. We find that exempt auto workers, compared with non-exempt, are slightly older, are less likely to have a college degree, have nearly twice the employment tenure, earn nearly 25 percent more a year, and draw only a quarter of UI benefits. Virtually all exempt workers are unemployed because of lack of work. For non-exempt auto workers, on the other hand, lack of work is still the most prevalent reason cited for being unemployed (72 percent), but quits and dismissals account for the remaining 28 percent of those out of work. These same difference between exempt and non-exempt auto workers persists for the 2005 cohort of UI applicants (not shown), with the difference in job tenure between the two groups even greater and with exempt workers likely to be out of work longer than before.

[3] The regression models also include dummy variables for each quarter and for each county in which the UI claimant made a claim.

Table 1: Characteristics of Michigan Workers Displaced from the Auto Industry and other Industries, 2001

Description	Auto Industry		Non-Exempt Workers	
	Exempt	Not Exempt	Auto	Non-Auto
Age at Filing (Years)	40.7	38.5	38.5	38.1
Male	0.672	0.637	0.637	0.605
Female	0.328	0.363	0.363	0.395
Education, None	0.007	0.005	0.005	0.006
Education, Less than High School	0.119	0.155	0.155	0.141
Education, High School Grad/GED	0.629	0.547	0.547	0.498
Education, Some College	0.202	0.201	0.201	0.233
Education, Bachelor	0.029	0.059	0.059	0.080
Education, Advanced	0.014	0.034	0.034	0.041
Race, White	0.666	0.638	0.638	0.694
Race, African American	0.171	0.177	0.177	0.153
Race, Asian	0.019	0.023	0.023	0.011
Race, Native Amer, Pac Islander	0.003	0.006	0.006	0.007
Race, Unknown	0.140	0.156	0.156	0.135
Registered Alien	0.030	0.049	0.049	0.028
Job Search Exempt	1.000	0.000	0.000	0.000
Search Exempt & Recalled	0.709	0.000	0.000	0.000
Sep Reason, Lack of Work	0.990	0.721	0.721	0.640
Sep Reason, Quit	0.005	0.197	0.197	0.243
Sep Reason, Fired	0.004	0.073	0.073	0.108
Sep Reason, Other	0.001	0.010	0.010	0.010
Employed at Filing	0.002	0.003	0.003	0.004
Earnings in Year Before Filing	39,617	31,656	31,656	26,300
Job Tenure (Months)	103.1	56.5	56.5	37.3
Total Weeks of UI Drawn	3.3	14.3	14.3	13.8
UI Compensation Received	867	3,881	3,881	3,438
Exhaustion Rate if Monetary Valid	0.004	0.264	0.264	0.271

Source: Michigan Unemployment Insurance Administrative records

Comparing non-exempt auto workers with their non-exempt counterparts in other industries, we find that even though auto workers are about the same age, they are less likely to have a college degree or even to attend some college. They are also less likely to quit and be dismissed from their jobs but draw UI benefits for about the same length of time. Their job tenure is also longer, but the difference is only 19 months compared with a difference of nearly 50 months between exempt and non-exempt auto workers. Non-exempt auto workers earn 20 percent more than their counterparts from other industries, but the gap is narrower than it is between exempt and non-exempt auto workers.

B. Estimates of the Determinants of Recall

Table 2 displays the estimated effects of personal characteristics on the probability of a non-exempt UI claimant being recalled. The dependent variable takes on the value of 1 if the UI claimant is recalled and 0 otherwise. By estimating a linear probability model (LPM), the coefficients reflect the marginal effect of each characteristic on the probability of recall. Since our primary purpose is to estimate the partial effects of the various factors and since most of the explanatory variables are categorical, with the exception of entitlement length and earnings, the drawbacks of linear probability models and the differences in the coefficients obtained using logit and LPM may be minimal. [4] Furthermore, since it is generally agreed that the typical R-squared generated from LPM regressions is not an appropriate measure of goodness of fit, it is not included in the tables.

We find that most of the variables are statistically significant. For auto workers, there is a much higher probability of being recalled by motor vehicle manufacturers than by parts manufacturers (16.9 percentage points higher). In addition, older workers (45 years of age and older) are more likely to be recalled in the auto industry than mid-age workers (25-44). For non-auto industries, younger workers (24 years of age or younger) are more likely to be recalled while older workers are less likely. However, the magnitudes of the coefficients are small. For both auto workers and non-auto workers, attaining post-secondary education does not appear to help being recalled, and may even hurt. However, for both groups, not having a high school education reduces the probability of being recalled. Having more tenure increases the probability of recall for both auto and non-auto workers, and the effect of 5 or more years of tenure is nearly twice as large for auto workers as it is for non-auto workers.

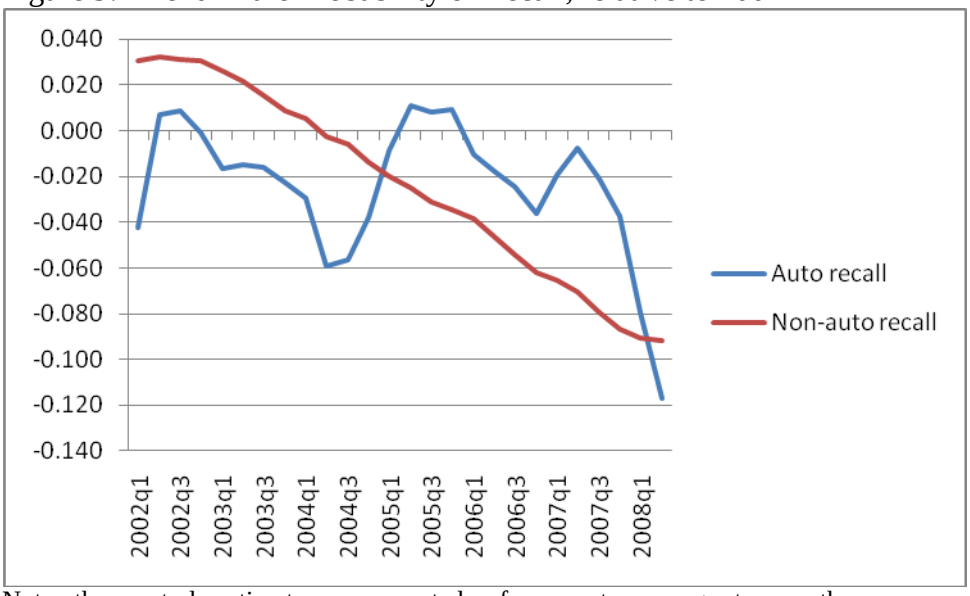
[4] Wooldridge (2002) states in his textbook that the linear probability model "often seems to give good estimates of the partial effects on the response probability near the center of the distribution of x" (p. 455). He adds that "if the main purpose is to estimate the partial effect of x on the response probability, averaged across the distribution of x, then the fact that some predicted values are outside the unit interval may not be very important" (p. 455). Wooldridge goes on to assert that "the case for the linear probability model is even stronger if most of the explanatory variables are discrete and take on only a few values." Furthermore, if the model contains dummy variables for mutually exclusive and exhaustive categories, as ours does, then the linear probability model is completely general, and "we need not worry about fitted probabilities less than zero or greater than one." See Jeffrey M. Wooldridge, *Econometric Analysis of Cross Section and Panel Data*, Cambridge, MA: MIT Press, 2002.

Table 2: Recall to prior-Employer by Industry

Description	Auto Parameter Estimate	Auto t-Statistic	Non-Auto Parameter Estimate	Non-Auto t-Statistic
Intercept	-0.394	-35.95	-0.140	-61.45
Age 24 or Less	-0.016	-5.43	0.008	13.79
Age 45 or Older	0.006	3.91	-0.005	-11.56
Gender, Male	-0.013	-8.20	-0.018	-42.07
Education, None	-0.057	-4.68	-0.023	-5.48
Education, Less than High School	-0.020	-8.77	-0.022	-39.15
Education, Some College	-0.011	-6.03	-0.002	-3.82
Education, Advanced	-0.084	-16.76	-0.019	-19.86
Race, Black	-0.030	-14.40	-0.008	-11.89
Asian	-0.037	-7.49	0.026	13.15
Native Amer/Alaskan/Haw/Pac Isl	-0.073	-6.82	-0.015	-7.55
Unknown	-0.027	-14.74	0.000	0.78
Registered Alien	-0.048	-11.94	-0.031	-25.81
Requested Tax Withholding	-0.076	-36.95	-0.027	-58.81
Separation, Quit	-0.404	-144.42	-0.166	-317.07
Separation, Fired/Discharged	-0.423	-102.28	-0.169	-242.21
Separation, Other	-0.363	-30.15	-0.139	-63.08
Job Tenure, 1-5 Years	0.022	9.31	0.018	38.55
Job Tenure, 5 Years or More	0.111	45.64	0.063	112.53
Employed at Filing	0.043	5.03	0.097	36.69
Monetary Valid UI Claim	0.369	98.27	0.123	173.82
Weekly Benefit Amount ($10)	0.002	10.73	0.002	73.56
Entitlement Length (Weeks)	0.014	32.84	0.006	81.25
Avg Qtrly Earnings, T-3..T-6)	0.004	26.56	0.002	42.02
Quarters with Earnings, T-3..T-6	0.006	3.85	0.011	39.40
Employment Growth, BYB-1 to BYB+(2,4)	-0.382	-7.88	0.129	17.65
NAICS 3361	0.169	83.59		

In addition to personal characteristics and employment history, the model also included quarterly dummy variables to estimate the trend, relative to 2001, in the probability of recall holding the other factors constant. The probablity of recall trends are down during this period for both auto and non-auto workers. The non-auto workers experienced a steady decline in the likelihood of being recalled, whereas the auto workers experienced a rebound in 2005 but still ended up in 2008 12 percent points below the recall probability in 2001, as shown in figure 9.

Figure 9: Trend in the Probability of Recall, relative to 2001



Note: the quarterly estimates are presented as four-quarter averages to smooth the large quarterly fluctuations.

C. Estimates of the Determinants of Reemployment

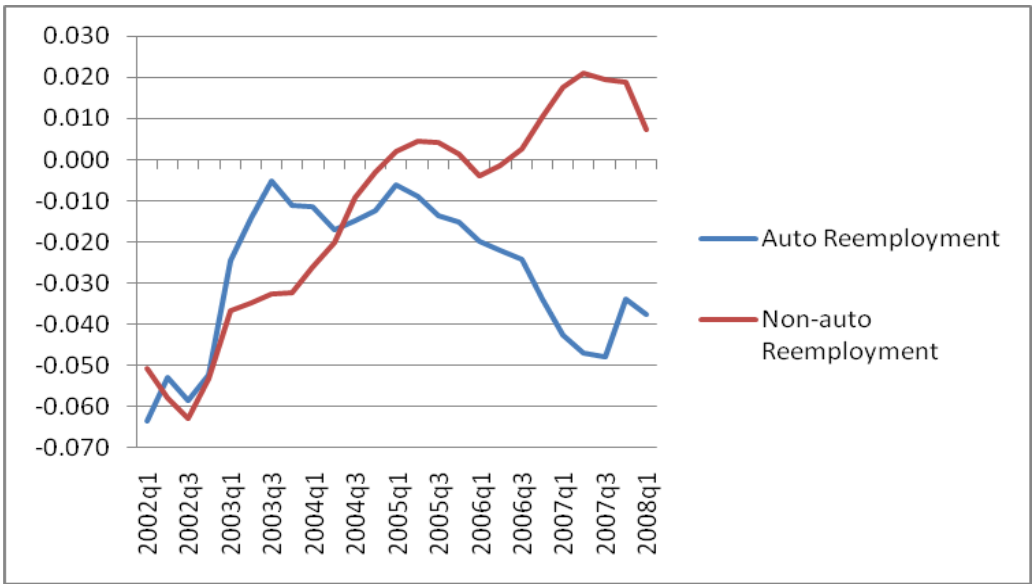
The estimated effects of factors on the probability of reemployment for non-exempt auto and non-exempt non-auto workers are displayed in Table 3. As with recall, auto workers who were previous employed in the motor vehicles manufacturing sector (3361) have a higher probability of being reemployed than those in the parts industry (3363). The difference is 7 percentage points. For both auto and non-auto workers, it appears that the younger, less tenured worker is more likely to be reemployed than the older more tenured worker. Those without a high school diploma are less likely to be reemployed, while post-secondary education appears to be detrimental to reemployment, for both groups of workers.

Table 3: Reemployment by Industry of Prior Employment

Description	Non-exempt Auto Parameter Estimate	t-Statistic	Non-exempt Non-Auto Parameter Estimate	t-Statistic
Intercept	0.516	46.04	0.595	185.84
Age 24 or Less	0.010	3.23	0.031	38.83
Age 45 or Older	-0.047	-24.80	-0.040	-75.67
Gender, Male	0.006	3.40	-0.003	0.92
Education, None	-0.038	-2.58	-0.099	-17.50
Less than High School	-0.024	-9.44	-0.019	-24.36
Some College	-0.010	-4.77	-0.006	-7.54
Bachelor Degree	-0.049	-11.01	-0.034	-27.59
Advanced	-0.048	-8.73	-0.030	-19.15
Race, Black	0.036	13.90	0.017	19.42
Asian	0.019	3.54	-0.015	-7.78
Native Amer/Alaskan/Haw./Pac Isl	-0.027	-2.43	-0.003	-1.15
Unknown	0.030	14.35	0.036	59.05
Registered Alien	-0.024	-5.39	0.008	8.14
Requested Tax Withholding	-0.028	-12.75	-0.013	-15.74
Separation, Quit	-0.139	-54.31	-0.111	-128.36
Separation, Fired/Discharged	-0.130	-34.86	-0.099	-82.46
Separation, Other	-0.206	-18.86	-0.117	-34.44
Job Tenure, 1-5 Years	-0.027	-11.18	-0.038	-68.84
Job Tenure, 5 Years or More	-0.054	-20.50	-0.030	-55.55
Employed at Filing	0.075	7.26	0.072	20.48
Monetary Valid UI Claim	0.153	36.02	0.116	87.04
Weekly Benefit Amount ($10)	0.001	5.39	0.002	36.07
Entitlement Length (Weeks)	0.003	6.77	-0.004	-37.75
UI Beneficiary but Not Exhaustee	0.115	39.08	0.155	147.64
UI Exhaustee	-0.306	-93.41	-0.227	-221.16
Avg Qtrly Earnings, T-3..T-6)	0.001	5.22	-0.001	-16.68
Quarters with Earnings, T-3..T-6	0.016	10.06	0.023	60.36
Emp. Growth, BYB-1 to BYB+(2,4)	-0.158	-2.86	0.051	4.71
NAICS 3361	0.070	27.33		

We also tracked the trend in the probability of reemployment over the time period by estimating quarterly dummy variables. Figure 10 displays trends for both auto and non-auto workers using a four-quarter moving average of the estimated quarterly coefficients. The probability of reemployment for workers outside the auto industry steadily climbed, presumably as conditions in other industries improved after the 2001 recession. The auto industry followed suit until 2003 when the probability of reemployment plateaued and then started to drop shortly thereafter.

Figure 10: Trend in the Probability of Reemployment for Non-exempt Workers, Relative to 2001



Note: the quarterly estimates are presented as four-quarter averages to smooth the large quarterly fluctuations.

D. Estimates of the Determinants of Retention

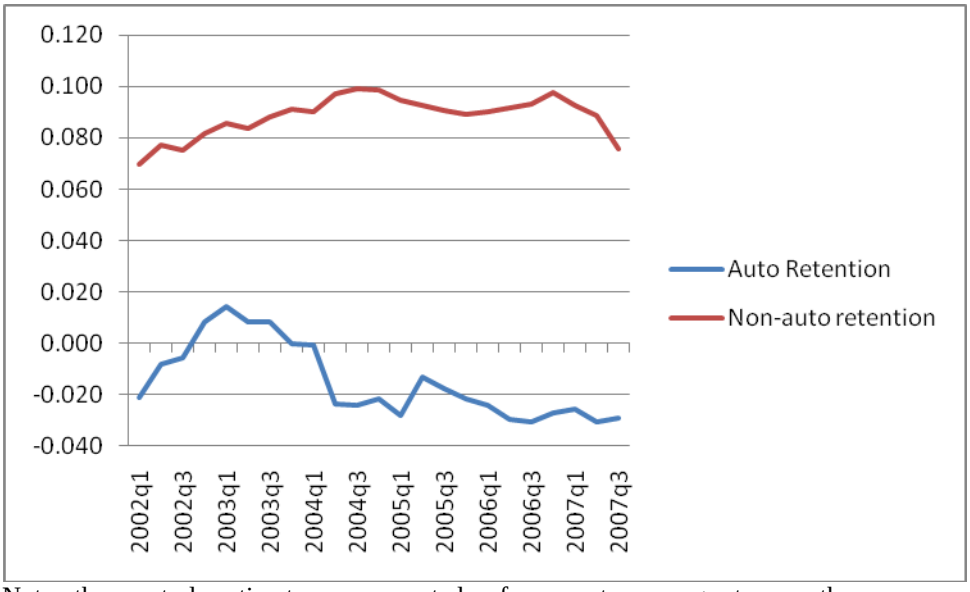
Estimated effects of factors on job retention (four quarters of employment after returning to work) are displayed in Table 4. Unlike recall and reemployment, the probability of retention is no different between motor vehicle manufacturers (3361) and parts manufacturers (3363). Also different between retention and the other two probabilities is the importance of post-secondary education. Some college is important for auto workers in retaining employment, although only slightly (a coefficient of 0.006). For non-auto workers, post-secondary education is even more important; the coefficients on "some college," a BA degree, and even advanced degrees are all positive and statistically significant. Interestingly, tenure is important for retention in the non-auto sectors, but is detrimental in the auto sectors, but older workers (45 or older) are less likely to be retained.

Table 4: Job-Retention Among Those Reemployed in Prior Industry

Description	Non-exempt Auto Parameter Estimate	t-Statistic	Non-exempt Non-Auto Parameter Estimate	t-Statistic
Intercept	0.655	48.77	0.473	122.25
Age 24 or Less	-0.005	-1.46	0.004	4.50
Age 45 or Older	-0.030	-14.41	-0.029	-39.54
Gender, Male	-0.006	-3.06	-0.027	-36.48
Education, None	-0.014	-0.83	-0.048	-6.25
Less than High School	-0.023	-7.77	-0.034	-35.74
Some College	0.006	2.41	0.010	12.24
Bachelor Degree	0.000	0.00	0.014	9.79
Advanced	-0.005	-0.79	0.014	8.25
Race, Black	-0.006	-2.05	-0.014	-12.65
Asian	0.029	4.73	0.005	1.53
Native Amer/Alaskan/Haw/Pac	-0.016	-1.21	-0.015	-4.41
Unknown	0.012	5.00	0.005	6.92
Registered Alien	-0.016	-3.17	-0.002	-1.19
Requested Tax Withholding	-0.022	-8.61	-0.003	-3.30
Separation, Quit	-0.133	-42.74	-0.053	-58.71
Separation, Fired/Discharged	-0.115	-25.99	-0.063	-53.82
Separation, Other	-0.109	-7.35	-0.047	-12.07
Job Tenure, 1-5 Years	-0.005	-1.70	0.003	4.29
Job Tenure, 5 Years or More	-0.022	-7.38	0.009	9.52
Employed at Filing	0.001	0.06	0.026	5.72
Monetary Valid UI Claim	0.088	17.57	0.087	56.42
Weekly Benefit Amount ($10)	0.000	1.72	0.001	15.22
Entitlement Length (Weeks)	0.003	5.74	0.003	25.14
UI Beneficiary but Not an Exhaustee	-0.013	-4.03	0.000	0.11
UI Exhaustee	-0.160	-40.05	-0.106	-85.26
Avg Qtrly Earnings, T-3..T-6)	0.003	13.65	0.002	18.59
Quarters with Earnings, T-3..T-6	0.022	12.30	0.031	68.08
Employment Growth, BYB-1 to BYB+(2,4)	-0.014	-0.24	-0.039	-3.06
NAICS 3361	0.002	0.54		

The trends in retention probabilities are shown in Figure 11. A significant gap in the retention probabilities persists between the two groups of workers throughout the entire period. Retention jumped by 7 percentage points from the 2001 level for non-auto workers, while it declined by two percentage points for auto workers. Afterward, non-auto retention trended upward slightly until 2004 where it remained relatively constant until coming back down to the 2001 level toward the end of 2007. Auto worker retention rebounded by nearly four percentage points quickly after 2001 but steadily lost ground immediately after that and by the middle of 2007 ended up lower than in 2001.

Figure 11: Trend in the Probability of Retention for Non-exempt Workers, Relative to 2001

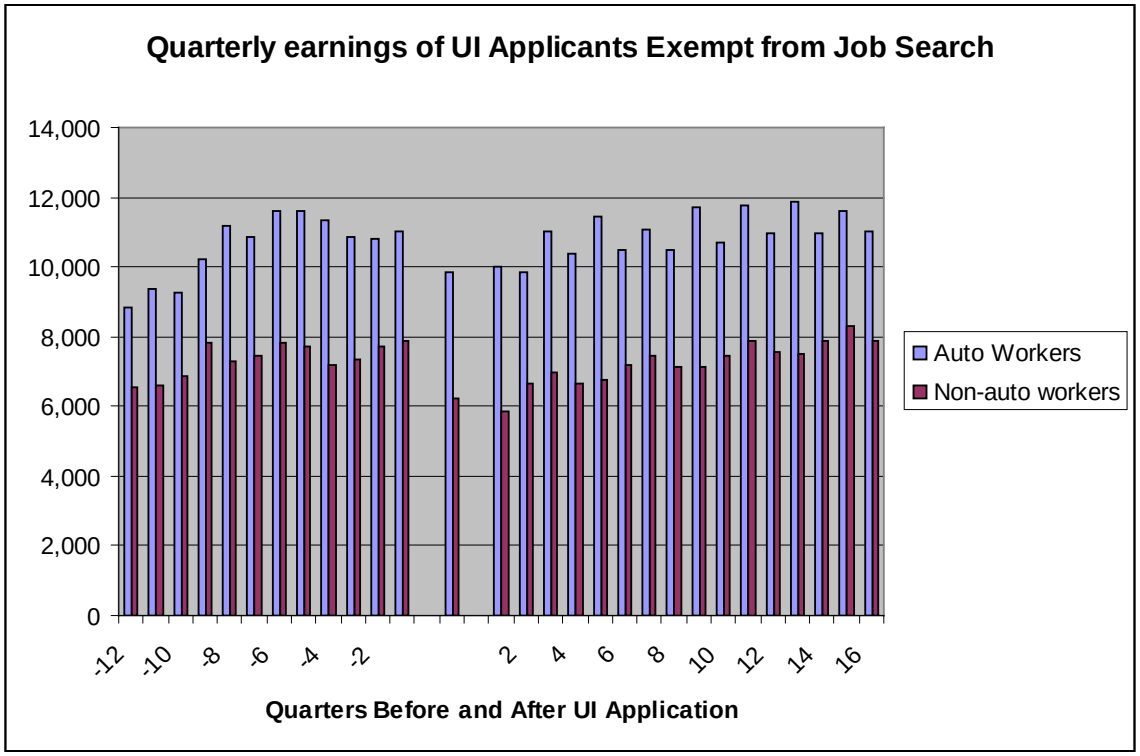


Note: the quarterly estimates are presented as four-quarter averages to smooth the large quarterly fluctuations.

E. Earnings Differentials

As shown in Figure 12, the quarterly earnings of exempt auto workers before and after filing for UI are considerably higher than the earnings of exempt workers from other industries. Over the time period included in Figure 6, auto workers earned nearly 50 percent more than their non-auto counterparts. Moreover, after a dip of 10 percent the quarter following UI application, the earnings of auto workers fully recovered. In fact, for the 12 quarters after applying for UI, their earnings were 2 percent higher than their earnings in the 12 quarters prior to UI application (in nominal terms). Workers from other industries, on the other hand, experienced a larger initial dip in earnings (26 percent) and were 4 percent behind their pre-application earnings levels for that same time period.

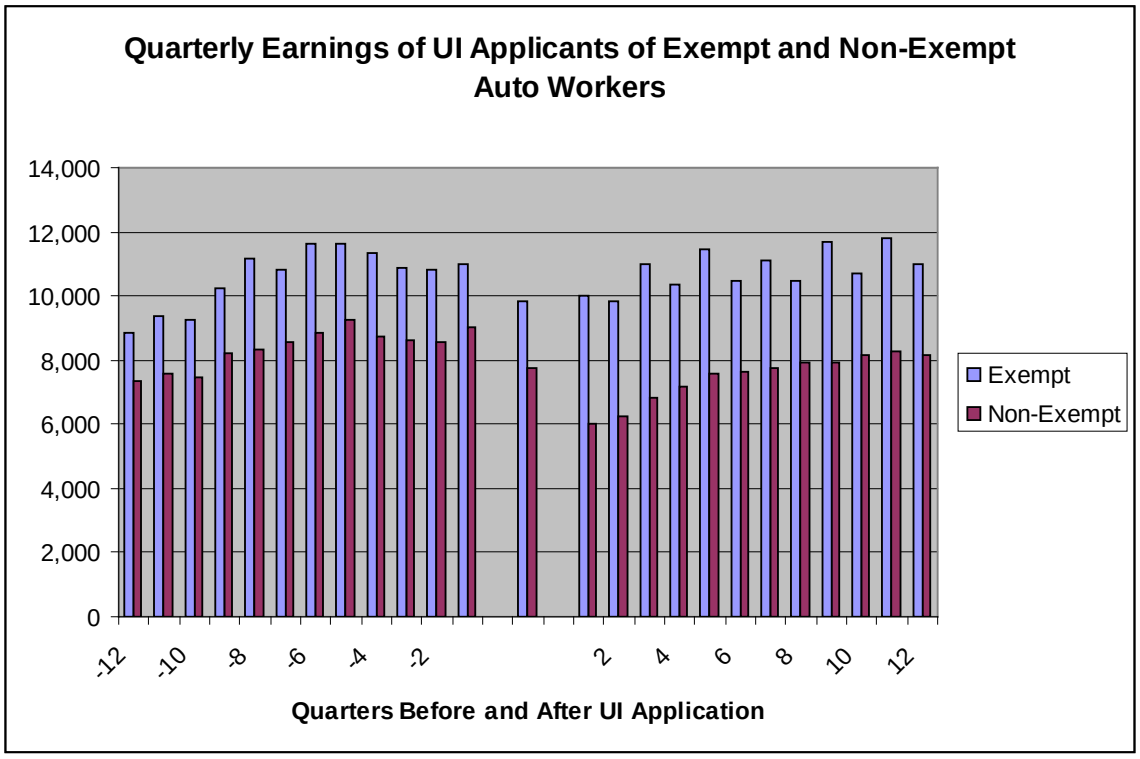
Figure 12:



Source: Author's analysis of UI Administrative Data.

Non-exempt workers did not fare as well as their exempt counterparts, in either the auto industry or other industries. For auto workers as shown in Figure 13, the earnings dip after applying for UI was more severe than for exempt workers. Earnings from the first quarter before application to the first quarter after application dropped 34 percent for non-exempt auto workers and 9 percent for exempt auto workers. Over a longer period, in this case 12 quarters before and 12 quarters after UI application, total nominal earnings of non-exempt auto workers fell 11 percent while total nominal earnings of exempt auto workers increased 2 percent.

Figure 13:

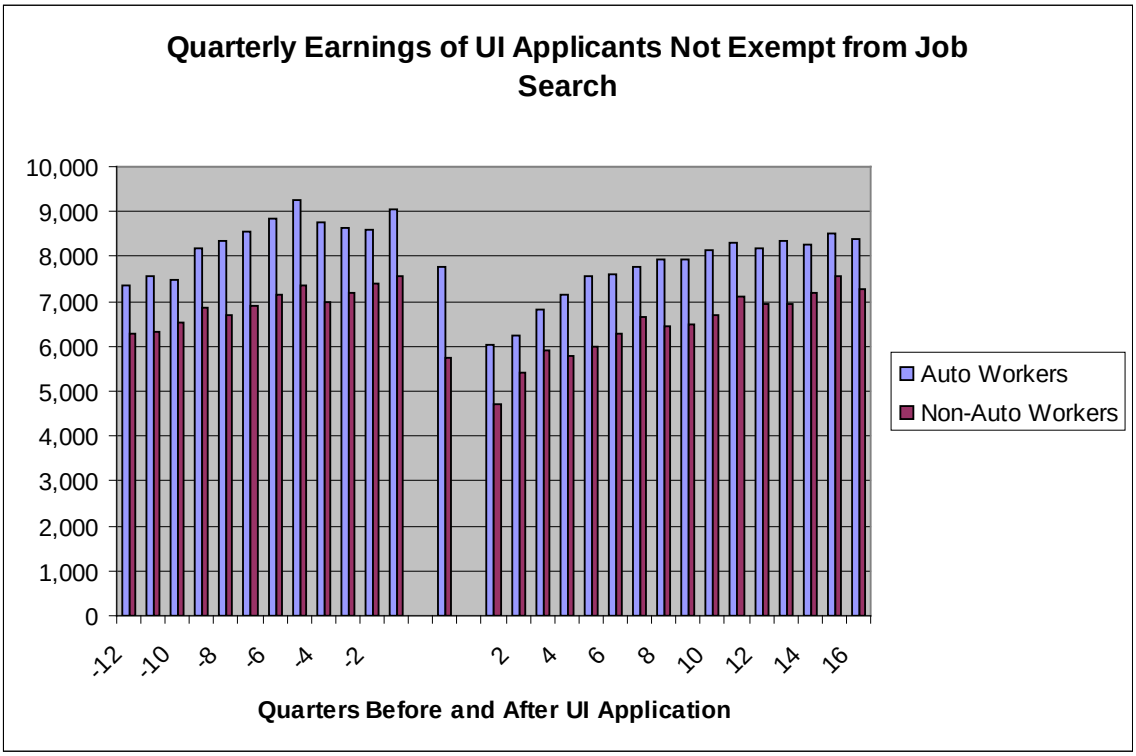


Source: Author's analysis of UI Administrative Data.

However, in more recent years (not shown in the graphs), auto workers' earnings were more severely impacted by layoffs than were earnings of their non-auto counterparts. For those applying for UI benefits in 2005, the decline in total earnings 12 quarters after UI application, compared with the 12 quarters before, was 17 percent for auto workers and 10 percent for workers from other industries.

Earnings of non-exempt workers from the auto industry and from other industries followed similar paths, as evident in Figure 14. For non-auto workers, the earnings dip immediately before and after UI application was 38 percent, compared with 34 percent for auto workers. Both groups of workers regained earnings during the first 12 quarters after UI application, but did not fully recover in terms of total nominal earnings compared with the 12 quarters prior to applying for UI. Both groups experienced an 11 percent decline in total nominal earnings.

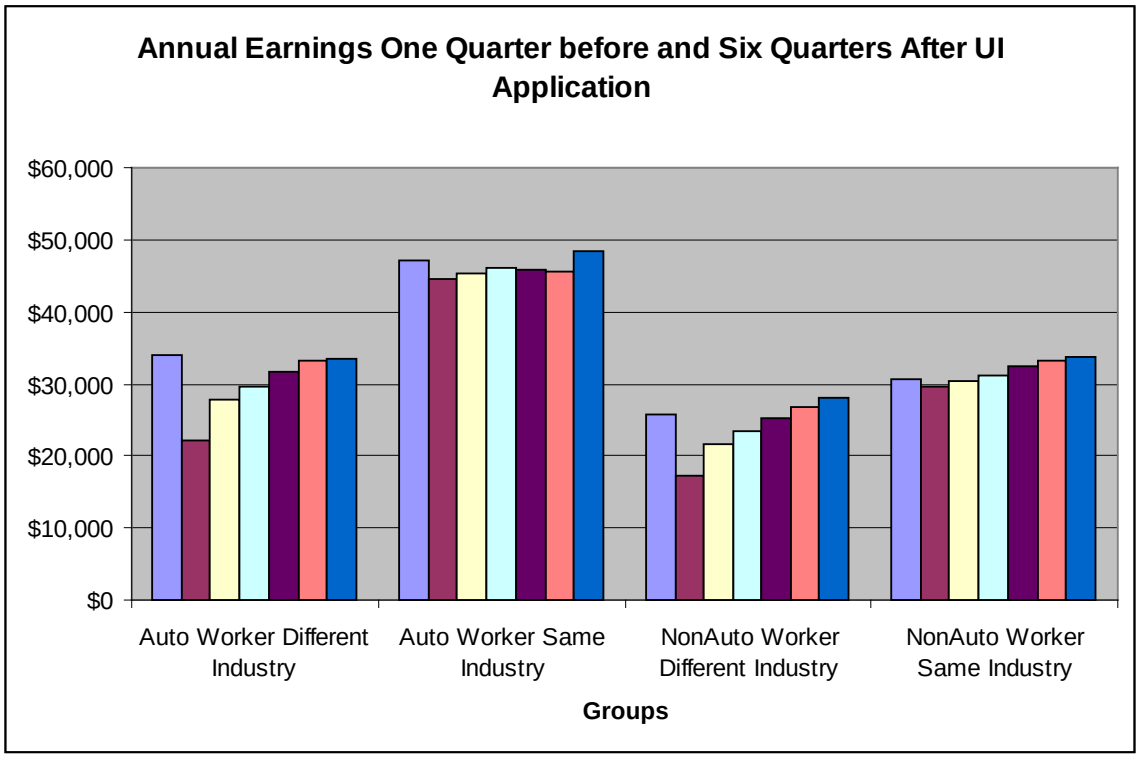
Figure 14:



Source: Author's analysis of UI Administrative Data.

The likelihood of returning to the same industry after displacement has a significant effect on future earnings compared with past earnings. As shown in Figure 15, the decline in earnings for those auto workers returning to the auto industry is 4 percent, compared with a decline in earnings of 34 percent for those who have to change industries. The same large differential is also found for those outside the auto industry. For both cases, earnings eventually converge to their pre-displacement levels, but the earnings of auto workers who found jobs in other industries were not completely restored whereas earnings of the other three groups were restored and even exceeded previous levels.

Figure 15:



Source: Author's analysis of UI Administrative Data.

F. Determinants of Quarterly Earnings

Table 5 presents the estimates of the effect of personal characteristics and employment history on quarterly earnings of reemployed auto and non-auto workers who were retained for one year. Most of the estimates are consistent with typical earnings models.[5] In the case of both groups of workers, reemployment earnings are higher for those with more education. Workers in the mid-age range are slightly better compensated than younger workers and older workers. If a worker quits voluntarily or is fired or discharged, their reemployment earnings are lower than if they were involuntarily laid off because of lack of work. Finally, those auto workers in motor vehicle manufacturing (3361) earn a $2,100 premium over those in the parts manufacturing sector (3363).

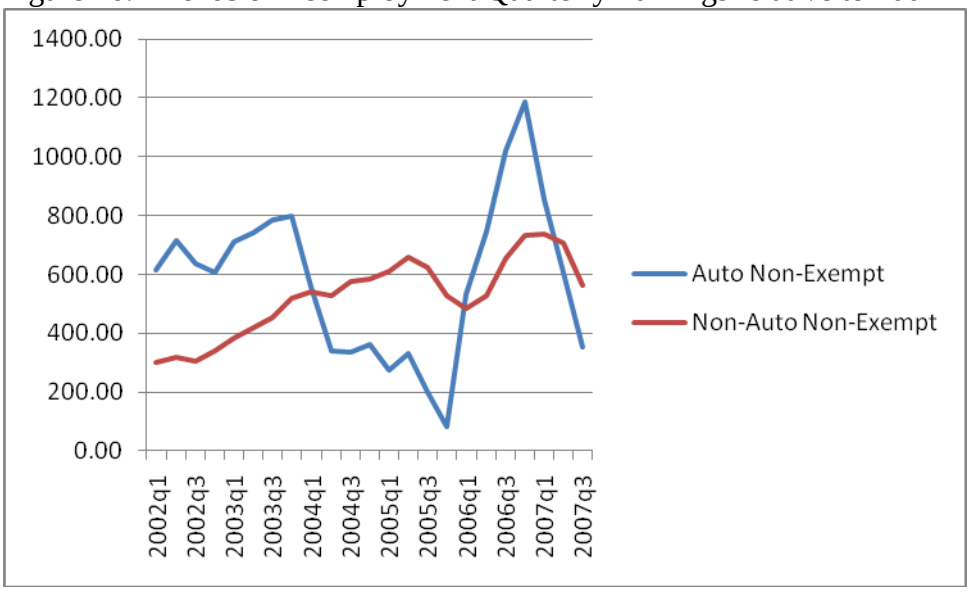
[5] Most earnings models are estimated in log form. We chose to estimate a linear model instead.

Table 5: Average Quarterly Reemployment Earnings among those Reemployed who also retain Employment

Description	Non-exempt Auto Parameter Estimate	Non-exempt Auto t-Statistic	Non-exempt Non-Auto Parameter Estimate	Non-exempt Non-Auto t-Statistic
Intercept	478.50	1.89	32.05	0.65
Age 24 or Less	-1.24	-0.02	-43.61	-3.91
Age 45 or Older	-229.10	-7.35	-329.60	-43.73
Gender, Male	616.12	20.25	557.66	69.03
Education, None	737.58	3.03	63.96	0.74
Education, Less than High School	-373.04	-8.32	-278.70	-26.25
Education, Some College	209.26	5.99	150.17	18.21
Education, Bachelor Degree	922.58	12.42	702.91	49.88
Education, Advanced	802.47	8.68	774.71	45.36
Race, Black	-172.50	-4.10	-250.37	-20.84
Asian	-403.17	-4.46	394.05	10.90
Native Amer/Alaskan/Hawaiian/Pac Isl	-358.54	-1.78	-90.65	-2.49
Unknown	-306.06	-8.73	-125.28	-15.22
Registered Alien	-281.87	-3.76	61.95	2.93
Requested Tax Withholding	-406.86	-10.41	-236.98	-29.00
Separation, Quit	-1617.20	-32.10	-825.94	-83.55
Separation, Fired/Discharged	-1401.92	-19.65	-886.13	-68.04
Separation, Other	-1992.80	-8.48	-649.28	-15.01
Job Tenure, 1-5 Years	-365.18	-8.53	-491.45	-61.95
Job Tenure, 5 Years or More	-182.30	-4.00	-597.65	-62.65
Employed at Filing	311.19	1.93	319.74	6.86
Monetary Valid UI Claim	1912.60	21.45	1257.41	59.10
Weekly Benefit Amount ($10)	57.87	17.03	53.15	84.20
Entitlement Length (Weeks)	48.81	5.70	29.26	19.49
UI Beneficiary but Not an Exhaustee	-1053.85	-22.59	-254.65	-21.80
UI Exhaustee	-2565.10	-41.78	-1330.43	-98.22
Avg Qtrly Earnings, T-3..T-6)	0.60	180.39	0.61	642.59
Quarters with Earnings, T-3..T-6	-325.42	-8.43	-169.37	-25.17
Emp. Growth, BYB-1 to BYB+(2,4)	-286.84	-0.34	34.36	0.25
Auto Industry, NAICS = 3361	2100.23	43.84		

We also included quarterly dummy variables in the earnings regression in order to track the trends during the time period included in the analysis, adjusted for personal factors and employment history. As shown in Figure 16, the reemployment earnings of non-auto workers gradually increased during the decade except for a dip in 2005 and then another dip right before the onset of the 2007 recession. Reemployment earnings of auto workers were quite erratic during this period, with a large spike in the latter part of 2006 but then a sharp fall going into the 2007 recession.

Figure 16: Trends of Reemployment Quarterly Earnings relative to 2001



V. Summary

This paper presents a preliminary view of the various paths that displaced Michigan auto workers (and their non-auto counterparts) have followed during the significant restructuring of the auto industry within Michigan and across the country during the past decade. Even with the significant restructuring of the auto industry, it appears that reemployment and retention rates are no worse in Michigan's auto sectors than in other sectors. Auto workers have higher recall rates and reemployment rates than workers in other sectors in Michigan. Moreover, auto workers are more likely to return to the same industry (the two auto sectors 3361 and 3363) in which they were employed prior to applying for UI benefits than workers in other sectors. Earnings of auto workers nearly returned to pre-layoff levels after a year or so if the worker remained employed. As the decade progressed and restructuring in the auto industry deepened, only the likelihood of recall decreased significantly for both auto and non-auto workers; the probability of reemployment and retention did not exhibit the same downward trend.