

**The Impact of Restructuring in the Steel Industry  
on Local Labor Markets**

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## **I. Introduction**

Inter-industry employment shifts are a frequently reason cited for the growth in earning inequality in the U.S.(Katz and Murphy, 1992, Bound and Johnson, 1992, and Harrison and Bluestone, 1988). Earnings in the shrinking manufacturing sectors were higher, on average, and less disperse than in the expanding trade and service sectors. Greater earnings inequality due to industry shifts, however, tends to be more pronounced in regions where declining sectors employ many workers. Recent research by Beeson, Shore-Sheppard and Shaw (2001) documents the effect of the decline in the American steel industry on the communities in which it is over represented. They report an increase in wage inequality in these regions as reduced employment in steel spilled over onto other industries.

The research in this paper builds upon Beeson et. al. to document the effect of the drop in steel employment on the earnings distribution in one region where it had been the mainstay of the local economy—Pittsburgh, PA. The one region focus provides insights obscured by aggregate data that combines the diverse experiences of many local labor markets. In national samples of workers, widespread employment increases in one region may be offset by large localized reductions in others, and cross-sectional analyses of many local markets average the effects of mild fluctuations with the effects of more severe structural changes. The response of workers to large-scale layoffs associated with mill closures, with no chance of recall, may be different from their reactions to temporary layoffs at a single plant. Migration and retirement decisions are more likely to be affected by permanent job loss. Young people in depressed labor markets may delay entry into the labor market, enter with different skills, or move elsewhere to find work. Focusing on Pittsburgh allows us to examine how one labor market adjusted to severe structural change. While the experiences of workers in Pittsburgh may be unique because of the regional dependence on high-wage steel jobs, the fortunes of many towns and cities rely on the success of a single industry. Observing how this local labor market was affected by a

severe shock to its dominant industry helps us to understand more about how these local labor markets work.

This study benefits from a unique data set drawn from very accurate administrative data for a 5 percent sample of area workers covered by Pennsylvania Unemployment Insurance (UI) between 1975 and 1991. We combine these data with kernel density estimators and earnings decompositions techniques developed by DiNardo, Fortin, and Lemieux (1996) to assess the importance of industry shifts, within industry earnings changes, and local labor market dynamics on the earnings distribution of workers in the Pittsburgh region. The availability data over this time allows us to examine the short and long-term effects of industrial restructuring on the distribution of earnings. Unique worker identifiers also permits us to investigate how shocks to the local economy influenced the labor market experiences of workers caught in the wake of structural change. Worker identifiers also shows who enters and leaves local employment and how their employment and earnings changed before, during and after the depression-like business conditions in the early 1980s. Although earnings data is available from 1975 through 1991, we can only identify workers leaving the sample when no earnings are reported in the calendar year. Hence, we consider a study period from 1978 to 1989.

## **II. Background and Previous Literature**

The 1980s was a remarkable period for the Pittsburgh economy. In July 1979 employment in the Pittsburgh region reached a peak of 977,600 and the unemployment rate was 5.1 percent.<sup>1</sup> By early 1983, employment fell by 14 percent to 837,300 and the unemployment rate tripled to 17.1 percent. In the following years the local economy recovered along with the national economy, and by the end of the

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<sup>1</sup> The labor force statistics are as reported by the Bureau of Labor Statistics. See Labor Market Letter—US Department of Labor.

decade the local unemployment rate was actually less than the national rate.<sup>2</sup> However, the lower unemployment rate was not accompanied by an increase in employment to its pre-recession high. In 1987, when the local unemployment rate fell below the national rate, employment was 8 percent less than its previous high, and at the end of the decade employment was still 3.5 percent less than its July 1979 peak. Over the same period, national employment grew by 17.7 percent.

Employment changes coincided with important shifts in the industrial distribution of jobs. Historically, the durable manufacturing sector, and especially the steel-dominated primary metals industry were important components of the local economy. In 1979, over 250,000 jobs were in durable goods production and more than 100,000 were in primary metals. By the first quarter of 1983, employment in durable manufacturing and primary metals had fallen by half to 124.7 and 41.1 thousand respectively. The subsequent improvements in the Pittsburgh economy were not due to employment gains in these industries. Durable manufacturing employment dropped to 91,400 by the end of 1987, and only 28,600 of these jobs were in primary metals. There was also a steady increase in trade and service sector employment during this time.

Changes in the level and industrial composition of employment accompanied changes in the distribution of earnings. Figure 1 presents the 1978 and 1989 distributions of the natural log of quarterly earnings in the Pittsburgh labor market.<sup>3</sup> Earnings include hours and weeks worked along with wage rates and, as such, is more variable than hourly wage, but includes important component of earnings obscured by the wage rate. It also has the advantage of reporting the influence of unemployment spells, but quarters without earnings are omitted. Earnings losses were greatest near the middle of the earnings

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<sup>2</sup> In 1984 the Pittsburgh Standard Metropolitan Statistical Area (SMSA) was replaced by the Primary Metropolitan Statistical Area (PMSA), and Fayette County replaced Beaver County, which became a separate labor market area. Unless otherwise noted, references to the Pittsburgh region are to the 1980 SMSA which included Allegheny, Beaver, Washington and Westmoreland Counties.

<sup>3</sup> Data and method used to generate this figure are discussed in data section.

distribution. The peak of the 1978 log earnings was 8.754 while the peak of the 1989 earnings was 8.252, representing a 39 percent decline in modal real earnings. Figure 1 also shows that the upper tail of the earnings distribution was relatively unchanged.

Several studies, most notably Jacobsen, Sullivan, and LaLonde (1993), have examined the plight of workers dislocated from their jobs during this period of industrial restructuring.<sup>4</sup> Jacobson, et. al use the same data as used in this study to show that earnings losses during the 1980s for those displaced from the steel industry were considerably higher than those displaced from other industries. Even in the fifth year after displacement, former steel workers suffered earnings losses that were roughly twice those of individuals displaced from other durable manufacturing industries. How these earnings losses translated into changes in the overall earnings distribution depends on the distribution of earnings for the displaced steel workers relative to others both before and after the displacement.

The losses of displaced workers are correlated with local economic conditions (see Howland 1988, Howland and Peterson 1988, and Carrington 1993), and a number of studies have examined the effects of industrial restructuring and changes in demand conditions on regional earnings inequality. These studies usually include variables measuring overall employment or unemployment rates, and the share of employment in various industries, particularly manufacturing (or durable and non-durable goods manufacturing separately), in an equation exploring the determinants of area wage or income inequality. Karoly and Klerman (1994) examine state wage inequality between 1973 and 1988. They find that the variance of log wages is lower in states with a larger fraction of employment in manufacturing. This result, however, is not robust to the state fixed effects. Cloutier (1997) takes a similar approach in examining family income inequality in metropolitan areas in 1979 and 1989 and finds evidence of lower levels of inequality in areas with higher shares of manufacturing employment.

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<sup>4</sup> Other studies include Addison and Portugal 1987, Kletzer, 1989, and Topel 1990.

Levernier, Partridge, and Rickman (1998) use county data from the 1990 Census and include industrial employment shares and an index of structural change to examine family income inequality. The index, which is the sum of absolute changes in one-digit industry employment shares between two periods captures shifts in industrial employment. In addition to the common result that higher levels of manufacturing employment are associated with lower levels of income inequality, they find that counties that recently experienced greater industrial shifts have higher levels of family income inequality. Borjas and Ramey (1995) examine how industrial composition affects the college wage premium (relative to either high school graduates or dropouts). They focus on the impact of trade and domestic competition, and following their theoretical model, separate manufacturing industries into four categories: trade-impacted concentrated manufacturing (including steel, motor vehicles, farm equipment, glass, and appliances, among others), trade-impacted competitive manufacturing, other durable goods manufacturing, and other manufacturing. They estimate a negative relationship between the proportion of employment in trade-impacted concentrated industries and the return to college, even when metropolitan statistical area (MSA) and year fixed effects are included. This relationship holds when only workers outside these industries are examined, indicating the presence of spillovers from the trade-impacted concentrated manufacturing sector to other sectors within a metropolitan area. Their results indicate that between 12 and 14 percent of the increase in returns to college between 1976 and 1990 can be explained by the decline in employment in trade-impacted concentrated manufacturing industries.<sup>5</sup>

### **III. Empirical Specification**

We examine the sources of rising earnings inequality in the Pittsburgh labor market using the nonparametric approach developed by DiNardo, Fortin, and Lemieux (1996). The spirit of this

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<sup>5</sup>Bartik (1996) uses individual panel data to examine a somewhat different question: what impact do local labor demand changes and industrial mix have on income levels among individuals whose characteristics place them in various quintiles of the income distribution. He finds evidence that local labor demand, but not the wage premium implied by the area's industrial mix, has progressive effects.

procedure is to decompose changes in the entire wage distribution as Oaxaca (1973) did for the mean wage. The procedure requires estimating counterfactual densities that would prevail if some feature of the work force had not changed.

Our interest is in how the earnings distribution changed between 1978 and 1989 and the contributions of changes in industry mix and labor force composition to the change. Let  $f(w_{89})$  be the earnings distribution in 1989, which includes hours and weeks worked along with wage rates. Define  $f(w_{89} | Z = 89)$  be the actual distribution of earnings in 1989 given the industrial distribution of employment. The change in earnings between 1978 and 1989 can be written as:

$$(1) \quad \Delta f(w) = f(w_{89}|Z=89) - f(x_{78} | Z=78).$$

Changes in earnings results from both within industry changes in earnings and employment shift between industries. Hence, we can redefine (1) as:

$$(2) \quad \Delta f(w) = [f(w_{89}|Z=89) - f(x_{89} | Z=78)] + [f(w_{89}|Z=78) - f(x_{78} | Z=78)].$$

The term  $f(x_{89} | Z=78)$  represents the counterfactual density of earnings in 1989 had the industrial distribution been preserved from its 1978 level. DiNardo, et. al. show that the counterfactual density can be written as a function of the actual density and a re-weighting function  $\omega(z)$ , as

$$f(x_{89} | Z=78) = f(x_{89} | Z=89) * \omega(z).$$

where  $z$  represents individual and labor market characteristics. The re-weighting function accounts for changes in the industrial distribution of employment between the two years. It can be easily calculated for each industry as the ratio of the industry's share of employment in 1978 as a fraction of its share in 1989, i.e.

$$\omega(z) = \Pr(Z_j = 1 | 78) / \Pr(Z_j = 1 | 89)$$

where  $Z_j$  is an indicator function equal to 1 if employed in industry  $j$ . The estimate of the density function then follows as:

$$(3) \quad f(w_{89} | Z=78) = 1/(nh) \sum_{i=1}^n K[(w - W_i)/h]$$

where  $n$  is the sample size,  $h$  is the bandwidth,  $W_i$  are the earnings of those in the sample, and  $K$  is the kernel function.<sup>6</sup>

The kernel function weights observation based on how close they are to the point of interest,  $w$ , and observations closer to  $w$  receive a higher weight. In the graphs below, we represent  $w$  by the log of quarterly earnings and the density function is calculated for 1000 equally spaced values  $w$ .

The counterfactual distributions simply show the impact of a change in the distribution of employment shares given the existing wage distribution in 1989. The weight for steel workers, for example,  $\psi(z) = \text{steel industry share of 1978 employment} / \text{steel industry share of 1989 employment}$  and similar weights are used of other industries. Similarly, changes in the earnings of existing workers and new entrants into the region can be adjusted for industry composition. The DiNardo methodology has the important advantage that it can show the impact of various changes on the earnings at all points of the distribution, and not just the mean as is typically presented.

## IV. Data

### A. Data Sources and Construction.

The data come from a 5 percent sample of workers covered by the Pennsylvania Unemployment Insurance (UI) Program between 1975 and 1991. Administrative records reporting quarterly earnings for workers covered by the UI program are merged with annual employer information including size, location, and four-digit SIC industry. Information from UI claims, such as a worker's zip code, are also included. Many workers report multiple employers in a year. We define a worker's principal employer as the one paying the most to the worker. We limit our attention to workers employed in the Pittsburgh Metropolitan Area, as defined in 1980, based on the location of the principal employer.

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<sup>6</sup> Estimation in STATA which uses the Epanechnikov function.

These data have several important advantages over alternative data sets and are especially well suited for the analysis of local labor markets. The sample contains earnings for approximately 40,000 earnings records per year for workers in the Pittsburgh Metropolitan area. The large number of observation from a single labor market enables us to estimate the earnings distribution much more accurately than would be possible with other data sets. The long study period also provides a clearer picture of the conditions in the local labor market before and after the events leading to plant closings and mass layoffs in the steel industry. Employment records also contain workers' social security numbers, which allows us to follow the employment histories of individual workers over time, and allowing us to identify individuals who are entering or leaving local employment providing some insight into the entry-level market and the conditions that motivate workers to leave. Moreover, these administrative data do not suffer from recall errors, misreporting nor sample selection problems which plague survey based data. Earnings records are not top coded and so provide a more accurate measure of the earnings in the upper end of the distribution. They may also more accurately report the earnings of those in the lowest percentiles of the earnings distribution who might be less likely to respond to a survey.

One potential problem with these data is that the county of operation cannot be identified for all plants. The only location recorded in the data is the employer's principal county of operation. Many employers, however, operate plants in several counties making it difficult to identify some worker's location. We address this problem related to multi-county workers as follows. First, if more than 90 percent of a firm's employment lies in a county we assign workers to the firm's principal county. Second, if less than 90 percent of the firm's employment lies in the principal county and individual plant identifiers are recorded in the data, we assign workers to the most frequent county of residence among those claiming UI benefits from the same plant. (Since many workers claimed UI benefits during this

period, there were many observations available to help locate plants). Finally, if plant identifiers are not reported for a multi-county employer no county location could be identified and workers in these firms are not included in our analysis. The most prominent omission is employment in state and federal government, where individual plants are not identified.

Another potential drawback of the data is that they do not distinguish between interstate migration, leaving the labor force, or prolonged unemployment. This can be a serious limitation if one is interested in following the experiences of individual workers following a shock to local labor markets. However, our interest is in how the local labor market adjusted after plant closings and mass layoffs, and, for this purpose, it is less important to identify where individuals went when they left the Pittsburgh market. Finally, there is little demographic information; education is not reported and sex and race are only reported for UI claimants, and for those in the data in 1976.

## **B. Employment Trends**

Figure 2 clearly shows the level of industrial employment shifts based on our sample.<sup>7</sup> Employment fell sharply in steel and other durable manufacturing industries in the early 1980s. Steel's decline continued nearly unabated during the period as the industry lost jobs even before the recession arrived and continued to lose workers after the recession ended in 1983. Similarly, many jobs were lost in other durable manufacturing sectors during and after the recession. Clearly, the national recovery during the 1980s did not spillover onto Pittsburgh's manufacturing sector. Table 1 provides more detail of industry shifts and job loss by listing total employment and employment in steel and durable manufacturing along with the shares in each industry on an annual basis from 1975 through 1991.

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<sup>7</sup> Note that fewer workers are employed in the region based on the 5 percent sample than estimated by the CPS survey. Our data includes only workers covered by the PA UI law, which is about 95 percent of all employers. A larger omission reflects the inability to identify the county of employment for workers in multi-county firms when no plant identifier is listed, for example, nearly all federal and state employees are excluded because individual plants are not identified.

Employment outside of services fell in nearly every year. While total employment in column 1 is higher at the end of the period, the growth reflects a change in coverage owing largely to government workers covered by the UI program<sup>8</sup>. Nowhere is the employment loss as large as in the steel industry, which fell from 15.4 percent of employment to just 2.6 percent.

Table 2 present employment in selected years by industry and by attachment to the local labor market. The top panel repeats the information fore selected years from Table 1. The second panel reports employment shifts for workers employed in Pittsburgh in both 1978 *and* 1989 by industry of employment in 1978. Workers with earnings at the beginning and end of the sample period reported an industrial distribution of employment that was comparable to all workers in 1978. Even workers with stronger local labor force ties - indicated by employment in both 1978 and 1989 - moved in and out of the local work force during this period. Nearly 25% of those who were employed locally in both 1978 and 1989 either did not work or worked outside of the region in 1983. Workers were more likely to stay in the region if they worked in the better-paying durable manufacturing industries. Among these workers, employment in the entire durable manufacturing sector fell by 42 percent compared of the 67 percent drop in industry employment.

The number and industrial distribution of workers entering and leaving local employment are listed in the next two panels. Entrants include both first-time entrants and reentrants employed in Pittsburgh after an absence of at least one calendar year.<sup>9</sup> Similarly, Those leaving the local employment have at least one calendar year absence from the sample. Even in 1978, before the decline of steel production, two-thirds of all entrants found employment in the service sector. Only 15.4 percent of

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<sup>8</sup> Prior to 1984, wages were only requested for government employees who claimed UI benefits. From 1984 on, wage are automatically reported regardless of a UI claim.

<sup>9</sup> To avoid complications associated with part-year employment, we count entrants the year after they appear following an absence and exits the year prior to their exiting the Pittsburgh labor market. Thus, 'entrants' in 1978 actually first appeared in the data in 1977 after an absence of at least one year. Similarly, those who leave local employment, 'exits' in 1978 last appeared in the data in 1979.

entrants worked in the durable manufacturing sector compared to 28.5 percent of all employment. During the 1980s, the share of entrants finding employment in the high-wage durable manufacturing sector fell to less than 8 percent in 1983 and less than 6 percent by 1989. This decline in durable manufacturing employment of entrants was offset by increased employment in services, and construction and transportation. The 1989 labor market also offered many more jobs to entrants than it did in earlier years.

The number of workers leaving local employment grew sharply between 1978 and 1983 before falling even more dramatically in the next period. Over 21 percent of those who last worked locally in 1979 worked in steel or other durable manufacturing in 1978. The sharp recession eliminated many jobs in durable manufacturing and increased the proportion of the industry's employment that left the region. Column 2 reports that over 10 percent of those in steel in 1983 dropped out in 1984 (326/3,012), compared to 6.5 percent in 1978. Workers in other durable manufacturing industries were also more likely to leave in 1984 than in 1979. The fraction of workers leaving local employment from jobs in the trade and service sectors increased sharply from 58 percent in 1978 to 82 percent in 1989. This follows from both an increase in this industry's share on local employment and from changes in the composition of workers leaving from the region. Drop-outs from the service sector are more likely to be younger inexperienced workers who leave local employment for jobs elsewhere. Workers who left the region in 1978 were more likely to leave a mainstream job for work in a different labor market, suffer a long spell of unemployment, or retire.

### **C. Earnings**

Much of the erosion in earnings near the center of the distribution charted in Figure 1 occurred as the economy plunged into the recession in the early 1980s. Table 3 reports quarterly log earnings from 1975 through 1991 at various points of the distribution. Median earnings fell by 15.4 percent from 1978

to 1983, while earnings at the 25<sup>th</sup> and 75<sup>th</sup> percentiles fell by 11 and 13 percent respectively. By comparison, earnings at the 10<sup>th</sup> and 90<sup>th</sup> percentiles dropped by 8 percent and 7.4 percent respectively. The recovery in the next six years did little to restore earnings at any point of the distribution. Median earnings grew by a mere 1.2 percent, while earnings at the 10<sup>th</sup> percentile fell by another 3.6 percent. Figures 3 and 4 chart the earnings distributions for broadly defined industrial sectors in 1978 and 1989. The trend to a service-based economy not only lowered earnings, but it also increased earnings inequality as employment in low-dispersion manufacturing sectors was replaced by jobs in high-variance trade and service industries. Earnings inequality also increased over the period because of larger within industry earnings dispersion in 1989 than in 1978.

Table 4 reports on the distribution of earnings by the same mobility categories and years listed in Table 2. For comparisons sake, the top panel reproduces the earnings for selected years listed in Table 3. Panel 2 presents the earnings of the workers employed locally in 1978 and 1989. Despite adverse business conditions, the earnings of workers at and below the median increases sharply from 1978 to 1983. Large increases for workers with low earnings in 1978 is consistent with normal earnings growth of relatively inexperienced workers as they acquire human capital and become better matched to employers. Alternatively, there are only modest gains for workers above the median. The third panel reports on the earnings of entrants the year after they first appear in the data. Hence, the year of entry listed on the left is the year before when earnings accrued. Mean earnings of entrants fell by 7.9 percent from 1978 to 1983 compared to an 11.1 percent decline for all workers. Between 1983 and 1989, however, mean entrant earnings continued to fall while all workers enjoyed a small increase. Most notably, the earnings losses between 1978 and 1983 were concentrated in the lower end of the distribution. Workers in the 10<sup>th</sup> percentile suffered a 13.5 percent loss and the earnings of those at the 25<sup>th</sup> percentile fell by 13.1 percent. The depressed earnings of entrants in the lower part of the

distribution demonstrates the importance of part-time and temporary work. The earnings gains from an increase in the minimum wages from \$2.65 per hour in 1978 to \$3.35 per hour in 1983 was more than offset by a combination of reduced hours and fewer weeks of employment. In the later part of the study period, entrant earnings continued to fall, but the largest losses occurred in the upper part of the distribution. Lower earnings at the 90<sup>th</sup> percentile suggests that fewer experienced workers moved into the region at the end of the study period. The continued decline in the lower part of the distribution may be due to the falling real value of the minimum wage was unchanged in nominal terms from 1983 to 1989.

The final panel of table 4 reports the earnings distribution in the years listed on the left for those who dropped out of the sample in the next year. Workers who left local employment at the end of the period earned far less in their last full year of employment than their counterparts who dropped out before the industrial restructuring. The losses were large and occurred at all points of the distribution. Comparisons of the earnings of drop-outs from the upper part of the distribution shows the impact of the recession on the incidence of leaving the sample between 1978 and 1983. Workers who left the in 1983 earned more than in 1978, which is consistent with plant closings and mass layoffs eliminating the jobs of relatively high-wage workers. This could also reflect the accelerated rate of retirement and relocation of experienced workers during this time period. The sharply lower earnings at all point of the distribution in 1989 suggests that the most recent drop-outs have less experience and are leaving the region for jobs elsewhere.

Changes in the distribution of earnings by mobility status, together with the changes in the share of new entrants and soon to be movers shows that labor market dynamics contributed to the overall rise in earnings inequality in the Pittsburgh region between 1978 and 1989.

## V. Earnings Decomposition Results

Table 5 presents the results of the DFL earnings decomposition, allocating change at various points in the earnings distribution to changes in industry mix, and changes in the mix and wages of entrants and exits. Column 1 in the top panel repeats the previously reported 11 percent drop in mean earning between 1978 and 1983. Earnings losses were larger nearer to the center of the distribution. Median earnings fell 15 percent, earnings at the 25<sup>th</sup> and 75<sup>th</sup> percentiles fell 12-13 percent, and earnings at the 10<sup>th</sup> and 90<sup>th</sup> percentiles fell about 7 percent. According to the DFL decomposition in column 2, just over 25% of the reduced mean earnings between 1978 and 1983 came from employment shifts away from the high-wage steel industry. While steelworker wage rates exceeded average wage rates, the impact of reduced steel employment was greatest at the lower end of the earnings distribution. The large impact at the lower end of the earnings distribution testifies to the intermittent work schedules of many steelworkers in the times leading up to plant closings. Employment shifts between all 2-digit SIC industries including steel listed in column 3, accounts for an additional 16 percent drop in mean earnings. Again, the industrial shifts depresses earnings at the lower end of the distribution. Movement of employment between 2-digit industries account for almost 2/3rds of the earnings decline at the 10<sup>th</sup> and 25<sup>th</sup> percentiles, 40 percent at the median, and between 20-30 percent of the decline in earnings at the 75<sup>th</sup> and 90<sup>th</sup> percentiles. This is only slightly more than that directly attributable to the decline of steel employment (column 2).

Columns 4 and 5 report the effects of workers entering and leaving local employment. The earnings distribution is sensitive to changes in the mix of entrants and exits because their earnings differ from other workers, and their earnings change over time. The results in column 4, however, show that the earnings distribution did not change much with the incidence of entry and exit between 1978 and 1983. Column 5 adjusts the earnings distribution to reflect changes in the earnings of entrants and exits,

holding constant their share of employment.<sup>10</sup> Changes in the earnings of workers moving into and out of the local labor market had little impact on mean earnings, but accounted for 33 and 18 percent of the reduced earnings at the 10<sup>th</sup> and 25<sup>th</sup> percentiles respectively. Much of the reduced earnings occurred as entrants moved into lower-wage industries and workers move out of higher-wage sectors. Column 6 reports the combined effects of changes in industry mix and changes in number and earnings distribution of workers entering and exiting local employment. After accounting for industry shifts in column 3, the marginal impact of the entrant/exit wages is only 11 percent at the 10<sup>th</sup> percentile and is actually positive at the higher deciles. Hence, within industries, entrants and exits were disproportionately drawn from the higher end of the earnings distribution, which is consistent with workers in Pittsburgh leaving high-wage jobs during this period.

The lower panel of table 5 reports changes in the earnings distribution between 1978-89, after the local economy had time to adjust to the shocks of the early 1980s. Mean earnings recovered very little from 1983 to 1989, and earnings losses from 1978-1989 were also greatest near the center of the distribution. Earnings at the 50<sup>th</sup> and 75<sup>th</sup> percentiles fell by 14.24 percent, while earnings dropped by only 5.25 percent at the 90<sup>th</sup> percentile. Over the longer time period, changes in industry mix account for a much larger portion of the change at each point of the earnings distribution. Movement from high to low-wage industrial sectors accounts for 76 percent of the lower mean earnings, 78 percent of the lower earnings at the 10<sup>th</sup> percentile, and 93 percent at the 25<sup>th</sup> percentile. Over the entire period, industry mix also accounts for most of the earnings loss in the upper half of the distribution, with as much as 85 percent of the reduced earnings at the 90<sup>th</sup> percentile due to differences in the industrial distribution of employment. In the long-term as in the short-term, changes in the wages of entrants and exits account

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<sup>10</sup> This was calculated by constructing a hypothetical distribution combining the earnings distributions for entrants and exits in 1978 with that of all other workers in 1983 (1989 in the lower panel), and then comparing that hypothetical distribution with the actual distribution in 1983 (1989 in the lower panel)).

for a small portion of the overall change in the earnings distribution, particularly at the lower end of the distribution. Again, the marginal impact in the long run is zero or positive at all points in the distribution.

Figure 5 presents clear visual evidence of how industry shifts and entrant/exit mix affected the earnings distribution. The lower peak of the counterfactual DFL distribution shows the impact of lower earnings of largely durable manufacturing employees as firm production schedules in 1989 required less overtime, fewer hours per week, and fewer weeks per quarter than in 1978. The close approximation of the 1978 and 1989-DFL at the lower end of the distribution follows the results in columns 6 of Table 5. While industrial restructuring eliminated many high-wage jobs manufacturing jobs, the earnings in the lower end of the distribution were more depressed by industrial restructuring and entrant/exit earnings changes.

## **VI. Summary**

The effect of shifts in the industrial composition of employment has received considerable attention as a source of the increase in earnings inequality. This paper combines a unique sample of very reliable earnings and employment records with kernel density estimators to account for the influence of both industrial employment shifts and labor market dynamics on the earnings distribution.

We find that real earnings declined at nearly all points in the distribution between 1978 and 1989. In the short-term, shifts of employment between 2-digit industries accounted for most of the reduced earnings in the lower end of the distribution, but relatively little in the upper end. Over the entire period, the impact of industrial restructuring was felt throughout the distribution, as earnings of workers at all points in the distribution fell in response to changes in industry mix. Changes in the distribution of earnings for entrants and exits account for some of the lower earnings at the lower end of the distribution in both the short- and long-term. Earnings at all points of the distribution fell workers

moving into the local economy in the 1980s earned less than entrants in the 1978. The higher incidence of entry also further depresses the earnings in the lower part of the distribution. However, the earnings losses are attributable mostly to changes in the industries in which they were employed. Accounting for these changes, the marginal impact of changes in the earnings distribution of entrants and exits is quite small.

## References

- Addison, John T., and Pedro Portugal. 1987. "The Effects of Advance Notification of Plant Closings on Unemployment, *Industrial and Labor Relations Review* 41(1): 3-15.
- Bartik, Timothy J. 1996. "The Distributional Effects of Local Labor Demand and Industrial Mix: Estimates Using Individual Panel Data." *Journal of Urban Economics* 40: 150-178.
- Beeson, Patricia, Lara Shore-Sheppard, and Kathryn Shaw. 2001. Industrial Change and Wage Inequality: Evidence from the Steel Industry, *Industrial and Labor Relations Review* 54, no 2A: 466-483.
- Borjas, George J. and Valerie A. Ramey. 1995. "Foreign Competition, Market Power, and Wage Inequality." *Quarterly Journal of Economics* 110: 1075-1110.
- Cloutier, Norman R. 1997. "Metropolitan Income Inequality During the 1980s: The Impact of Urban Development, Industrial Mix, and Family Structure." *Journal of Regional Science* 37, no. 3: 459-478.
- DiNardo, John, Nicole M. Fortin, and Thomas Lemieux. 1996. Labor Market Institutions and the Distribution of Wages, 1973-1992: A Semiparametric Approach. *Econometrica* 64: 1001-1044.
- Harrison, Bennett and Barry Bluestone. 1988. *The Great U-Turn: Corporate Restructuring and the Polarization of America*. New York: Basic Books.
- Jacobson, LaLonde, and Sullivan. 1993. Earnings Losses of Displaced Workers, *American Economic Review* 83, no. 4: 685-709.
- Karoly, Lynn A. and Jacob Alex Klerman. 1994. Using Regional Data to Reexamine the Contribution of Demographic and Sectoral Changes to Increasing U.S. Wage Inequality. In *The Changing Distribution of Income in an Open U.S. Economy*, J. H. Bergstrand et al., eds. Elsevier Science Publishers.
- Katz, Lawrence F. and David H. Autor. 1998. Changes in the Wage Structure and Earnings Inequality. forthcoming in the *Handbook of Labor Economics*.
- Kletzer, Lori. 1989. Returns to Job Seniority After Permanent Job Loss, *American Economic Review* 79, no. 3: 536-43.
- Levernier, William, Mark D. Partridge, and Dan S. Rickman. 1998. "Differences in Metropolitan and Nonmetropolitan U.S. Family Income Inequality: A Cross-County Comparison." *Journal of Urban Economics* 44: 272-290.

**Table 1.**  
**Employment Trends in the Pittsburgh Metropolitan Area, 1975-1991**

Year	Employment			Share of Total Employment					
	Total (1)	Steel (2)	Total Durable (3)	Steel (4)	Other Durables (5)	Non Durables (5)	Construct & Trans (6)	Services (7)	Other (8)
<b>1975</b>	36,166	5,261	11,431	0.145	0.171	0.066	0.114	0.490	0.014
<b>1976</b>	36,631	5,290	11,483	0.144	0.169	0.064	0.115	0.494	0.014
<b>1977</b>	36,979	5,168	11,246	0.140	0.164	0.065	0.120	0.495	0.015
<b>1978</b>	38,971	5,007	11,108	0.128	0.157	0.061	0.121	0.515	0.017
<b>1979</b>	39,468	4,739	11,162	0.120	0.163	0.057	0.124	0.511	0.025
<b>1980</b>	38,432	4,478	10,799	0.117	0.164	0.056	0.117	0.526	0.020
<b>1981</b>	37,755	4,461	10,853	0.118	0.169	0.055	0.113	0.522	0.022
<b>1982</b>	35,870	3,910	9,545	0.109	0.157	0.054	0.120	0.537	0.023
<b>1983</b>	34,438	3,012	8,102	0.088	0.148	0.054	0.120	0.579	0.012
<b>1984*</b>	39,894	1,986	6,793	0.050	0.120	0.045	0.113	0.660	0.013
<b>1985*</b>	39,223	1,707	4,938	0.044	0.082	0.043	0.112	0.708	0.010
<b>1986*</b>	39,175	1,394	5,399	0.036	0.102	0.043	0.116	0.685	0.018
<b>1987*</b>	38,206	1,015	4,909	0.027	0.102	0.043	0.128	0.687	0.013
<b>1988*</b>	38,807	895	4,655	0.023	0.097	0.042	0.123	0.702	0.013
<b>1989*</b>	38,662	997	3,609	0.026	0.068	0.040	0.121	0.733	0.012
<b>1990*</b>	38,240	967	3,458	0.025	0.065	0.040	0.122	0.737	0.011
<b>1991*</b>	39,413	1,031	3,568	0.026	0.064	0.043	0.138	0.722	0.007

Note: Coverage expanded in 1984.

Table 2.  
Employment Trends in the Pittsburgh Metropolitan Area, 1978-1989

	5% Sample Size			Share of Total Employment					
	Total (1)	Steel (2)	Total Durable (3)	Steel (4)	Other Durable (5)	Non Durables (6)	Construct & Trans (7)	Services (8)	Other (9)
Year									
	All Workers								
1978	38,971	5,007	11,108	0.128	0.157	0.061	0.121	0.515	0.017
1983	34,438	3,012	8,102	0.088	0.148	0.054	0.120	0.579	0.011
1989	38,662	997	3,609	0.026	0.068	0.040	0.121	0.733	0.012
	Employed in Pittsburgh MSA 1978 and 1989								
1978	14,109	1,557	2,309	0.110	0.164	0.062	0.126	0.520	0.018
1983	10,725	1,139	2,036	0.106	0.190	0.070	0.140	0.486	0.009
1989	14,008	801	1,413	0.057	0.101	0.054	0.143	0.635	0.010
	Entrants								
1978	2,844	152	286	0.053	0.101	0.050	0.116	0.664	0.015
1983	3,243	39	201	0.012	0.062	0.031	0.104	0.780	0.011
1989	4,119	46	195	0.011	0.047	0.032	0.132	0.762	0.015
	Exits								
1978	3,572	326	436	0.091	0.122	0.058	0.131	0.579	0.018
1983	3,987	307	522	0.077	0.131	0.049	0.114	0.613	0.017
1989	2,605	11	125	0.004	0.048	0.028	0.091	0.817	0.013

**Table 3.**  
**Earnings Trends in the Pittsburgh Metropolitan Area, 1975-1991**

Log Real Quarterly Earnings, (1982-84 dollars)								
Year	Sample Size	Mean	Variance	Percentiles				
				10th	25th	50th	75th	90th
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<b>1975</b>	36,166	7.864	1.112	6.330	7.193	8.118	8.658	8.981
<b>1976</b>	36,631	7.883	1.111	6.343	7.204	8.137	8.684	8.996
<b>1977</b>	36,979	7.887	1.132	6.328	7.194	8.130	8.713	8.976
<b>1978</b>	38,971	7.906	1.134	6.376	7.220	8.129	8.723	9.048
<b>1979</b>	39,468	7.918	1.121	6.402	7.239	8.131	8.735	9.054
<b>1980</b>	38,432	7.882	1.128	6.355	7.204	8.101	8.691	9.023
<b>1981</b>	37,755	7.885	1.109	6.369	7.213	8.101	8.683	9.021
<b>1982</b>	35,870	7.827	1.097	6.349	7.162	8.021	8.603	8.971
<b>1983</b>	34,438	7.795	1.130	6.296	7.107	7.975	8.593	8.974
<b>1984*</b>	39,894	7.832	1.092	6.338	7.176	8.040	8.609	8.958
<b>1985*</b>	39,223	7.811	1.119	6.314	7.135	8.013	8.598	8.966
<b>1986*</b>	39,175	7.818	1.129	6.299	7.137	8.020	8.609	8.985
<b>1987*</b>	38,206	7.814	1.170	6.271	7.124	8.009	8.601	9.012
<b>1988*</b>	38,807	7.796	1.178	6.253	7.088	7.988	8.596	9.002
<b>1989*</b>	38,662	7.800	1.160	6.260	7.109	7.987	8.578	8.995
<b>1990*</b>	38,240	7.781	1.141	6.259	7.111	7.963	8.547	8.959
<b>1991*</b>	39,413	7.809	1.124	6.290	7.155	7.998	8.558	8.973

Note: Coverage expanded in 1984.

Table 4.

## Earning Trends in Pittsburgh Metropolitan Area, 1978-89

Year	Sample Size (1)	Mean (2)	Variance (3)	Percentiles				
				10th (4)	25th (5)	50th (6)	75th (7)	90th (8)
<b>All Workers</b>								
1978	38,971	7.906	1.134	6.376	7.220	8.129	8.723	9.048
1983	34,438	7.795	1.130	6.296	7.107	7.975	8.593	8.974
1989	38,662	7.800	1.160	6.260	7.109	7.987	8.578	8.995
<b>Employed in Pittsburgh MSA 1978 and 1989</b>								
1978	14,109	7.997	1.012	6.556	7.407	8.201	8.740	9.051
1983	10,725	8.184	0.753	6.998	7.733	8.335	8.763	9.091
1989	14,008	8.179	0.818	6.955	7.733	8.325	8.770	9.124
<b>Entrants</b>								
1978	2,844	7.416	1.084	6.054	6.714	7.446	8.202	8.729
1983	3,243	7.337	1.149	5.919	6.583	7.344	8.141	8.721
1989	4,119	7.282	1.147	5.872	6.528	7.291	8.056	8.639
<b>Exiters</b>								
1978	3,572	7.629	1.174	6.108	6.874	7.785	8.480	8.916
1983	3,987	7.610	1.233	6.079	6.832	7.733	8.521	8.948
1989	2,605	7.400	1.171	5.959	6.640	7.457	8.165	8.745

Table 5.  
Decomposing Changes in the log of Real Earnings Distribution, 1978-89

	Overall log Change	Industry Mix		Entrant/Exit Mix		Industry & Enter/Exit Mix (6)
	(1)	Steel only (2)	All 2-digit Industries (3)	Employment Shares (4)	Wages (5)	
1978-1983						
Mean	-11.02	-2.79 (25%)	-4.57 (41%)	0.12 (-1%)	-0.27 (2%)	-3.66 (33%)
Percentiles						
10th	-6.75	-2.25 (33%)	-4.50 (66%)	0.75 (-11%)	-2.25 (33%)	-5.25 (77%)
25th	-11.99	-3.75 (31%)	-7.50 (62%)	0.00 (0%)	-2.25 (18%)	-6.75 (56%)
50th	-14.99	-3.75 (25%)	-6.00 (40%)	0.75 (-5%)	0.75 (-5%)	-3.75 (25%)
75th	-12.74	-3.00 (23%)	-3.75 (29%)	0.00 (0%)	0.75 (-5%)	-2.25 (17%)
90th	-7.50	-1.50 (20%)	-1.50 (20%)	0.00 (0%)	0.00 (0%)	-0.75 (10%)
1978-1989						
Mean	-10.59	-9.29 (87%)	-8.07 (76%)	0.14 (-1%)	-1.26 (11%)	-7.06 (66%)
Percentiles						
10th	-10.50	-7.50 (71%)	-8.25 (78%)	0.00 (0%)	-3.00 (28%)	-8.25 (78%)
25th	-11.24	-11.99 (106%)	-10.50 (93%)	0.00 (0%)	-3.00 (26%)	-9.75 (86%)
50th	-14.24	-11.24 (78%)	-9.75 (68%)	0.00 (0%)	-0.75 (5%)	-8.25 (57%)
75th	-14.24	-10.50 (73%)	-8.25 (57%)	0.00 (0%)	-0.75 (5%)	-7.50 (52%)
90th	-5.25	-5.25 (100%)	-4.50 (85%)	0.00 (0%)	-0.75 (14%)	-3.75 (71%)

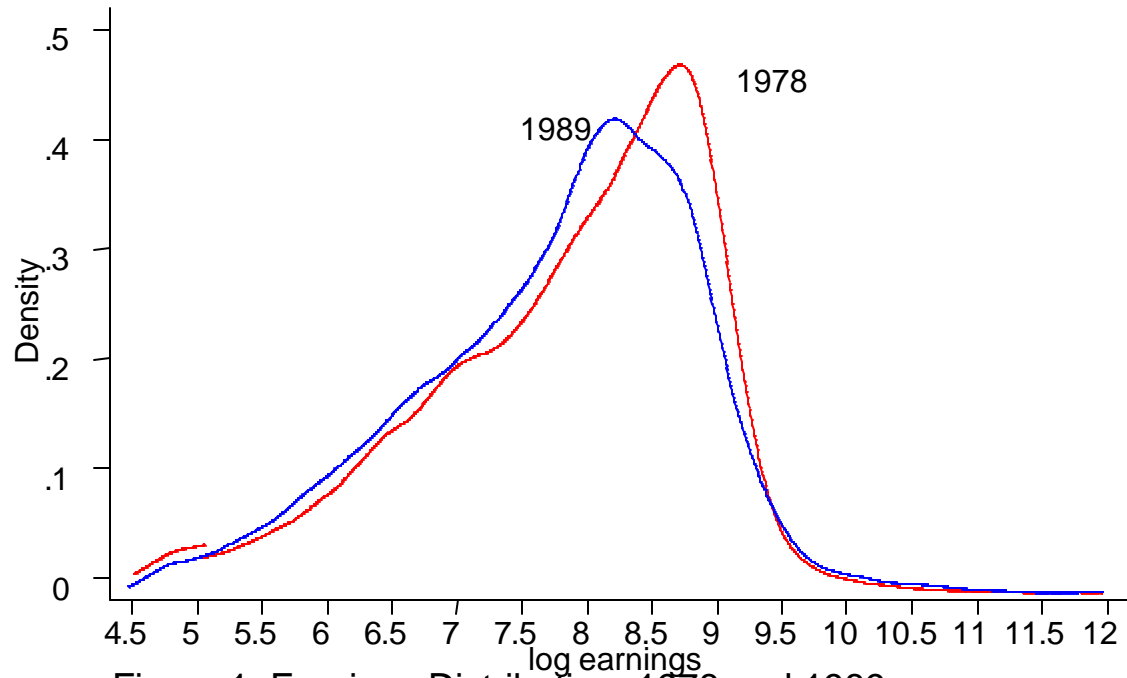
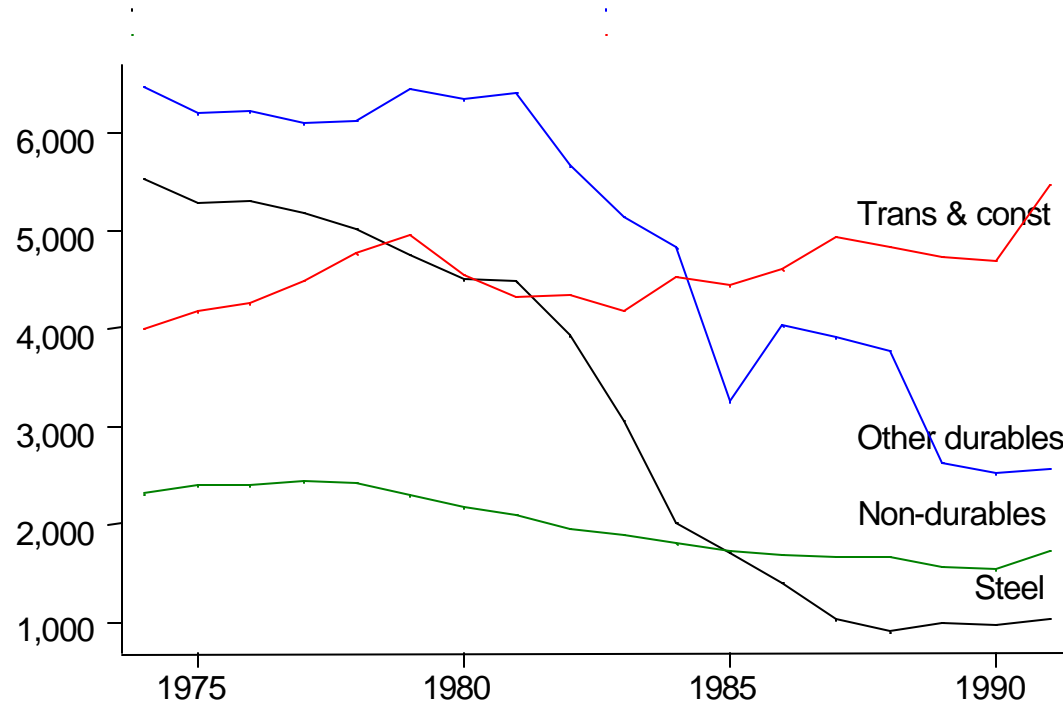


Figure 1. Earnings Distribution, 1978 and 1989



**Figure 2. Employment by Selected Industry , 1974-1991**

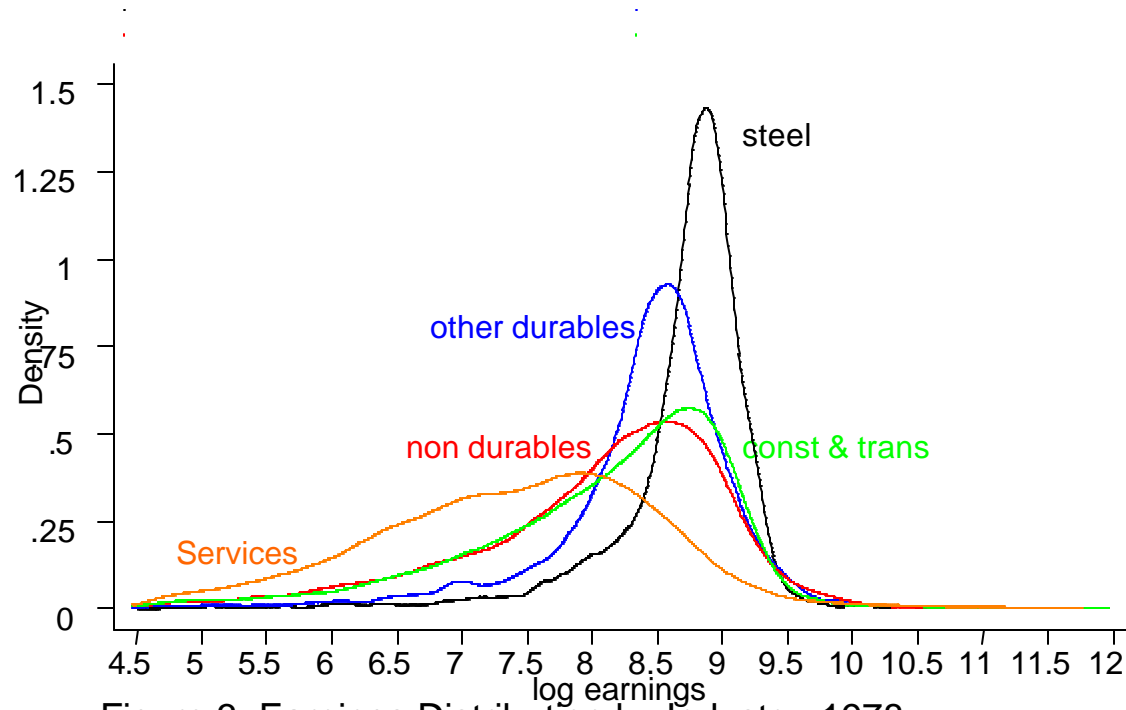


Figure 3. Earnings Distribution by Industry, 1978

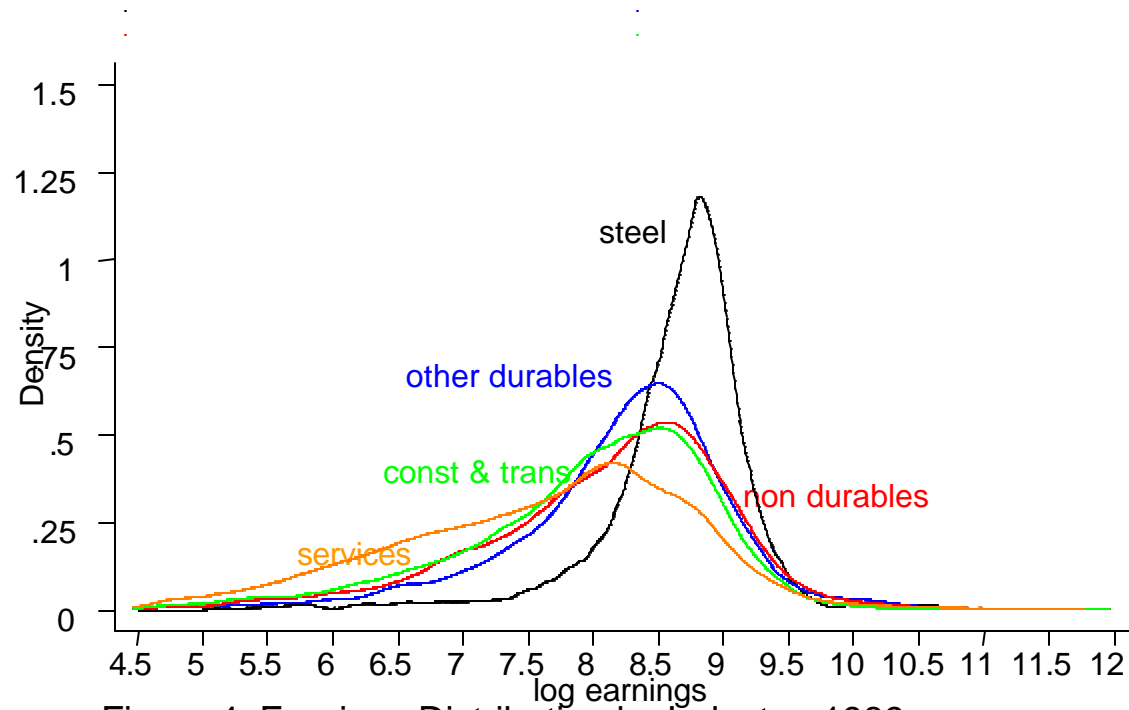
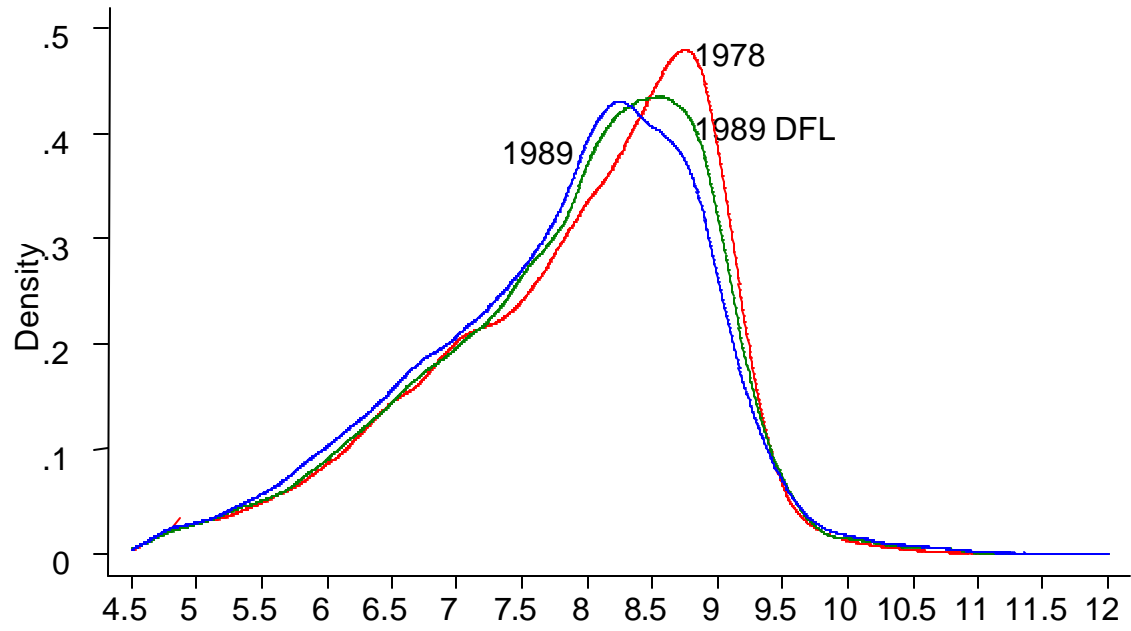


Figure 4. Earnings Distribution by Industry, 1989



**Figure 5. DFL Decomposition of Earnings Distribution, 1978 & 1989**