The Local Labor-Market Response to a Plant Shutdown

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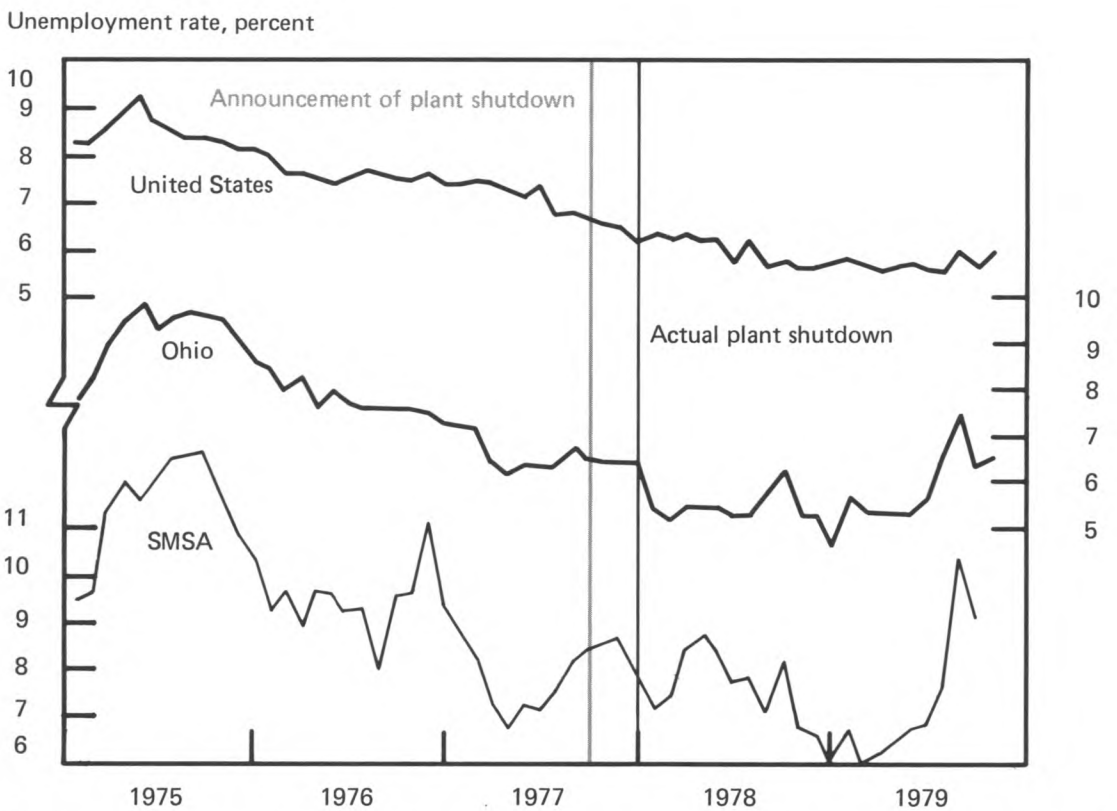
Although the shutdown of a major manufacturing plant can have a severe and lasting impact on a local economy, labor markets adjust, at least partially, to compensate for the loss of jobs. At the national level a plant shutdown may represent a reallocation of resources that eventually benefits the whole economy. However, the area that has lost the plant is confronted with the need to make often painful adjustments. A plant shutdown immediately reduces the size of the local labor market. While the laid-off workers' adjustments are a reflection of the *direct effects* of a shutdown, the loss is shared by others, both in the local and the adjacent areas, through a wide-ranging set of *indirect effects.*

There have been several labor markets in the Fourth Federal Reserve District that have been disrupted by major plant shutdowns in recent years. The Akron SMSA has been losing tire-production facilities for many years. Akron's employment, however, has increased steadily over the last two years. In fact, its rubber-industry employment has increased as the corporate headquarters' work force of Akron's rubber industry has grown. In the spring of 1979, the Dayton SMSA experienced the closing of a Frigidaire plant that employed over 5,000 workers. However, the subsequent pattern of Dayton's employment/unemployment figures was not perceptively different either from most of Ohio's other major SMSAs or from Dayton's pattern prior to the plant closing. One of the most widely publicized plant closings in the Fourth District occurred in the Youngstown-Warren SMSA in 1977 with the shutdown of the Campbell Works of Youngstown Sheet & Tube Co., a subsidiary of LTV Corp.[1] In November 1979 U.S. Steel Corp. announced the permanent closing of its McDonald and Ohio Works in Youngstown, a move that will idle 3,500 workers and managers. Although the impact of the U.S. Steel closings will not be known for some time, the 1977 Campbell works shutdown can illustrate the adjustment mechanism of a local labor market to a plant shutdown.

The shutdown of the Campbell Works plant was initially projected to affect 4,000 to 5,000 jobs, or about 2 percent of the total employment in the Youngstown-Warren SMSA at that time. Yet, over the subsequent two years, the local employment/unemployment figures returned to pre-shutdown levels. Because most of the laid-off Campbell Works employees either found new jobs or accepted early retirement benefits, their being laid off ceased to be a serious unemployment problem to the local economy. Employment in the

1. It is important to distinguish between a temporary layoff, which is subject to recall, and a shutdown, which permanently affects employment. A shutdown can result from the closing of only a section of a plant's facilities as well as from the complete closing of a plant. In the case of Youngstown's Campbell Works, operations that were discontinued included the production of hot rolled sheets and plates, cold rolled sheets, some bar type products, and continuous weld pipe. Continued operations include production of seamless pipe, cold finished bars, and coke to support the Brier Hill Works.

Chart 1 Unemployment Rates
Seasonally adjusted



SOURCES: Bureau of Labor Statistics, *Employment and Earnings* (Washington, D.C.: U.S. Department of Labor); *Ohio Labor Market Information* (Columbus, OH: Bureau of Employment Services).

Youngstown-Warren SMSA surpassed the earlier peak levels within one year of the shutdown. The Youngstown-Warren SMSA unemployment rate, as shown in chart 1, has trended downward since April 1978, paralleling the state and national unemployment rates. Despite the dramatic recovery from the Campbell Works shutdown, the full labor-market effects of the shutdown have been disguised by the adjustment process of the local labor market. This article attempts to differentiate between the direct and indirect effects of the post-shutdown labor-market adjustments in the Youngstown-Warren SMSA.

THE ADJUSTMENT PROCESS OF LOCAL LABOR MARKETS

Labor markets are constantly adjusting to changing economic conditions. Plant shutdowns are only one example, although perhaps the most dramatic, of a whole series of factors that change the demand for labor in a local economy. Seasonal and cyclical fluctuations in demand also affect employment/unemployment levels, without altering the basic structure of the local economy. Although plant shutdowns can occur, especially among marginal firms, they are not usually associated with these types of demand changes.

Plant shutdowns are more typically caused by permanent changes in demand through either the secular decline of an industry or the redistribution of industries to more profitable locations. A plant closedown may have only a temporary effect on the local economy if it is offset by the birth of a new firm or the expansion of an existing firm. Because the Campbell Works shutdown represents the decline of an industry, it is assumed to represent a permanent loss of jobs in the Youngstown-Warren SMSA.

The direct effect of a permanent loss of jobs is the adjustment of the laid-off workers themselves as they choose among new jobs, relocation, retirement, or unemployment. In seeking employment, the laid-off workers compete with the rest of the labor force for a diminished number of jobs in the local economy. The direct adjustments of the laid-off workers lead to indirect adjustments by others in the labor force who would have had jobs if those jobs had not been taken by the laid-off workers. The actual process of these adjustments seldom takes place in a static labor market. Because these changes in demand and job turnovers are constantly occurring, job openings are continually becoming available.

The initial effect of a plant shutdown is to increase directly the level of unemployment. Some laid-off workers leave the labor force, either through retirement or relocation. By leaving the labor force, laid-off workers do not appear in the unemployment figures and, therefore, mitigate the increase in the unemployment level. Relocation would have the same effect on the labor force and unemployment levels in the local economy. However, the locality receiving the relocating worker would then be required to adjust its labor force to either an increase in employment or unemployment.[2]

Many workers seek new employment. Since many of these workers have specific skills, they may find new employment in the remaining establishments of their industry or in closely related industries. If laid-off workers have difficulty finding employment at a comparable skill level, they may settle for a job with lower skill requirements and lower pay. Unlike the laid-off workers who leave the labor force or remain unemployed, the reemployment of the laid-off workers affects others in the local labor force, especially the previously unemployed. Reemployment of laid-off workers must displace other workers holding jobs or unemployed workers who would otherwise have acquired jobs.[3]

POST-SHUTDOWN STATUS OF LAID-OFF WORKERS

The post-shutdown status of workers who were laid off as a direct result of a plant shutdown was obtained via labor-force surveys. In the case of the steel plant in Youngstown, surveys were conducted in July and August 1978 (about one year after the shutdown announcement and six months after the actual shutdown) to determine the labor-market status of the laid-off workers.[4] According to the survey 4,200 union workers were laid off by the Campbell Works shutdown. Six months later about one-third of these workers (1,300 to 1,500) had been reemployed, but not necessarily in comparable or even permanent jobs. Of the remaining workers 400 to 600 relocated to another SMSA, and about 1,000 took early retirement.[5] Approximately 1,200 to 1,500, including those enrolled in retraining programs, were still seeking employment. Therefore, the labor-market

2. If the two labor markets are in the same state, the net effect on the state's labor market would be nullified and thus go unnoticed in the state's labor-force statistics.

3. If a job opening is intended for a skill level beyond that of an unemployed worker, the laid-off worker who does qualify for the job may have prevented a series of promotions that ultimately would have opened a job at a lower skill level for the unemployed worker. Thus, all unemployed workers are, in a sense, competing for any job opening.

4. In this survey 282 steelworkers, from both Brier Hill and Campbell Works, were interviewed in a random sampling. The estimates were based on reports obtained from the Ohio Bureau of Employment, union officials, and other local sources. The number reported did not include an estimate of clerical and other white-collar personnel who may have been affected. The survey results were obtained from a working paper entitled "Developing a Human Services Response to Economic Crisis," Center for Urban Studies, Youngstown State University, October 1978. The Center for Urban Studies is currently conducting follow-up studies on the impact of a plant shutdown.

5. The rather large number of retirees may be the result of the age of the plant facility and the relative maturity of the industry.

Table 1 Distribution and Changes in Employment in the Youngstown-Warren SMSA

Employment levels, 000

Industries	April 1977	April 1978	Net change	Change in SMSA,%	Change in U.S.,%
Total[a]	**182.3**	**189.2**	**6.9**	**3.8**	**9.4**
Manufacturing	**81.3**	**80.0**	**−1.3**	**−1.6**	**7.6**
Durable goods	75.1	74.0	−1.1	−1.5	11.3
Primary metals	42.3	36.3	−6.0	−14.2	3.9
Blast furnace and basic products	26.7	20.9	−5.8	−21.7	1.8
Fabricated metals	8.3	9.2	0.9	10.8	19.4
Machinery (excluding electrical)	6.6	6.6	0	0	16.6
Electrical equipment	3.4	3.3	−0.1	−2.9	7.8
Transportation equipment	9.6	13.7	4.1	42.7	13.6
Nondurable goods	6.2	6.0	−0.2	−3.2	2.3
Nonmanufacturing	**101.0**	**109.2**	**8.2**	**8.1**	**10.2**
Retail trade	37.2	39.1	1.9	5.1	7.9
Services	33.6	36.4	2.8	8.3	8.4

SOURCE: Ohio Bureau of Employment Services.

a. Total employment represents total nonagricultural employment minus government employment.

adjustment of the laid-off workers—the direct effect—was about evenly distributed among those who found employment, those who left the labor force in the Youngstown-Warren SMSA through retirement or relocation, and those who were still unemployed.

Considering the relatively large number of workers involved in this plant shutdown, the Youngstown-Warren labor market was remarkably successful in reabsorbing the laid-off workers. Almost one year from the announcement of the shutdown, only one-third of the laid-off workers were still classified as unemployed. Because most of these unemployed workers were unskilled, they qualified for retraining assistance. Indeed, the most current estimates indicate that about 600 laid-off workers remain unemployed.[6]

Employment opportunities available to the laid-off workers in the Youngstown-Warren SMSA were augmented by the employment expansion in other industries, as shown in table 1. Between

6. Conversations with Donald Curry and Anthony Fortunato of the Ohio Bureau of Employment Services, Youngstown-Warren branch office, Youngstown, Ohio, September 24, 1979, and October 2, 1979, respectively.

April 1977 (prior to the shutdown) and April 1979, the total employment in the Youngstown-Warren SMSA expanded by 6,900, or 3.8 percent. While this increase was less than one-half as rapid as the increase experienced by the nation, the increase locally was equivalent to one and one-half times the number of workers laid off from the Campbell Works. Local employment declined by 1,300 in manufacturing and by 5,800 in steel-related industries—more than can be attributed solely to the plant shutdown.

Although the Youngstown-Warren SMSA experienced relatively strong growth in nonmanufacturing employment, transportation equipment was the only local manufacturing industry to exceed the national rate of increase in employ-

The Application of Intervention Analysis to the Campbell Works Shutdown

The shutdown of a plant can affect total employment/unemployment levels of the local labor market in several ways. Prior to a shutdown, there is no way to predict what type of pattern may result from a shutdown. The impact of a shutdown could cause any of the following:

1. a one-step change in the level of the employment/unemployment series if all adjustments occur instantaneously;
2. a shift in the growth trend of the series if adjustments are made gradually over a period of time;
3. a shift in the seasonal or cyclical pattern of the series due to the new structure of the local economy; or
4. a combination of these three effects.

One of the major problems associated with measuring the effects of the Campbell Works shutdown is to determine the type of pattern caused by the shutdown. This determination is very important, because an assumption of the type of pattern shift leads to the type of analysis performed and thus affects the outcome of the analysis. If, for example, an *a priori* assumption of the type of pattern shift is made and this assumption is incorrect, then incorrect results may be derived from analysis based on this assumption. Consequently, rather than using methods based on *a priori* assumptions, the method of intervention analysis has been used in this study.[1] In this method one of the principal steps is to perform tests on the data to determine what type of pattern shift (if any) occurred rather than using an arbitrary pattern shift.

Intervention analysis, as used in this study, consisted of four basic steps applied separately to the total employment/unemployment series. First, the relationship between the total employment/unemployment levels in the Youngstown-Warren SMSA and the corresponding national series was estimated for the time period between January 1971 and August 1977 (a period before the announcement of the shutdown). Second, this relationship was used to forecast the levels of both SMSA employment and unemployment for the time period from September 1977 through April 1979 (a period that included the plant shutdown), using the actual values of the national series during this period. Third, the differences between these forecasts and the actual values of the SMSA employment and unemployment series over this time period were used to identify a pattern for the impact of the shutdown. Finally, a model was estimated that included this pattern of impact. This procedure provided an estimate of the actual impact of the plant shutdown. This last step also included tests to assure that the pattern of impact chosen in this analysis was correct.

1. For a detailed discussion of this method, see G. E. P. Box and George C. Tiao, "Intervention Analysis with Applications to Environmental Problems," *Journal of the American Statistical Association,* 70 (1975): 70-79.

ment, largely because of an increase in small-car production at the nearby General Motors plant in Lordstown, Ohio. Indeed, this expansion accounted for much of the reemployment of the laid-off Campbell Works employees. Although employment in the fabricated metals industry expanded, the Youngstown-Warren SMSA did not fully share in the increased employment that was generated by national growth in the industry. Some laid-off workers were employed at nearby steel plants, such as the Brier Hill Works; others were temporarily recalled at the Campbell Works. However, the overall decline in steel-related employment limited job opportunities in the steel industry.

TOTAL LABOR-MARKET ADJUSTMENTS

Using data for Ohio and the nation as standards of comparison, the full impact of the Campbell Works shutdown was observed in the changing level of blast-furnace employment in the Youngstown-Warren SMSA (see chart 2). In the cyclical expansion that occurred between 1975

Chart 2 Blast-Furnace Employment
Not seasonally adjusted

SOURCES: Bureau of Labor Statistics, *Employment and Earnings* (Washington, D.C.: U.S. Department of Labor); *Ohio Labor Market Information* (Columbus, OH: Bureau of Employment Services).

and 1979, blast-furnace employment in the nation experienced seasonal swings in employment levels, with peaks occurring in the summer months and troughs occurring in the winter months. Employment in both the state and the SMSA showed a similar seasonal and cyclical pattern. The cyclical trend in the Youngstown-Warren SMSA was clearly disrupted by the plant shutdown at the end of 1977, resulting in a seasonal trough in January 1978 that was much deeper in both the state and the SMSA than in the nation. Assuming that the Campbell Works shutdown was the only employment disruption that occurred in the SMSA since 1975, the drop in the SMSA's blast-furnace employment fully reflects the 4,200 jobs that were permanently lost.

The national level of total employment was taken to be an indicator of how total employment in the Youngstown-Warren SMSA would have performed without the Campbell Works shutdown. The method of analysis that compares the behavioral patterns of total employment/unemployment of a region or SMSA with those of the nation is called intervention analysis. Estimates of the impact of an event can be determined by this method of analysis. (See box on page 20 for a further discussion of intervention analysis as applied to the Campbell Works shutdown.)

Results derived from this technique indicated that a one-time shift in the levels of both total employment and unemployment occurred in the Youngstown-Warren SMSA in December 1977, three months after the announcement of the shutdown. By the end of that year, total employment and unemployment resumed their historical pattern of behavior relative to the corresponding national series. In all, total employment was estimated to have declined by 4,600, and unemployment increased by 3,200 over the last three months of 1977 as a result of the plant shutdown.[7] Since the change in employment/unemployment levels must equal the total change in the labor-force size, it follows that the SMSA's labor force must have declined by 1,400. Chart 3 illustrates employment levels for the SMSA, the state, and the nation; it also includes the SMSA's projected employment level without the impact of the shutdown.

The discrepancy between the 4,200 jobs lost from the Campbell Works shutdown and the estimated 4,600 employment drop may have several explanations. In addition to the 4,200 workers involved in the shutdown, a small number of white-collar support staff were either laid off or transferred to other facilities after the shutdown. Also, a possible "ripple effect," causing other cutbacks by businesses dependent on orders from Campbell Works or on the purchases of the work force, could have contributed to job losses. In any case, the discrepancy was small enough to assume that the 4,600 employment drop was caused solely by the Campbell Works shutdown.

The difference between the adjustments of the laid-off Campbell Works employees and the total labor-market adjustments in the SMSA indicates the extent to which the burden of the plant shutdown was shifted to others in the local labor market—the indirect effect. Within six months after the shutdown, employment among former Campbell Works employees had dropped by approximately 2,850 (or the two-thirds who either left the labor force or remained unemployed), compared to a total estimated loss in employment of 4,600. The loss of unemployment was, of course, concentrated in the steel industry. Most of the decline in the labor force was attributed to Campbell Works employees; but the remaining 1,200 to 1,500 unemployed former Campbell Works employees accounted for less than one-half of the total rise in unemployment. Therefore, those previously unemployed bore the brunt of the plant shutdown as the jobs that they may have obtained were taken by the laid-off workers.

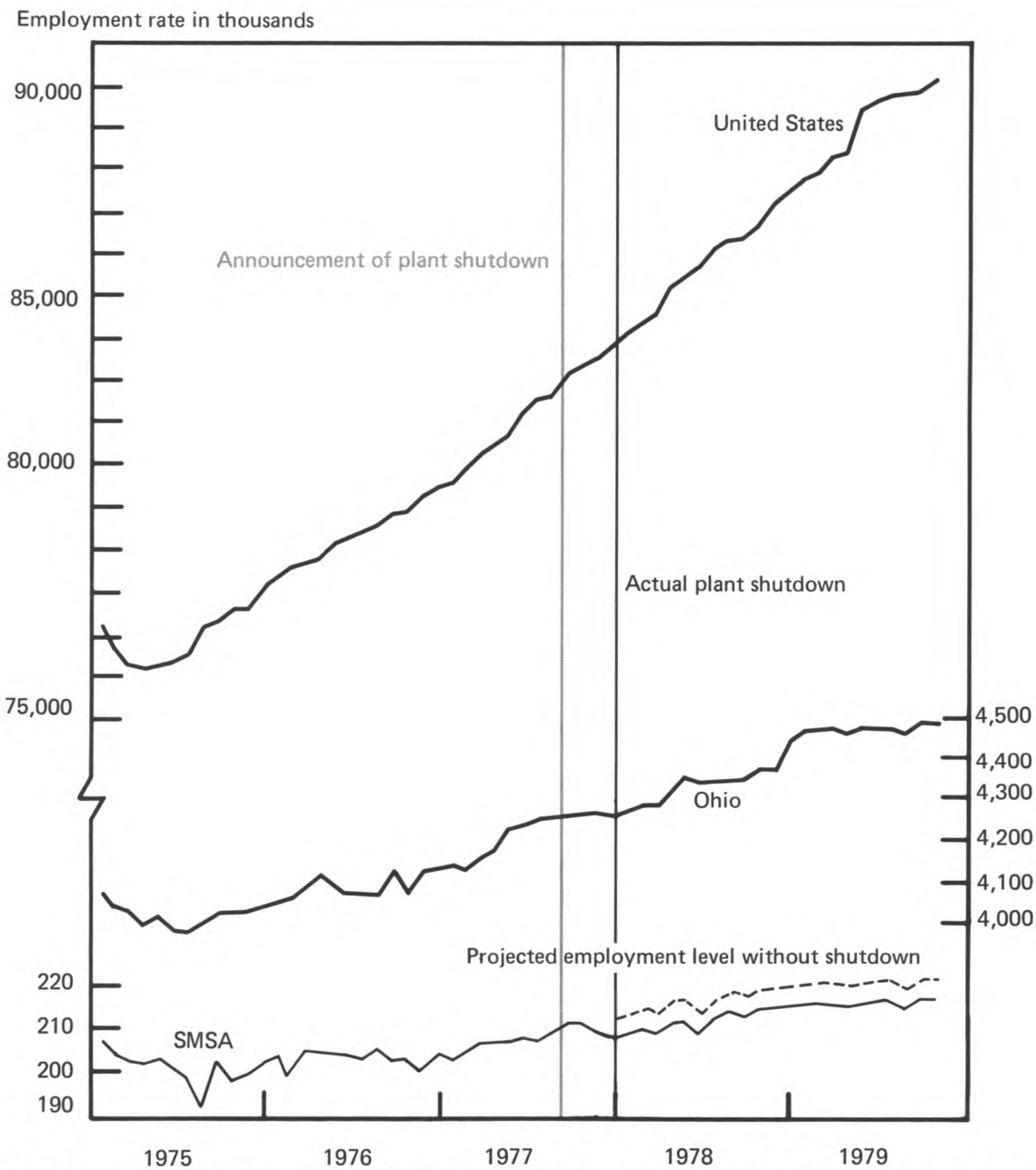
CONCLUSION

The response of the Youngstown-Warren SMSA must be measured not only in the adjustments of the laid-off Campbell Works employees, but also in the adjustments of those indirectly affected by the shutdown. (See table 2 for a summary of the direct and indirect effects of the shutdown.) Although the adustment mechanism

7. The numbers represent the statistical best estimate within a range of significance. For employment measured in thousands, the range at the 0.95-significance level was −7.37 to −1.87 for the value −4.62. Unemployment ranged between −0.47 and 6.91 for the value 3.22.

Chart 3 Nonagricultural Employment

Seasonally adjusted



SOURCES: Bureau of Labor Statistics, ***Employment and Earnings*** (Washington, D.C.: U.S. Department of Labor); ***Ohio Labor Market Information*** (Columbus, OH: Bureau of Employment Services).

Table 2 Summary of the Impact of the Campbell Works Plant Shutdown

	Direct effect[a]	Indirect effect	Total effect
Change in employment	−2,850	−1,750	−4,600
Change in unemployment	1,350	1,850	3,200
Change in the labor force	−1,500	100	−1,400

a. The size of the direct effect is based on the simple mean of the stated range.

works best when local or national employment is growing strongly, the ability of the Youngstown-Warren SMSA to restore its pre-shutdown levels of employment at comparable unemployment rates in as short a time as one year attests to the strength of the local labor market as an adjustment mechanism. The fact that the Youngstown-Warren SMSA has not witnessed a collapse of its economy or chronic unemployment problems should not distract from the serious impact of its declining steel industry. The local economy has shrunk relative to the national economy as a result of the plant shutdown, and workers have relocated to find new employment. Further reductions in employment will undoubtedly occur when the Brier Hill Works of Youngstown Sheet & Tube Co. is phased out and when the McDonald and Ohio Works are closed by U.S. Steel. Unless new sources of industrial growth can be found to replace the jobs lost to permanent shutdowns, the economy of the Youngstown-Warren SMSA will adjust by continuing to fall behind the national economy, both in employment and labor-force growth.