# Dynamics of Growth and Restructuring in the Pittsburgh Metropolitan Region

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## 1. Introduction

Perhaps the most important attribute that might characterize a region is its resilience: Can, a region bounce back from adversity? In the United States, two examples are often drawn of major regions that have met this test. Just after World War II, New England lost the dominance that it had held for decades as the center of the nation's textile industry. Its loss was the South's gain, and enormous movements of capital and labor were determined in the balance. Today, New England's rebirth is widely acknowledged, and industries ranging from electronics and computer software to higher education and medical research vie for leadership as drivers of economic change. Few would now doubt its vitality. The second example to which attention is drawn is that of the Pittsburgh region. In contrast to New England, Pittsburgh's resilience does not come from phenomenal growth in several key industries. Rather, its restructuring resulted from a radical decline in its manufacturing sector and modest growth elsewhere. Taken together, however, the factors that lay behind this change seem to have brought about a new vitality in the region. In this paper, we intend to describe the structural change that Pittsburgh has undergone and to present evidence that this change may have established a basis for the region's future growth.

## 2. The genesis of economic change

Consider the decade of the 1960's in the United States. Urban populations were growing rapidly. In the previous decade, cities were fed by in-migration from agricultural areas as machines replaced people in the fields. The consequences of this great migration flow are still felt today, but in the 1960's they were direct and clear: on average, urban populations were young and urban birth rates were high. Indeed, the growth of urban regions was so robust that leading academics postulated theories of a “ratchet” effect associated with urban size (Thompson, 1965). Cities, they argued, once having achieved a given population threshold (e.g., one million) simply would not get smaller. The advantages of economic activity at that scale in that kind of concentration were simply overpowering, or so the story was told.

Unfortunately, there was an exception to this theoretical finding. In the decade of the 1960’s, the population of the Pittsburgh metropolitan region, which was well over two million, actually declined. An aberration we were told. Pittsburgh, the Steel City, was so specialized that it lacked the functional characteristics necessary for the ratchet theory to hold. The region was a curiosity.

By the 1970’s, more facts presented themselves, and for those with a vested belief in the inevitability of urban growth, the facts were not pleasant. Not only did the Pittsburgh region decline further, but it was joined in population decline by a number of other large metropolitan regions. Many, but not all, of these regions began to grow again in the 1980’s, but Pittsburgh’s population decline only accelerated. Much of this decline was concentrated in the core of the region (Allegheny County). Figure 1 shows the population breakdown between the core and surrounding region over the last two decades. Decline in the core region was coupled with near zero growth in suburban counties to produce an overall shrinking regional population. So much for the ratchet effect; it was another theory laid to rest by a lack of coincidence with reality.

Today, Pittsburgh’s population seems to be growing. After many decades in which migration trends were adverse to the region. One of the more striking aspects of this turnaround has been the reversal of migration rates in the region. Net out-migration from the region exceeded fifty thousand people annually during most of the 1980’s. Figure 2 shows the rate of net migration in the region and its sharp turnaround. In the early 1990's, what had been a mass exodus from the region had turned into a small but positive in-migration.

## 3. Changing industry structure

In order to understand this turnaround, one must look to changes in the region's industrial structure, both as an explanation of its decline and of its resurgence. The data in Table 1 describe the restructuring of major sectors in the Pittsburgh region in terms of employment change and change in "real" value added, a key measure of output.[1] As shown in Panel A, over the twenty years from 1978 to 1998, manufacturing employment in the region declined by 134 thousand jobs, a loss of 52.1 percent. During the same period, non-manufacturing employment increased by 289 thousand jobs or 40.7 percent. The description of change that is given by focusing on output, as measured by real value added is much different. In Panel B, we find that the decline in Pittsburgh's manufacturing sector was limited to the 1978-88 period; it stabilized and posted modest recovery in 1988-98. The losses in the first period were overwhelming, however, and decline characterizes the twenty year period as a whole. Growth in the region's non-manufacturing output closely parallels that in its non-manufacturing employment. Over the twenty year period, 1978-1998, constant dollar value added in this sector increased by nearly 38.2 percent, and this is just slightly less than the percentage gain in employment.

Perspective on this change can be obtained from examining the performance of the U.S. economy, also measured in terms of employment and value added, over the same period of time. Table 2 provides this information, and the comparison is revealing. Again, Panel A presents data on

[1] The word "real" in the term real value added means that constant dollars are used and that the dollar figures are corrected for inflation. In this paper, dollar amounts expressed are measured in constant 1987 dollars.

employment change.  Both Pittsburgh and the United States as a whole lost manufacturing jobs and gained non-manufacturing jobs from 1978-1998.  However, Pittsburgh's decline in manufacturing was very large by national standards (-52.1 percent for Pittsburgh and –10 percent for the U.S.), and Pittsburgh's gain in non-manufacturing employment was relatively weak by national standards (40.7 percent for Pittsburgh and 69.5 percent for the U.S.).  Value added growth was robust at the national level from 1976-1996.  By this measure, manufacturing output increased by 63.2 percent, and the increase in non-manufacturing output was 70.1 percent.  The comparison shows clearly that the drag on the Pittsburgh economy was to be found in its manufacturing sector.  While U.S. manufacturing output was up substantially over the 1978-98 interval, Pittsburgh's manufacturing output declined by over 15 percent.

The decline of Pittsburgh's employment and output base in manufacturing can be traced in large measure to losses in the steel industry.  Of the over 142,000 manufacturing jobs that were lost in the region from 1978-1998,  all but 11 thousand were in durable goods industries, and in Pittsburgh this means steel or closely related activities in large measure.  The reasons for this loss are complex.  The U.S. steel industry as a whole has been challenged by competition from abroad, and while that challenge has been met and U.S. steel manufacturers are now among the most productive in the world, the industry's new competitive strength came at enormous cost in terms of job loss.  For the U.S. as a whole, of the 45 ore-based plants in operation in 1974, only 23 remained open in 1991 (Giarratani and Beeson, 1998) while other plants had their capacity reduced.

Compared to other regions of the United States, Pittsburgh's losses in steel were among the largest, in absolute and relative terms. Simply put, the geographic center of steel-making in the United States had been shifting away from Pittsburgh and toward the Great Lakes since the end of World War II, but during the 1980's that shift accelerated rapidly. Figures 3 and 4 illustrate the spatial changes in the distribution of steel-making capacity over this time period.

The geographic shift in the American steel industry was caused by changes in the core technology used to manufacture steel. The growth of scrap based mini-mill production at the expense of larger integrated producers diminished the competitive advantage employed by the Pittsburgh Region. Pittsburgh once formed a nexus of the raw materials needed to produce steel, being close to abundant supplies of coal and coke production, ample river and rail transportation for delivery of iron ore and finished steel, and a workforce with extensive and specific skills. Being fueled mostly by electric arc furnaces, the need for large coal and coke supplies are not needed in these new plants. Pittsburgh has little competitive advantage in the production or pricing of electricity. The local electric production capacity infrastructure was built out, at significant cost, to accommodate a large heavy manufacturing industry. When this industrial base dissipated the benefits of scale in energy production could not be realized, and prices became inflated. Electric costs in the region remain uncompetitive with the rest of the U.S. to this day.

Pittsburgh is at a further disadvantage with regards to the other major inputs used by the new mini-mills: scrap steel and labor. The Pittsburgh region has a long history of unionization, and it is inconceivable that a new plant in the region would not have a unionized labor force. This is not true elsewhere in the country. While plants in Pittsburgh would necessarily be 'union shops', plants in many other states have right-to-work laws which give individual workers the choice as to whether to join a union.  New mills elsewhere may not even have union representation at all.  In the market for scrap steel Pittsburgh has no real competitive advantage.  Markets in the South and Midwest often have lower prices of No.1 and No.2 scrap steel that are primarily used as inputs in mini-mills.

New mini-mills are far less tied to any geographically defined region. As such, they have often found it more advantageous to locate closer to the markets they intend to serve. Pittsburgh already has a large existing steel production capacity already.  From a demand based, or customer, perspective there is minimal reason to locate a new plant in the region.  The job losses in Pittsburgh reflect both of these phenomenons: restructuring of the national steel industry and loss of much of the region's traditional locational advantage for steel-making.

The steel industry has not, however, totally disappeared from the area.  In fact, a tremendous amount of steel is still made in the Pittsburgh region.  Furnace capacity in the region was estimated at 6.79 million tons in 1994, and this represents 6.18 percent of U.S. total.  Of this, integrated steel firms account for 3.74 million, and most of this is ore-based production of carbon steels.  Specialty steel makers account for just over three million tons of capacity in the region.  Indeed, the industry's restructuring during the 1980's increased the dominance of Pittsburgh in the specialty steel sector. Fully, 38 percent of all U.S. capacity in the specialty steel industry is located in the Pittsburgh region.  The remaining steel-making capacity is accounted for by independent scrap-based producers.

To understand the nature of change in Pittsburgh's non-manufacturing sector more fully, it will prove useful to examine employment growth for the major subsectors of this aggregate category.[2]  Table 3 shows compound annual rates of growth for employment in Pittsburgh and in the U.S. as a whole in six non-manufacturing subsectors: (1) services; (2) finance, Insurance, and

[2] Changes in real value added correspond closely to employment changes in non-manufacturing activities, and for this reason, we rely only on employment to describe trends in the non-manufacturing sub-sectors.

real estate; (3) retail trade; (4) wholesale trade; (5) transportation and utilities; (6) construction; and (7) agriculture. The region's recovery from the economic setback it suffered in the early 1980's is reflected well by this data. While employment growth in all major non-manufacturing sectors lags that of the nation as a whole for the longer period, 1978-98, the region's relative and absolute position improved substantially from 1988-1998 in services, retail trade, transportation and public utilities, and construction. Growth in the transportation and construction industries is explained, in part, by major investments taken in public infrastructure (a new airport and new highway development) as well as by public/private commercial developments in such areas as biotechnology, software engineering, and robotics. Within Services, several sectors stand out as generators of employment growth, including education, medical services (including hospitals), and business services (City of Pittsburgh Department of Finance, 1993), although Table 3 does not show this level of detail.

## 4. **The consequences of adjustment**

One would expect the employment and output changes described above to have substantial impact on Pittsburgh's job market, and they did. At an aggregate level, labor market adjustment in the region is captured well by changes in the overall rate of unemployment. Figure 5 shows the unemployment rate in Pittsburgh relative to the unemployment rate in the U.S. as a whole from 1978 to 1998. The magnitude of the region's employment crisis is brought out clearly in this diagram, but so is an impressive record of adjustment in the face of adversity. Plant closures in the early 1980's forced Pittsburgh's unemployment rate upward, and by 1983 it was more than 50 percent larger than the national average. However, this disparity dissipated rapidly, and by 1989 the region's unemployment rate was lower than the U.S. average. In 1989, the U.S. unemployment rate was 5.3 percent, and Pittsburgh's rate was only 4.7 percent. Since 1989, the differences between U.S. and regional unemployment rates have not exceeded 0.6 percent and at the end of 1998 were within 0.1 percent (Pittsburgh 4.6%, US 4.5%).

While this record of adjustment is impressive by any standard, it is important to appreciate the factors that lay behind it. Changes in a region's unemployment rate come about because of adjustments on both sides of the labor market, demand and supply. As we have seen, the latter half of the 1980's was associated with employment growth in Pittsburgh, and obviously this was a favorable turn of events for those seeking work. While this job growth was welcome, it was modest by national standards. This means that a substantial portion of the improvement we observe resulted from adjustment on the supply side of the market, and there were two contributing factors in this respect. First, out-migration from Pittsburgh was massive during the 1980's. Indeed, among large metropolitan regions in the United States (those with a total population of two million or more), Pittsburgh's rate of population decline in the 1980's was the greatest, and the decline was fed by the out-migration of more than 200,000 people. Migration is "selective", so it should be of no surprise that many of the out-migrants were young job seekers. Mass layoffs forced many to leave the region in search of jobs and union rules placed the brunt of these layoffs on younger workers. It was obvious to young workers that opportunities for the future were much greater in regions that were expanding.

One result of this selective migration has been a major shift in the demographic composition of the population. With the out-migration of younger age cohorts the population became much 'older' on average. The region and in particular it's core: Allegheny County, has one of the highest percentages 65 and older population in the US. (18.3% in Allegheny County, 17.4% for the region as compared to 12.3% for the US in 1998).

Another source of adjustment on the supply side of the labor market was the "discouraged worker effect": many individuals simply gave up looking for work and dropped out of the labor market. Because of this, they were not counted among the "unemployed," even though they may have continued to reside in Pittsburgh (Hoerr, 1988).

Whatever the main cause of adjustment in unemployment rates, the evidence is clear that, in the aggregate, the labor market played an important role in Pittsburgh's recovery, and the region's resilience is tied to this fact. However, adjustment and recovery were not as continuous or as evenly distributed as might be suggested from the region's aggregate unemployment experience. One aspect of the discontinuity involved is geographic in that the effects of the plant closings on area employment were not evenlyy distributed across the region. On the contrary, many of these impacts were highly localized, and concentrated in the area's "mill towns" (Ibid). Dealing with such localized economic displacement is made even more difficult by the highly fragmented structure of local government. In the United States, Allegheny County ranked second in the nation in terms of the level of municipal fragmentation. With over 128 separate municipal governments in Allegheny County (population 1.2 million) the average municipality has a population of under 10,000. Such small-scale governments faced enormous strains on the limited economic development resources needed to deal with structural and cyclical economic changes.

During the 1980's, there was actually only one closure of a steel mill within the city limits of Pittsburgh, the large J&L steel works, but the city itself had the resources to recover from this closing. Many more plants closed in areas that did not have the same ability to cope, and most of these occurred along the Monongahela River south of the city limits in an area called the Mon Valley. During the 1980's, no less than six large steel mills in this area were shuttered or sold and downsized. Two others have ceased most or all of their steel production and are running only limited metals processing or coke production operations. The mill towns that were home to these plants were economically devastated as their largest source of local employment and income was lost. Without the resources or diversity of the central city, there was little the mill towns could do, and a large portion of their working age population was left without jobs. Most of the mill towns have not yet recovered, and out-migration has left them smaller and with a much older demographic profile. Often their tax base collapsed as a result.

At the same time, however, growth in other parts of the region has been very robust. While the population of the central city is in decline, its employment base has expanded nicely. Moreover, centers of population and job growth can be found in many suburbs and in parts of the outlying counties (Bangs,1991). Some of this has to do simply with suburbanization, a movement of jobs and households that is endemic in the United States, but part of the activity is new to the region. There is recent commercial development associated with and in close proximity to Pittsburgh's new airport facilities, and a number of new activities have been attracted by suburban industrial parks. Inevitably, this growth has contributed to the region's recent construction boom.

The heterogeneity of the area's restructuring and subsequent growth has not been restricted to geography alone. During the 1980's more blue collar manufacturing jobs that were lost were white collar management or professional jobs. Recent unemployment numbers indicated that African-Americans were especially hard hit by employment decline in manufacturing. Racial disparities in unemployment and poverty in Pittsburgh are persistent and among some of the highest in the nation (Bangs, 1994).

## 5. **Evidence of Resilience**

The economic shock suffered by the Pittsburgh region in the 1980's was, but evidence of the region's recovery is apparent. Pittsburgh's resilience is reflected by modest employment and output growth after 1986, and in labor market adjustments that have brought its unemployment rate down relative to the national average. We have taken care to portray these findings accurately, and do not wish to diminish the importance of the suffering associated with job loss and economic decline in the region, but overall, the region's recovery from adversity is suggestive of its vitality.

The Pittsburgh region has survived the major structural changes that resulted from the decline of the U.S. Steel Industry. In 1998 the last basic steel operation actually within the limits of the City of Pittsburgh closed (LTV Coke plant). While this resulted in the loss of over 800 jobs, the effect on the regional economy has been minimal. In fact the unemployment rate in the region's core: Allegheny County, is at a multi-decade low of 3.3% at the end of 1998. Manufacturing employment in the Pittsburgh region ceased decreasing in the 1990's, and there has even been a small increase measured between 1992-1998. Pittsburgh has been able to retain significant manufacturing jobs from several multinational firms and has been able to attract significant new investment in recent years. One example is Japan's Sony Electronics Corporation, which built a new large manufacturing plant in the region in the early 1990's. The Sony has created over 2,000 new jobs in the region with a production line of large screen TV's. The region has also been successful in generating new employment in several high technology and high value added companies. Many leading companies have been formed from the intellectual capital concentrated in the Pittsburgh region's 25 colleges and universities. The Lycos Corporation, which is one of the leaders in internet search technology and now a major electronic commerce portal, is one example. Fore Systems, a leader in advanced telecommunications standards and equipment, is an example of a local company that has had a major international impact having been acquired by the General Electric Corporation of Britain in 1999.

Perhaps the most telling evidence of resilience in the Pittsburgh region is to be found in the slowing of its population decline. According to U.S. Census estimates, net out-migration from the region slowed dramatically in the late 1980's and early 1990's. For 1992, there was estimated to be a positive in-migration to the region for the first time in decades. This trend has reversed somewhat in the latter part of the 1990's with out-migration increasing but not reaching anywhere near the exodus of the preceding decades.

Taken together, this evidence suggests that Pittsburgh has reached an important stage of recovery, and this is reflected in one more measure of its resilience. Figure 6 compares the cyclical behavior of the Pittsburgh economy and the U.S. economy by charting real value added in manufacturing from 1978 to 1998. Notice that the region and the nation both enter a period of recession in 1979. While manufacturing output in the nation as a whole recovers from this recession quickly and grows rapidly through the 1980's from 1982 onward, the beginning of

Pittsburgh's recovery is delayed until, at least, 1986. Again in 1990, both the U.S. and Pittsburgh both enter a period of recession, but in this most recent experience, the region's recovery closely mirrors the nation's recovery. They show the same cyclical pattern. Thus, in the first of these two recessions, Pittsburgh's recovery lagged that of the nation by several years, while Pittsburgh's upswing was in tandem with that of the national economy in the second recession.

It is not unreasonable to attribute this change in Pittsburgh's performance over the course of the business cycle to economic restructuring that improved the competitiveness of firms in the region. Old plants were closed during the 1980's, and those that remain have been re-tooled and refocused. The productivity gains realized by firms in the region mean that more output can be produced from a smaller employment base, and the firms are more efficient and better able to cope with cyclical downturns.

6. **Workforce Needs of the New Pittsburgh Economy**.

The industrial changes in the Pittsburgh region have caused equally significant changes in the composition of the local workforce. Pittsburgh has to deal with many of the same trends that are affecting the national workforce, including much higher rates of both job creation and job destruction. Together these two forces have created the greatest levels of job turnover, and the modern worker is more likely than ever to have to deal with finding a new job. The demographics of the local workforce are also changing with more women and single parents working full time. At the same time, the education and skill levels of newly created jobs are far different now than they were two decades ago.

The demographics of the Pittsburgh workforce are unique in many ways. One of the more significant has been the decreased level of female participation in the labor force. Figure 7 shows the trend for female labor force participation for both the U.S. and the Pittsburgh region. Both continue to increase, but Pittsburgh continues to lag the national trend. There are several explanations for this. One explanation derives from the much older age distribution of the Pittsburgh region. As a proportion to the total population, the elderly in Allegheny County are more numerous than in any county outside of traditional retirement destinations in the state of Florida. The elderly population has significantly more women than men and thus more non working women as well. Another reason has been the predominance of shift-based manufacturing in the workforce. With constantly varying schedules, workers in the steel industry would frequently have to work a 2$^{nd}$ (evening) or 3$^{rd}$ (nighttime) shift. This posed significant obstacles for a family with children to have both parents working. As the predominance of manufacturing employment begins to decline, and the age demographics of the region converge with national trends these impacts are expected to decline.

The occupational changes within the workforce are changing rapidly with many of the new skills needed unheard of even a decade ago. Tables 4 and 5 highlight the occupations that have been estimated to have grown the fastest, or declined the most over the last two decades. Not surprisingly, the declining occupations are dominated by those tied to the steel industry, including foundry workers and millwrights. Many of the occupations in decline are not in the steel industry itself were part of the input and service structure required by the steel industry. These secondary effects were heavy, especially in surface transportation and railroad workers. Some of the occupations in decline result directly from specific and abrupt changes in technology, including the need for typesetters and compositors, a field decimated by advanced electronic printing technology.

The occupational fields that are growing the fastest require some of the most specific training and education. Database administrators and computer systems analysts are jobs that can not be filled by those with only a secondary education. The need for advanced education is expanding across industries. Table 6 breaks down the changes in the educational background of the most recently employed cohort of workers, aged 23-30, in the Pittsburgh region by industry. Even traditional blue-collar industries have seen significant increases in the percentage of new workers with college degrees. It is not surprising that the industries with the biggest positive change in the education level of workers correlates with the industries that have shown the largest increases in productivity per worker.

Much public discourse revolves around the demands of a new ‘high technology’ based economy. Pittsburgh has a core of high technology industries fueled by new startups and research ventures seeded by local universities and industries. Firms in industries such as telecommunications, robotics and research and development require a very different workforce than manufacturing industries. A point often overlooked is that the need for workers with high technology skills are needed not only in these new firms but also in more mature industries. The pervasiveness of new technology and it need in all parts of the economy is placing demands on all firms. Table 7 looks at a small subset of high technology workers, those in occupations defined by telecommunications and computer systems. The industry breakdown of where these jobs were created shows that about a third come from firms with a high technology focus. However, two thirds of the new jobs were generated in much more traditional industries as diverse as insurance and education.

A skilled workforce is a key factor in regional competitiveness and is essential to attracting new firms to the region. With higher education levels needed in the workforce, the pipeline of worker development has been extended. Looking toward future growth has become more reliant on training qualified workers now.

## 7. Conclusions

Pittsburgh's experience stands as an important example of a region that has faced enormous challenges and responded to them well. The collapse of its manufacturing base was swift and extreme, and the resultant job losses imposed hardships on many individuals, but in important ways, the region has recovered from this loss.

The region's policy response to this crisis emphasized the promotion of business development. The strategy consisted of: (1) supporting high technology and other growth industries; (2) targeting traditional manufacturing industries for development; (3) encouraging state government to reduce business taxes and help lower other costs of doing business; and (4) making major transportation improvements (particularly the airport and highways).

The effectiveness of these efforts cannot be judged by employment growth alone. Employment losses in Pittsburgh's manufacturing base are the result of very powerful market forces, and the effects of these losses have spilled over to non-manufacturing activities. Frankly, within the U.S. policy environment, it is not in the realm of possibility for any regional initiative to counter those forces fully and restore the region's traditional economic base. However, if the criterion for success is the restoration of Pittsburgh's vitality, a strong case can be made that development policies have had a positive effect. They have contributed to the diversification of economic activity in the region, helped to restore and modernize its infrastructure base, and assisted individuals and firms as they coped with adversity.

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Table 1: Employment and Value Added by Major Sector in the Pittsburgh Region, 1978-1998

Panel A: Employment (Thousands of Jobs)

| | 1978 | 1988 | 1998 | Percent Change 1978-1988 | Percent Change 1988-1998 | Percent Change 1978-1998 |
|---|---|---|---|---|---|---|
| Manufacturing | 272.7 | 151.1 | 130.5 | -44.6 | -13.6 | -52.1 |
| Non-Manufacturing | 748.6 | 881.5 | 1,053.3 | 17.8 | 19.5 | 40.7 |
| Total Private Non-Farm | 1,021.3 | 1,032.6 | 1,183.8 | 1.1 | 14.6 | 15.9 |

Panel B: Value Added (Billions of 1992 US$)

| | 1978 | 1988 | 1998 | Percent Change 1978-1988 | Percent Change 1988-1998 | Percent Change 1978-1998 |
|---|---|---|---|---|---|---|
| Manufacturing | 7.0 | 5.1 | 5.9 | -26.5 | 15.3 | -15.2 |
| Non-Manufacturing | 23.4 | 25.7 | 32.3 | 9.9 | 25.7 | 38.2 |
| Total Private Non-Farm | 30.4 | 30.9 | 38.3 | 1.5 | 24.0 | 25.9 |

*Source: The 1998 Pittsburgh REMI Model. Data for 1998 is estimated*

Table 2: Employment and Value Added by Major Sector in the United States, 1978-1998

Panel A: Employment (Thousands of Jobs)

| | 1978 | 1988 | 1998 | Percent Change 1978-1988 | Percent Change 1988-1998 | Percent Change 1978-1998 |
|---|---|---|---|---|---|---|
| Manufacturing | 20,967.4 | 19,886.0 | 18,867.0 | -5.2 | -5.1 | -10.0 |
| Non-Manufacturing | 66,962.2 | 91,149.9 | 113,467.6 | 36.1 | 24.5 | 69.5 |
| Total Private Non-Farm | 87,929.6 | 111,035.9 | 132,334.6 | 26.3 | 19.2 | 50.5 |

Panel B: Employment (Thousands of Jobs)

| | 1978 | 1988 | 1998 | Percent Change 1978-1988 | Percent Change 1988-1998 | Percent Change 1978-1998 |
|---|---|---|---|---|---|---|
| Manufacturing | 1,353.9 | 1,759.3 | 2,209.7 | 29.9 | 25.6 | 63.2 |
| Non-Manufacturing | 2,437.8 | 3,226.5 | 4,146.3 | 32.4 | 28.5 | 70.1 |
| Total Private Non-Farm | 3,791.7 | 4,985.8 | 6,356.0 | 31.5 | 27.5 | 67.6 |

*Source: The 1998 Pittsburgh REMI Model. Data for 1998 is estimated*

Table 3: Compound Annual Rates of Growth in Employment in Non-Manufacturing Sectors
Pittsburgh Region and the United States, 1978-1998

| Sector | Pittsburgh 1978-1988 | Pittsburgh 1988-1998 | Pittsburgh 1978-1998 | United States 1978-1988 | United States 1988-1998 | United States 1978-1998 |
|---|---|---|---|---|---|---|
| Services | 3.64 | 2.18 | 2.91 | 4.56 | 3.23 | 3.89 |
| FIRE | 0.73 | 3.38 | 2.05 | 2.58 | 0.95 | 1.76 |
| Retail Trade | 0.93 | 1.02 | 0.98 | 2.50 | 1.81 | 2.15 |
| Wholesale Trade | 0.51 | 0.36 | 0.44 | 1.75 | 1.00 | 1.38 |
| TPU | -0.94 | 1.86 | 0.45 | 1.40 | 1.80 | 1.60 |
| Construction | -0.22 | 1.26 | 0.52 | 2.49 | 1.61 | 2.05 |
| Mining | -3.29 | -3.36 | -3.32 | 0.32 | -3.16 | -1.44 |
| Agriculture and Forestry | 6.11 | 4.70 | 5.40 | 5.26 | 3.63 | 4.44 |

*Source: The 1998 Pittsburgh REMI Model. Data for 1998 is estimated , FIRE = Financial, Insurance and Real Estate, TPU= Transportation and Public Utilities*

**Table 4: Fastest Growing Occupations in Western Pennsylvania: 1980-2000**

| Rank | Occupation | Employment Total 1980 | Employment Total 2000 | Percentage Growth 1980-2000 |
|---|---|---|---|---|
| 1 | Database administrator | 139 | 3,357 | 2315.1 |
| 2 | Computer engineers | 723 | 6,290 | 770.0 |
| 3 | Computer systems analysts | 1,653 | 13,750 | 731.8 |
| 4 | All other therapists | 91 | 754 | 728.6 |
| 5 | Systems analysts | 924 | 7,420 | 703.0 |
| 6 | Computer, mathematical | 2,587 | 14,811 | 472.5 |
| 7 | Flight attendants | 526 | 2,371 | 350.8 |
| 8 | Teachers, special education | 534 | 2,171 | 306.6 |
| 9 | Manicurists | 283 | 1,131 | 299.6 |
| 10 | Respiratory therapists | 345 | 1,339 | 288.1 |
| 11 | Paralegals | 581 | 2,163 | 272.3 |
| 12 | Physical and corrective therapists | 397 | 1,467 | 269.5 |
| 13 | Occupational therapy assistants | 74 | 262 | 254.1 |
| 14 | Computer engineers | 846 | 2,925 | 245.7 |
| 15 | Therapists | 1,819 | 6,037 | 231.9 |
| 16 | Physical therapists | 576 | 1,862 | 223.3 |
| 17 | Occupational therapists | 261 | 841 | 222.2 |
| 18 | Cardiology technologists | 86 | 269 | 212.8 |

**Table 5: Occupations with the Largest Percentage Decrease Western Pennsylvania: 1980-2000**

| Rank | Occupation | Employment Total 1980 | Employment Total 2000 | Percentage Growth 1980-2000 |
|---|---|---|---|---|
| 1 | Station installers | 995 | 242 | -75.7 |
| 2 | Railroad brake, signal operators | 147 | 36 | -75.5 |
| 3 | Heat treating machine operators | 1,481 | 366 | -75.3 |
| 4 | Rail yard engineers | 323 | 81 | -74.9 |
| 5 | Riggers | 434 | 110 | -74.7 |
| 6 | Rail transportation worker | 484 | 123 | -74.6 |
| 7 | Film strippers, printers | 361 | 97 | -73.1 |
| 8 | Typesetting and compositors | 206 | 57 | -72.3 |
| 9 | Crane and tower operator | 3,937 | 1,093 | -72.2 |
| 10 | Foundry mold assemblers | 492 | 137 | -72.2 |
| 11 | Paste-up workers | 244 | 68 | -72.1 |
| 12 | Millwrights | 3,733 | 1,048 | -71.9 |
| 13 | Housekeepers and butlers | 294 | 85 | -71.1 |
| 14 | Coil winders, tapers | 635 | 208 | -67.2 |
| 15 | Roustabouts | 332 | 109 | -67.2 |
| 16 | Motion picture projectionists | 115 | 38 | -67.0 |
| 17 | Machine tool cutting operators | 3,172 | 1,094 | -65.5 |
| 18 | Furnace operators | 1,762 | 620 | -64.8 |

**Table 6: Educational Breakdown of 23-30 Year Old Labor Force by Industry**

Pittsburgh Metropolitan Area - 1980 and 1990

| | Percentage Breakdown | | | | | |
|---|---|---|---|---|---|---|
| | College Degree | | High School Degree | | Less than HS Degree | |
| | 1980 | 1990 | 1980 | 1990 | 1980 | 1990 |
| Mining | 18.8 | 29.4 | 74.2 | 58.8 | 7.0 | 11.8 |
| Construction | 14.1 | 10.9 | 75.3 | 76.6 | 10.6 | 12.5 |
| Manufacturing, Non-Durable | 21.2 | 26.9 | 70.1 | 66.4 | 8.7 | 6.7 |
| Manufacturing, Durable | 15.4 | 22.1 | 78.7 | 73.1 | 5.9 | 4.8 |
| Transportation and Utilites | 17.7 | 21.8 | 77.1 | 72.3 | 5.2 | 6.0 |
| Wholesale Trade | 26.0 | 26.8 | 69.8 | 70.2 | 4.2 | 3.0 |
| Retail Trade | 15.3 | 16.3 | 75.0 | 75.2 | 9.7 | 8.6 |
| Finance, Insurance and Real Estate | 32.4 | 37.5 | 66.4 | 60.6 | 1.1 | 1.9 |
| Services | 40.4 | 38.8 | 55.4 | 56.8 | 4.2 | 4.4 |
| Public Administration | 26.3 | 24.8 | 66.9 | 71.3 | 6.8 | 4.0 |

*source: Bureau of the Census, Public Use Micro Sample, authors' calculations*

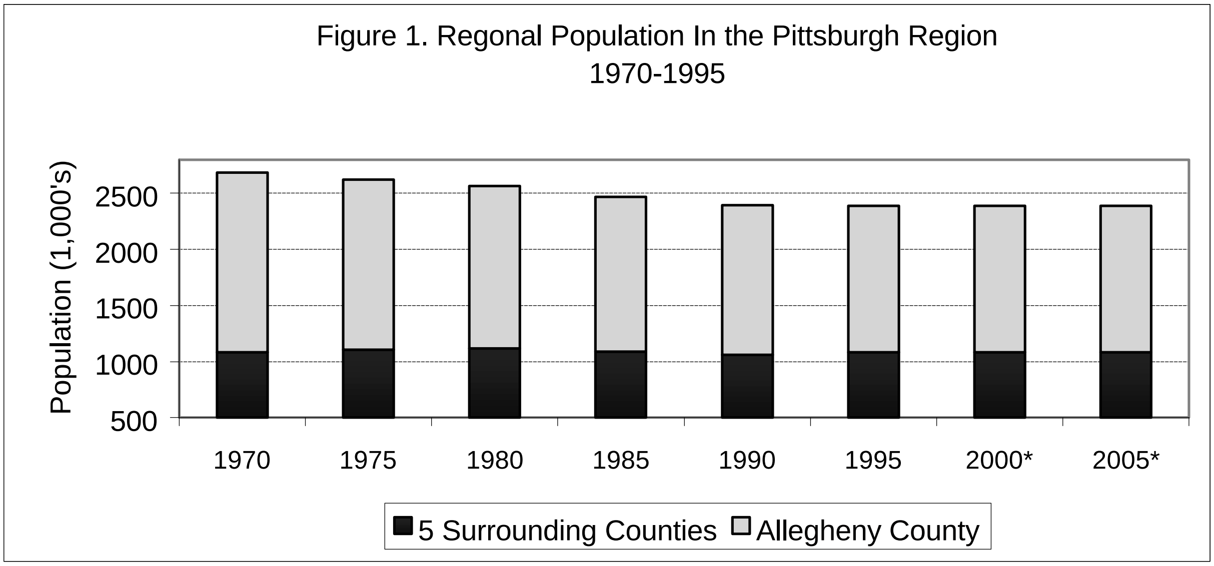


Figure 1. Regonal Population In the Pittsburgh Region
1970-1995
Population (1,000's)
2500
2000
1500
1000
500
1970
1975
1980
1985
1990
1995
2000*
2005*
5 Surrounding Counties
Allegheny County

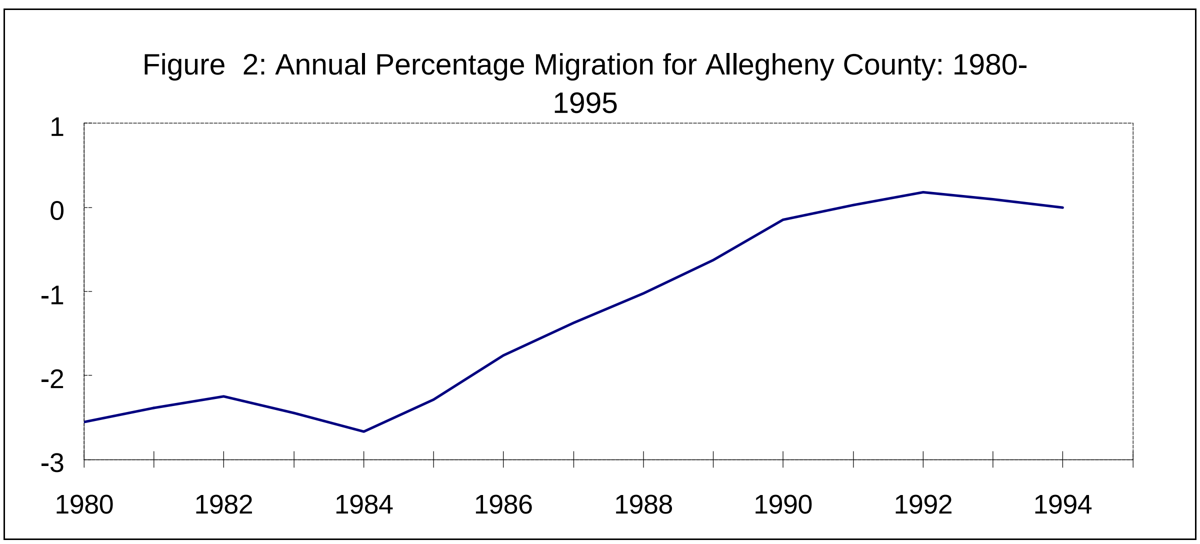
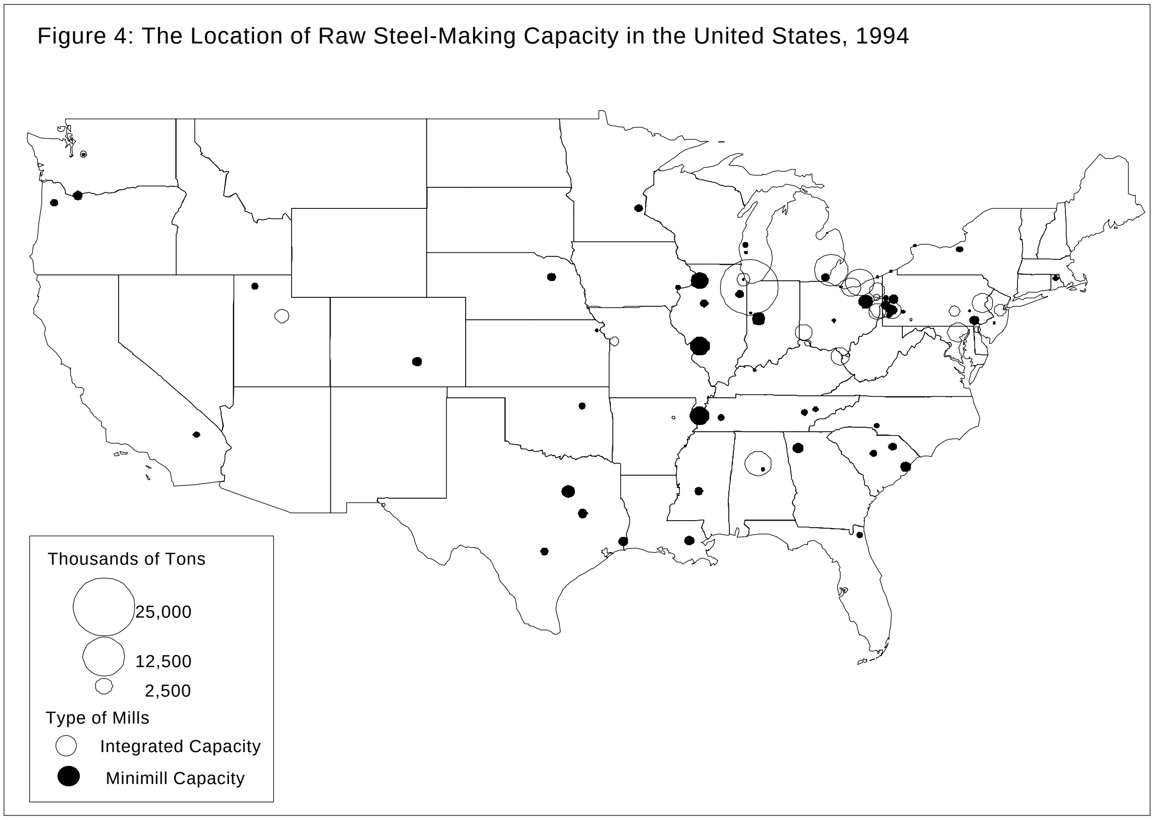


Figure 2: Annual Percentage Migration for Allegheny County: 1980-1995
1
0
-1
-2
-3
1980
1982
1984
1986
1988
1990
1992
1994

Figure 3: The Location of Raw Steel-Making Capacity in the United States, 1974


Source: Steel Industry Bank, University Center for Social and Urban Research, University of Pittsburgh




Source: Steel Industry Data Bank, University Center for Social and Urban Research, University of Pittsburgh

Figure 5. Unemployment Ratio: Pittsburgh/United States 1970-1998

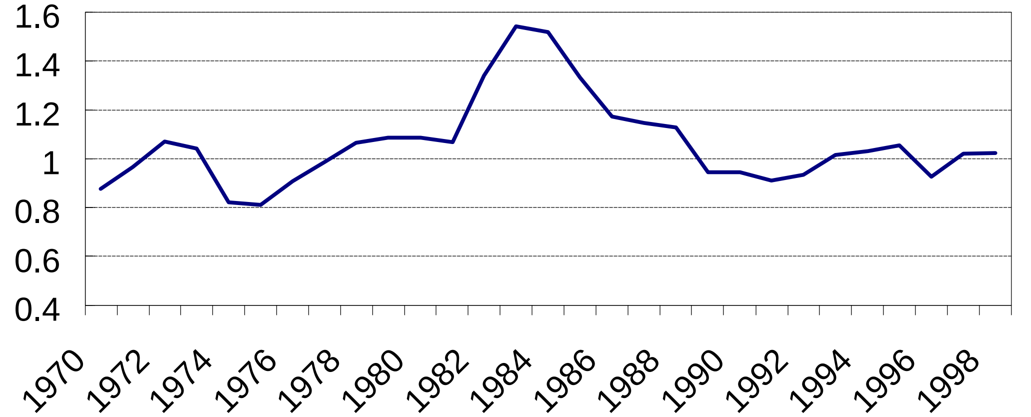
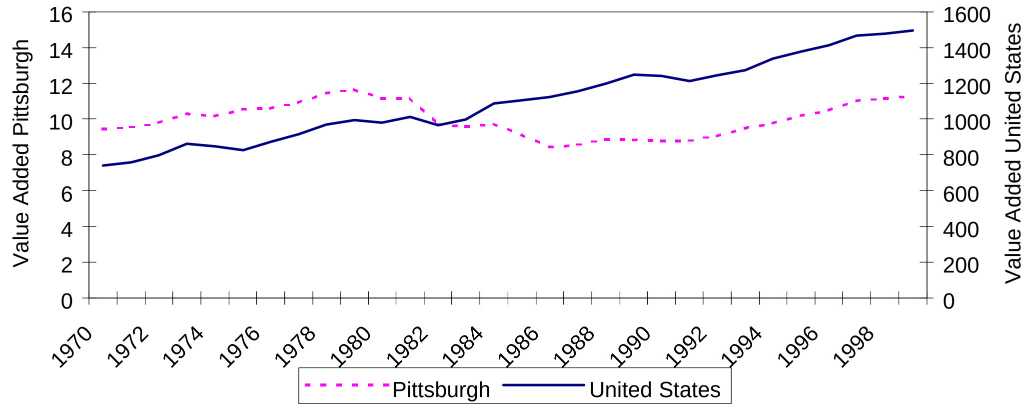



Figure 6: Total Manufacturing Vallue Added (Billions of 1992 US$)



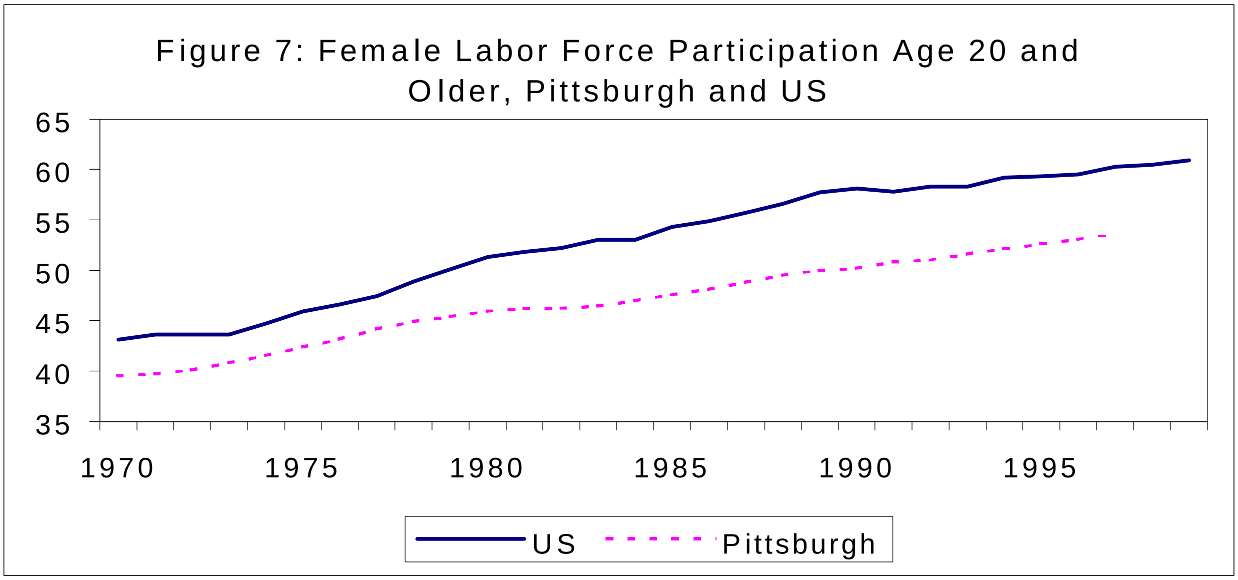


Figure 7: Female Labor Force Participation Age 20 and Older, Pittsburgh and US
65
60
55
50
45
40
35
1970
1975
1980
1985
1990
1995
US
Pittsburgh