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Education and Rural Economic Development: Strategies for the 1990's. Agriculture and Rural Economy Division, Economic Research Service, U.S. Department of Agriculture. ERS Staff Report No. AGES 9153.

Abstract

The 1980's found the U.S. economy vulnerable in the global marketplace. Many observers have argued that workforce education and skill levels are too low. Rural workers have especially low levels of education and the 1980's were especially unkind to these workers. This study examines the education crisis, the relationship between the education shortfall and rural economic stagnation, the importance of local workforce education levels for local area growth, and the options for upgrading the skills of the rural workforce. The central conclusion is that education's potential as a local area rural development strategy is probably quite limited, but that the need to raise education and training levels for rural youth, wherever they will work, is critical.

Keywords: Rural development, rural education and training, rural industry structure, rural earnings, local employment growth, rural development policy

Washington, D.C. 20005-4788 **September 1991**

Foreword

This report examines education and training as a strategy to promote rural economic development. It is the third of four reports on the effectiveness of selected strategies that governments can use to stimulate such development. Two published reports examined strategies centered on financial market intervention and investment in public infrastructure. A fourth, still in progress, will examine a range of business assistance strategies to enhance rural developments prospects.

For the purposes of our analysis the central goals of rural development are raising rural incomes toward the national average and helping preserve the viability of threatened rural communities. In this series, the effectiveness of each rural development strategy is measured by its chance of success in advancing either or both of these goals.

These reports are intended to support policymakers with timely economic analysis of rural issues. Like Rural Economic Development in the 1980's, the comprehensive collection of studies on rural conditions and economic characteristics published in 1988, it reflects ERS's efforts to sharpen the focus of its research and make it more useful and accessible to policymakers and their staffs.

Important rural policy issues are now on the agendas of the Executive Branch and Congress. The President's Rural Initiative shows a strong interest in rural development. Under that initiative rural development councils have been established in eight pilot states and USDA is moving to establish a Rural Development Administration, as authorized by the 1990 Farm Bill. Rural development has also been linked by the foreign ministers of the world's developed nations to agriculture policy reform and with success in the Uruguay Round of negotiations on the General Agreement on Tariffs and Trade. Finding effective means to help rural areas develop may be a key to agriculture policy reform.

The poor performance of the U.S. rural economy during most of the 1980's lies behind much of the current policy concern in this country. Similar trends are apparent in other developed countries. Following an historically unprecedented rural renaissance in the 1970's, most of America's rural areas were hit hard and recovered slowly from the 1980-82 recessions. Although there was evidence of an upturn late in the decade, the 1980's was a dismal decade for most rural areas by virtually every measure. Rural per capita income stagnated in real terms and fell in relation to urban per capita income. New jobs were created at a much slower pace and real earnings per job declined absolutely. Rural unemployment rates rose faster than urban rates and stayed at higher levels throughout the 1980's. At one point in the

decade, the rural poverty rate was 35 percent greater than in metropolitan areas. And more than half the nation's rural counties lost population in the 1980's.

Each report in this series contains chapters exploring various aspects of one broadly defined rural development strategy. They review previous social science research and present new analysis. They do not evaluate specific programs. Rather, the objective of the series is to describe the likely consequences of adopting a broad approach, including its effectiveness, limitations, and incidental effects.

As in the whole series, the authors of this report used their own methods of analysis and reached their own conclusions. However, each author or team of authors read drafts of the other chapters, and sometimes reshaped their own study to make this report more congruent. David McGranahan directed the current study. Other ERS researchers and analysts outside the agency also reviewed and commented on some or all of the chapters.

Rural development goals are numerous and diverse. They include reducing the gap in incomes and standards of living between rural and urban people, helping threatened rural communities remain viable, attacking extensive and persistent poverty in certain rural areas, preserving the rural character of some areas, helping the family farm survive, contributing to overall national economic well-being, and conserving natural resources and the environment.

Some of these goals are independent, some mutually reinforcing. But in practice, progress toward one goal often seems to come at the expense of others. Almost any strategy will succeed by some criteria and fail by others. Analysis that does not measure a strategy against a specified set of key goals may identify many benefits but not contribute much to the policymaker's search for best means of achieving the broader purposes. Therefore we have chosen, in effect, to define rural economic development by what seem to us its two broadest and most widely held goals: increasing incomes and promoting community viability.

Richard W. Long*
Associate Director
Agriculture and Rural Economy Division, 1988-91

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Acknowledgments

Many people in addition to the authors contributed to this report and others in the series. A committee made up of Richard Long, David McGranahan, Tom Hady, Herman Bluestone, Katherine Reichelderfer, Sara Mazie, Norman Reid, and Patrick Sullivan planned the series. Richard Long was editor of the series. For this publication, Lindsay Mann provided editorial guidance and Tonya Sullivan and Dominique Harris provided the production assistance and manuscript preparation. Martha Frederick helped prepare the charts.

Although final responsibility for the contents rests with the authors and the Economic Research Service, Stuart Rosenfeld of the Southern Growth Policies Board read and commented thoughtfully and usefully on several of the chapters in this report. Like most research in the Agriculture and Rural Economy Division of the Economic Research Service, many of the concepts and some of the analysis used in this series are drawn from a base built by colleagues. That base is too interwoven and has been created by too many researchers over too long a period to allow full recognition for each contribution. Most notable in that group, however, are Calvin Beale, originator of many of the ideas and approaches echoed in all ERS's rural development studies, and Kenneth Deavers, Director of the Division, who has guided the ERS rural development research program intellectually, as well as administratively, for many years.

Contents

Chapter 1
Introduction

David A. McGranahan*

"Jobs are becoming more demanding, more complex. But our schools don't seem up to the task. They are producing students who lack the skills that business so desperately needs to compete in today's global economy. And in doing so, they are condemning students to a life devoid of meaningful employment" (8).[1]

The 1980's found the U.S. economy vulnerable in the global marketplace. Many observers have argued that workforce education and skill levels are too low. Rural workers in the United States have especially low levels of education, and the 1980's were especially unkind to these workers. This coincidence prompted our charge to investigate education's role in rural development and its potential as a rural development strategy. We broke the investigation into several related questions: What is the evidence of a national crisis in workforce education? Were low rural education levels the cause or the consequence of rural economic misfortune in the 1980's? Is there a critical need to improve education and training of rural youth? What are the problems and possibilities for improving education and training in rural areas?

Our central conclusion is that education's potential as a local rural development strategy is probably quite limited. Rural areas appear to have been hampered more by their small size and remoteness in the 1980's than by a lack of qualified workers. Rural areas generally could not hold on to the better educated workers that they had. Urban jobs in the 1980's were more available and better paying than rural jobs for these workers, and they migrated from rural to urban areas. This "brain drain" lowered the workforce education levels of rural young adults. Other evidence that low education was generally not a hindrance is that employment growth in rural areas with relatively highly educated populations was generally no greater

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[1] Italicized numbers in parentheses identify literature cited in the References at the end of this chapter.

than in other rural areas. Local dropout rates were completely unrelated to economic growth.

Our second conclusion is that, although the link between local education and local economic growth appears weak, the need to improve the education and training of rural youth is critical. The earnings of less educated workers fell markedly in the 1980's in rural and urban areas alike, considerably increasing the importance of extra years of schooling for job and career opportunities. Moreover, while the severity of the problem is unclear, education and training levels need to be improved if the country is to fully compete on an international level with industrialized nations.

Finally, our findings strengthen the case for shifting the responsibility for funding education away from localities to broader units of government. Rural areas tend to be disadvantaged both by their small schools and school systems, which allow few economies of scale, and by weak tax bases. Many argue for a stronger State or national role on the basis of geographic equity. But, the problem is more than one of equity between rich and poor area students. To the extent that local investment in rural schools does not generate local economic growth, support by local business owners and other groups for raising local school property taxes is likely to be weakened. Education is apt to have a better payoff for States and the Nation as a whole, where outmigration is less of a factor. One reason for long-term educational underinvestment in this country compared with other industrialized nations may have been the geographic level at which education is funded.

Overview of the Problem

The 1980's were unkind to rural workers, their families, and their communities. Job growth stagnated, unemployment rates remained high, earnings declined, and people moved out. Outmigration had been characteristic of rural areas from the 1920's until the "rural renaissance" of the 1970's. But the 1980's did not involve a return to old trends. The rural outmigration of earlier decades, much of it an exodus from marginal farms, was accompanied by rising real rural per capita incomes and a narrowing of the rural-urban income gap (*3*). In contrast, rural per capita incomes fell in the 1980's, and the disparity between rural and urban incomes grew.

The stagnation of its manufacturing employment was a key contributor to the rural economy's problems in the 1980's.[2] Nonmetro manufacturing

[2] Despite the farm crisis, the farm population declined more slowly during 1980-87 than it had in the 1970's. The loss of jobs in mining severely hurt many rural communities, but even in 1980, mining employment was only 3 percent of the nonmetro total.

employment grew by 26 percent in the 1960's and 21 percent in the 1970's to occupy nearly 23 percent of the nonmetro workforce in 1980—over twice that of agriculture and mining combined (*4*)[3]. This engine of rural growth failed in 1980-88, when there was virtually no manufacturing employment gain. The stagnation in manufacturing, in combination with employment losses in both mining and farming, dampened growth in rural consumer service industries, and the rural economy languished.

While manufacturing employment stagnated in rural areas in the 1980's, it declined in the Nation as a whole. This loss, starting in the late 1970's, was induced by increasing foreign competition and the introduction of laborsaving technology. It provoked considerable concern about U.S. competitiveness in world markets. Industrial organization, management's short time horizons, and lack of innovation have been among the reasons cited for the failure of our industry to compete, but considerable attention has focused on the education and training of the workforce. The United States is losing out in international competition because, the argument goes, the workforce is too poorly educated to compete with other industrialized countries, and too well paid to compete with rising Third World countries.

This undereducation argument raises the question of whether the rural economic problems of the 1980's were not the reflection of an education crisis. Given their relatively low education compared with urban workers and workers in other developed countries, rural workers may simply not have been able to compete in the world market and earn what we consider a reasonable wage. If so, then the solution to the rural crisis would seem to be to lower rural dropout rates, improve the quality of rural schools, and develop rural area adult education and training programs.

There is an alternative explanation for the rural crisis, however. The remoteness and sparsity of rural settlements may make them largely unsuitable for complex manufacturing operations, industrial research, or other activities requiring relatively high-skill employees. Thus, rural areas lost out in the 1980's more because they were rural than because rural workers had low education levels. From this perspective, education is not the rural bottleneck, rurality itself is. To compete nationally and internationally, rural areas need to overcome the limitations of rurality, such as their lack of access to information and specialized services and the small, undiversified nature of their labor markets.

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[3] Statistics based on the 1974 definition of metro areas. The use of later definitions results in lower statistics for manufacturing because some of the counties most dependent on manufacturing are adjacent to metro areas and were absorbed in the redefinitions.

Overview of Findings

This report presents the results of our investigation into the issue of education and rural development. The second chapter describes and assesses the research evidence for the education crisis. The third and fourth chapters are original research examining the role of the education crisis in the current rural economic stagnation and the relevance of workforce education levels for local growth in rural and urban areas in the past two decades. The final chapter presents some components of a rural education strategy.

Chapter 2 focuses largely on the national education issue. Drawing from recent literature, Teixeira and Swaim look at the education crisis argument from both the demand side (job skill requirements are going up) and the supply side (young adults are not well trained) to make a preliminary assessment of the extent and importance of the crisis.

Evidence of a dramatic new rise in job skill requirements is weak. Shifts in the occupational/industrial structure of the economy suggest that the number of jobs demanding relatively high skills has been growing faster than the growth in lower skill jobs, but the shift upwards was actually slower in the 1980's than in earlier decades—or at least no faster. Moreover, projections of future change in job structure indicate an even greater slowing in the shift toward higher skill jobs.

Change over time also involves changes in the skill levels of the jobs themselves, however. With new technology, a textile mill machine operator may need much more skill and ability today than was required 10 years ago. This type of upgrading is not captured by analyses of which types of jobs are growing and which are declining. Much of the national debate on the education and skill crisis focuses on job upgrading, but the only recent information available is indirect or anecdotal. There is thus a great deal of uncertainty about changes in educational requirements in the workplace, even at the national level.

Evidence of a stagnation in workforce skill levels is stronger. First, the schooling levels of young adults, which rose markedly in the 1970's, stopped improving in the 1980's. Second, at least through high school, students are not learning what they need to know. Scholastic Aptitude Test scores are well below what they were 20 years ago. On international tests, U.S. students are well below the average for industrialized countries. Still other tests show that many students have acquired only minimal verbal and numerical skills. Vocational training programs often have limited payoffs, as the skills acquired are not those the students end up using. The quality aspects of the education crisis, however, seem to be largely limited to

primary and secondary schools. U.S. colleges and universities are generally considered internationally peerless.

The workforce skill level problem is exacerbated by the declining growth in the labor force as a whole. Workforce education levels typically have risen in recent decades because young entrants have much more education than workers who are retiring. With most members of the 1947-62 baby-boom generation now in the labor force and women's labor force participation increasing less rapidly, education levels of the workforce will rise relatively slowly in the coming decades even if young adults entering the labor market once again have high levels of education.

Chapters 3 and 4 investigate the changing importance of education for rural economies and workers. The measures of education in these chapters are based on years of schooling. Lacking data on other aspects of education, we cannot adequately investigate a number of issues important for considering rural educational strategies, including questions of the quality and type of education, on-the-job training, and nonacademic courses. Both chapters strongly suggest that low education levels, at least, were not at the root of the problems facing rural areas in the "new economy" in the 1980's.

In Chapter 3, McGranahan and Ghelfi analyze the ways that national changes in the supply and demand for educated workers have affected metro and nonmetro workers differently. During the 1970's, the labor force grew rapidly as the baby-boom generation became young adults. Members of this generation, especially those who were subject to the Vietnam War draft, were exceptionally highly educated, and the number of college-educated young adults grew rapidly in the 1970's. This growth, accompanied by an increase in women's labor force participation, appears to have exceeded any increases in demand for workers, especially for those with high education. Earnings fell during the period, somewhat more for the better educated young adults than the less well educated. This earnings decline was greater in urban than rural areas across all education levels, which probably contributed to the reversal of the historic pattern of rural outmigration to urban areas during the 1970's.[4]

The story was markedly different in the 1980's. The rise in employers' need for educated workers appears to have outpaced the rise in workforce education levels. In the production sector, more affected by global competition and changing technology than the consumer sector, the shift

[4] Even with net outmigration from metro areas, the entrance of the baby-boom generation into the labor market in the 1970's meant that the metro labor force growth rate was substantially greater than it had been in the 1960's. Because of declining birth rates and outmigration, however, metro population growth slowed (*4*).

towards jobs requiring high levels of education was much greater in the 1980's than in the previous decade. Jobs typically requiring 1 or more years of college comprised 75 percent of the net gain in new jobs in this sector. In the consumer services sector, the shift towards high education jobs completely disappeared in the 1980's so that, for the economy as a whole, there was little difference between the 1970's and 1980's in the rise in the education levels of jobs. These results help explain why industry analysts may see an accelerating demand for educated workers while the national studies cited in Chapter 2 find continued modest increases in the skills required in the economy.

The education levels of young adults stopped improving and even declined among men in the 1980's. The production sector shift away from low-skill jobs towards those requiring high education, combined with the stagnation in the education levels of new workers, contributed to a fall in earnings for young adults without college or graduate education in the 1980's. For men aged 25-34 working full-time who had not completed 12 years of school, median earnings fell by over 25 percent between 1970 and 1986. The shift from low to high education jobs was greater in metro areas. Metro employers outbid nonmetro employers for the more highly educated workers, which contributed to a substantial net outmovement of these workers from rural to urban areas in the 1980's.

Only in the relatively low-skill, routine manufacturing industries did rural areas maintain any advantage in the 1980's. When these industries, which include automobiles and textiles, closed factories or laid off workers, they tended to do it first in the higher wage urban areas. And the few new plants built tended to go to small towns rather than major cities. These rural-urban shifts resulted in a greater rural-urban division of labor, with jobs for the highly educated increasingly urban and jobs for the less educated increasingly rural. Rural areas fell further behind urban areas in both education and earnings during the decade.

The analysis presented in Chapter 3 provides no support for the thesis that rural area economic growth was impeded by the low education levels of rural workers in the 1980's. Rural workers had even lower education levels in the 1970's, when high-education jobs grew more rapidly in rural than urban areas. The premium paid to workers with high education, about the same in rural and urban areas in the 1970's, rose much more in urban areas than rural areas in the 1980's, suggesting a greater urban shortage relative to demand. Moreover, the rural brain drain, with a high proportion of the rural better educated migrating to urban areas, was apparently a major reason for the decline in rural young adult education levels in the 1980's.

In chapter 4, Killian and Parker investigate the importance of workforce education for rural area development more directly by testing whether local areas with relatively high education levels tended to have greater gains in employment in the 1970's and 1980's. They find a statistically significant association between the average education of nonmetro commuting zones in 1980 and subsequent employment growth in 1980-88. But this association is quite weak, weaker than found for the same areas a decade earlier and much weaker than among metro commuting zones. The weakness of the correspondence between local education and local growth is visibly apparent in the maps presented by the authors.

Multivariate regression results indicate that by far the best predictor of local growth rates in nonmetro commuting zones in the 1970's and 1980's is the national growth rate of the local mix of industries. Low earnings per job, high female composition of the workforce, and other characteristics of low wage areas were also associated with rural employment growth. A measure reflecting the attractiveness of areas as places to live was also strongly related to growth.

Once differences in industry mixes among rural commuting zones are taken into account, local education has no net association with local employment growth. Thus, the reason for any association between the two appears to be that areas with relatively high education levels have also tended to be areas with industries that gained employment nationally. For any given initial industry mix in 1970 or 1980, the education of an area's workforce had no bearing on its employment growth in the subsequent decade. Nonmetro results were similar for other measures of local education, including the proportion who had completed college and the proportion of young adults who were out of school without completing 12 years of high school.

The results were quite different for metro commuting zones. Surprisingly, areas with both a high proportion of young adults who have not finished 12 years of school and a high proportion of college finishers appear to have had more employment growth than other areas in 1980-88. The authors suggest that urban areas with a high proportion of school leavers may have an ability to create low-level service sector jobs, such as waiting tables, office cleaning, and message delivery, which are required to support managerial, financial, legal, and other operations associated with high education and high growth.[5]

[5] As the authors point out, their analysis does not address questions about the pay or quality of jobs. Some preliminary analyses of earnings in nonmetro commuting zones suggest that high local education levels did not generally provide local areas any advantage in change in earnings per job during 1980-88.

The results of the area analysis are generally consistent with the findings reported in Chapter 3 in suggesting that workforce education—in the 1980's, particularly college education—has been important in urban areas, but largely irrelevant to employment growth in more rural labor markets in the past 20 years. While raising individual education levels improves individual opportunities, and raising the Nation's education level should make us more competitive internationally, there is little evidence that raising local education levels is in itself a key to rural employment growth.

One reason may be that the types of activities that most require highly educated workers are also those that tend to require substantial skilled labor pools, access to specialists and information sources, and other social and informational infrastructure generally available only in larger, more urban areas. The globalization of markets, the increase in the pace of technological change, the growth in importance of small, independent firms, the decline in number of well-educated new labor force entrants, and the rapid development of information technology in the 1980's may all have made the access to this infrastructure, including its large, highly educated work force, more necessary for business success than in earlier decades. Thus, the greater the premium placed on access to knowledge and information in the economy, the more urban its orientation and the greater the urban demand for a highly educated labor force.

In the 1980's, outside of the usually declining and always unstable agriculture and mining industries and, in some sites, recreation and retirement, rural areas appear to have had a competitive advantage over urban areas only in routine manufacturing activities. To the extent that their current technology does not require a highly schooled workforce, however, rural manufacturers and, by extension, rural production labor may in turn be at a competitive disadvantage internationally, even at the currently low rural earnings levels. The future prosperity of rural areas depends on their finding niches in the global economy, niches which offer both comparative advantages and reasonable earnings.

One possible direction for rural areas would be toward becoming part of larger territorial complexes both in terms of labor market and industry structure. Nonmetro counties adjacent to metro areas have often benefited economically from this proximity, with somewhat greater employment and earnings gains than more remote counties. But the question may go beyond physical adjacency. The basic structure of industry may be evolving towards more flexible organizations and reduced inventories and, thus, smaller plants and closer ties between suppliers and assemblers (*1*, *6*). The Japanese auto industry has tended to function this way, with "just-in-time" parts delivery schedules, creating local complexes of suppliers and assemblers, a pattern that is being repeated around Japanese auto plants in the United States (*2*).

Plants in some smaller towns, especially those along Interstate highways, are participating in these complexes. The extent to which manufacturing industries in general will develop this type of organization is still unclear, but the pattern would appear to favor rural counties that can be linked into larger territorial complexes. In this context, improving local skill levels may gain in importance.

Even in the absence of this development, improving the quality of local schools and increasing completion rates may benefit rural economies indirectly, by making local labor more employable in general, more likely to migrate if local opportunities are poor, and thus less likely to suffer local unemployment and underemployment. Having a large number of high school dropouts, for instance, may add to the number of jobs in an area in certain circumstances, but given the wage levels involved, such a route is unlikely to lead to improved local living standards. Finally, some have suggested that the quality of local schools may become more important as quality-of-life consideration for firms and families considering relocation (*5*).

Thus, while the analyses reported in Chapters 3 and 4 provide little support for the thesis that raising local education levels in rural areas can itself lead to more jobs in these areas, this lack of support does not constitute an argument against improving local education systems. First, the findings are generalizations that do not deny the possibility that in some situations—where the local economy is tied into a regional industrial nexus, for instance—education improvements may assist in job growth. Second, all evidence suggests that job opportunities for workers are substantially greater for those with more schooling. Third, local rural economies are more likely to be helped than hurt if some workers migrate elsewhere to take advantage of opportunities. Finally, our national competitiveness would be enhanced by a better trained workforce, and a healthier national economy means a healthier rural economy. For individuals, localities, and the Nation as a whole, educational improvements make sense.

What should these improvements be and who should pay for them? In Chapter 5, Swaim and Teixeira explore these questions for rural areas. Because U.S. colleges compare favorably internationally, the authors focus on primary and secondary schools. They point to several areas where improvements could be made, including making transcripts available to potential employers, raising academic standards, improving measures of performance, strengthening compensatory education, enriching vocational curricula, and developing nontraditional, problem-solving programs.

Swaim and Teixeira point out that these and other improvements may be somewhat more difficult to carry out in rural than urban areas. In many respects, rural schools are starting off from a lower base. Rural youth

generally have lower educational aspirations and achievements than urban youth. Moreover, rural schools offer less academic preparation to those who do graduate.

A second rural drawback is that many improvements cost money, and many rural areas already face fiscal stress. Because local educational investments will not necessarily have direct payoffs for the local rural economy and because rural earnings have been falling in real terms, efforts to enhance local contributions are likely to be met less than enthusiastically by the local population. Both the continuing economic inequities among counties and the tendency for the better educated students in any school district to leave support the argument that educational financing to upgrade schools is most logically done at State or higher levels of government.

Finally, opportunities for postsecondary education are more limited for rural than urban students. Despite the development of community colleges, rural areas have relatively few postsecondary schools. Thus, nonmetro students are less likely than metro students to be able to live at home and commute to college, an increasingly popular solution to the problems of rising college costs and falling real earnings. Also, relatively few nonmetro workers can pursue a part-time education program to improve their career prospects.

Adult education and training are critical components of the workforce preparation system. Much training is now done outside of regular school systems. Federally sponsored training focuses on disadvantaged and displaced workers and is largely carried out through the Job Training Partnership Act of 1982 (JTPA). These programs appear to be more successful than their predecessors. Available measures suggest that the JTPA programs are about as effective in nonmetro as in metro areas. But in both types of areas, the programs served less than 3 percent of disadvantaged workers in 1987.

Employers themselves provide substantial training. The $30-billion corporate outlays on formal training far outweighed the 1987 Federal jobs program spending of $3.7 billion for disadvantaged and dislocated workers (*8*). Despite the amount of money spent, little is known about the efficacy of employer training, and many feel it is inadequate. Training undertaken or sponsored by rural employers is unknown, but is likely to be quite low.

Concluding Note

This report investigates workforce education and training as a rural economic development strategy. Our central conclusion is that the low education levels of local workforces were not significant contributors to the economic problems of rural areas in the 1980's. Rather, the problem seems

to have been on the demand side, with a lack of job creation, especially for better educated workers. Emphasis on education needs to be increased in rural areas—and in urban areas—but the rationale would be more to increase the job opportunities of rural youth wherever they may end up living than to increase the job opportunities in particular rural areas.

Our analysis has not addressed—and we do not know—what alternative types of strategies would definitely be effective in enhancing rural economic growth. The weakness of job generation in rural areas suggests, however, that while we have focused on workforce education and training, employer education and training may be equally, if not more, important. A recent Massachusetts Institute of Technology study, arguing for the adoption of new industrial technologies and work organization to meet the growing international competition, gives less emphasis to the training of the American workforce than to the knowledge, skills, and practices of its business owners and managers (*1*). The success of Japanese-managed auto plants in the United States is often cited as evidence of our management weakness. This employer knowledge problem may be particularly relevant in rural areas, where access to information about new technology and work organization is often more limited. The problem is, moreover, not simply a question of the management of large establishments. Studies of small business formation in rural areas find that people often attempt to start or expand businesses with little knowledge of planning and accounting (*7*).

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Chapter 2

Skill Demand and Supply in the New Economy: Issues for Rural Areas

Ruy A. Teixeira and Paul L. Swaim*

The rise of the new service-driven economy is supposedly increasing skill demand, while skill supply is declining or slowing down due to a nationwide "education crisis." Considerable evidence suggests that both trends are real, at least in some form. Some type of new economy transition is, in fact, increasing skill demand, while an education crisis of some dimension is holding back skill supply. Moreover, depending on such hard-to-measure factors as content change within jobs, this imbalance between demand and supply is potentially substantial and serious. These trends raise a number of important issues concerning the types of jobs and levels of earnings available to rural individuals and the general economic development prospects of rural areas.

Introduction

The United States is in the midst of a significant economic transition, as the formerly dominant system of mass-production manufacturing continues to decline. Variously described as the transition to a "service economy," "information economy," "postindustrial economy," or simply the "new economy," this transition is dramatically changing the industrial and occupational structure of the United States.[6] In the process, the structures of jobs are also significantly changing. Because of these changes, many new-economy analysts argue that jobs now require a higher level and somewhat different range of skills than previously and that this trend is likely to continue.

At the same time, many observers believe that an "education crisis" is gripping the country. These observers claim that schools are providing ever-

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[6] In this chapter, we use the term "new economy" because the other terms somewhat prejudge the nature of the economic transformation going on.

poorer education, turning out young adults who, if not actually illiterate, have skills that are woefully inadequate to the demands of a technological society. Thus, at the same time that new economy analysts are claiming that today's jobs demand higher levels of skill, the education crisis analysts are claiming that the supply of workers with these skills may be declining or, at best, failing to keep pace. If the demand for skills is going up while the supply of skills is declining or stagnant, then a serious imbalance between skill demand and supply may be evolving.

Such an imbalance would be a matter of great concern, posing a serious challenge to contemporary education and training policy. On the aggregate level, such an unfavorable relationship between skill demand and supply could seriously erode the Nation's international economic competitiveness, a possibility that has been widely discussed. And, on the level of people's everyday lives, such developments could have important implications for the types of jobs and levels of earnings available to people with a given amount of education and training. Those who are well-educated and trained will do well in a situation of high skill demand and short supply, while those who are relatively poorly educated and trained will be disadvantaged. If this demand-supply relationship is the same or worse in rural areas, it could significantly dim the economic prospects of rural individuals and places, since levels of education and training in these areas have historically lagged behind the rest of the country.

Much of what will happen will depend on answers to two questions: (1) to what extent are the skill trends identified above real, and (2) if they are real, to what extent do they apply to rural areas? In this chapter, we attempt to answer the first of these questions by reviewing the extensive literature on skill trends, both demand (job skill) and supply (worker skill). However, we cannot address the second question of applicability to rural areas by drawing on previous work. Previous research on skill trends has generally lacked a spatial dimension, and some key data on skills simply are not available for rural-urban comparisons.

Skill Demand in the New Economy

The skills required for jobs in the new economy are generally believed to be cognitive in nature, involving thinking, reasoning, reading, and other mental activities. Workers in these jobs increasingly absorb and manipulate information, rather than physical objects, to successfully perform their duties. Specific skills are thought to include at least the following: (1) basic literacy, (2) basic numeracy (the ability to comprehend the significance of numbers as well as to manipulate them), (3) problem-solving abilities, (4) abilities to learn and to adapt, and (5) the ability to work cooperatively.

The last three skills are associated particularly strongly with the new economy because they are believed to have emerged relatively recently as common job requirements, while literacy and numeracy (albeit on lower levels) have been requirements of many jobs for a long time (*1, 19, 28, 52*).[7]

Not all contemporary jobs require the full range of these skills, no more than all mass production jobs were limited to a narrow range and low level of skills. But the general pattern of how jobs are structured may have shifted decisively toward a more complex, cognitively oriented set of skills. Below, we consider the empirical evidence on whether this trend in skill demand has actually taken place.

Empirical Evidence on Skill Demand

Occupational change can affect job skill levels in two basic ways, which, while they can and do take place simultaneously, are important to keep separate conceptually. The two basic ways are through *compositional shifts* in the job structure, where the distribution of individuals into jobs with different skill levels changes, and through *content shifts*, where the actual content of the jobs individuals do changes (*44*).

Compositional Change

The weight of the evidence suggests that cognitive skill levels have risen due to compositional change since 1960 (*3, 15, 39, 45*). The most recent and complete of these analyses covers 1960-85 and finds that compositional upgrading of job skill levels took place in each decade (1960's, 1970's, and 1980-85), though the rate of increase declined substantially over time (*15*). For example, the "substantive complexity" of jobs went up 0.69 percent per year in the 1960's, 0.46 percent per year in the 1970's, and only 0.28 percent per year in the 1980's (table 1).[8] Compositional change may be broken into two components: change occurring through industry shifts (the changing

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[7] Italicized numbers in parentheses identify literature cited in the References at the end of this chapter.

[8] "Substantive complexity" of jobs is a factor-analytic score created from Dictionary of Occupational Titles (DOT) variables that measure general educational development, vocational preparation, relationship to handling data, and worker aptitudes. The *DOT* is a compendium of occupational titles in common use in civilian U.S. labor markets. The compendium is based on survey information collected at irregular intervals by job analysts for the U.S. Employment Services. A variety of information about each occupational title is contained in the *DOT*, including ratings of the educational development, training time, physical capabilities, temperaments, and aptitudes necessary for the job. There have been four editions of the *DOT*: 1939, 1949, 1965, and 1977. The 1977 edition contained information on some 12,855 different occupations.

Table 1--Compositional change in substantive complexity of jobs, 1960-85

Period	Annual rate of change	10-year rate of change[1]	Industry component	Occupation component
		Percent		
1960-70	0.69	7.1	55.2	44.8
1970-80	0.46	4.7	44.6	55.4
1980-85	0.28	2.8	49.9	50.1

[1] To facilitate comparison of time periods, data have been converted to 10-year rates of change—the change that would have occurred if the annual rates of change in each time period had continued for a full 10 years.
Source: (*15*).

distribution of individuals *across* industries); and change occurring through occupation shifts (the changing distribution of individuals to occupations occupation shifts (the changing distribution of individuals to occupations *within* industries). Industry shifts affect skill levels by changing the relative weight of industries with different average skill levels. Occupation shifts change the relative weight within industries of occupations with different specific skill levels.

Compositional upgrading during 1960-85 was about equally attributable to industry and occupation shifts ((*15*) and table 1). The occupation shifts are generally attributable to the growth of professional, technical, and managerial (PTM) occupations. The industry shifts are accounted for by an overall shift of employment to the service sector, which has higher average skill levels than the goods-producing sector, and employment shifts within both the service and goods-producing sectors toward industries with relatively high skill levels.[9]

The overall U. S. economic trend has been toward growth of industries with higher skill levels, but the job structure for all industries still contains many low-skill jobs. Some low-skill industries have, in fact, expanded substantially

[9] The service sector includes trade, finance, insurance, real estate, personal services, business services, public administration, and professional services (such as health, education, welfare, and research). The goods-producing sector includes agriculture, mining, construction, manufacturing, transportation, communication, and utilities.

in the recent past. This expansion of certain low-skill industries, however, has not been as rapid as the growth of some relatively high-skill industries. This pattern is particularly clear for the services-producing sector, which accounts for most jobs and which has accounted for virtually all recent employment expansion.

A study of the Canadian economy provides the best data illustrating this pattern (*30*). That study used the Canadian version of the *Dictionary of Occupational (DOT)* to identify high-skill and low-skill industries within the service sector. Business services, professional services (such as health and education services) and public administration tend to have relatively high skill levels, and consumer-oriented services (such as retail trade and personal services) tend to have much lower skill levels. Industries at both the high and low ends of the skill distribution had grown substantially in the recent past, but the high-skill industries (business, professional, public administration) had grown more rapidly. This relatively rapid growth in the high-skill "information economy" industries decreased the relative weight of low-skill consumer-oriented services within the service sector and contributed to skill upgrading in the Canadian economy.

A 1989 study confirmed this pattern for the U.S. economy, but it relied on an indirect measure of skill, educational attainment, rather than data from the *DOT* (*2*). The analysts of that study divided the service sector into "information-knowledge" (high-skill) services and "other" (low-skill) services. The use of educational attainment as a measure of skill suggested that the information-knowledge services were substantially more highly skilled than the other services.

In both 1973-79 and 1979-87, information-knowledge services grew faster than other services, although both types of services grew substantially in each period (table 2). The data suggest that the relatively rapid growth of high-skill information-knowledge services has contributed to skill upgrading within the service sector, despite the offsetting influence of growth in relatively low-skill service industries.

Thus, growth in the service sector should not be viewed as just low-skill or high-skill job growth but rather as the result of offsetting trends. On the one hand, the information-knowledge services have grown substantially, producing many relatively high-skill jobs. Those jobs lead some observers to optimistically view the rise of a "service economy," where everyone is engaged in processing information. On the other hand, low-skill consumer-oriented service industries have also grown substantially, producing many relatively low-skill jobs. This aspect of service-sector growth worries other observers who foresee a Nation of "hamburger flippers" if the decline in manufacturing continues. These different assessments seem to be at least

Table 2--Share of employment, employment growth, and educational level of industry groups, 1987

Industry group	Share of employment	Annual growth rate, 1973-87	Proportion with college degree
		Percent	
All	100.0	2.1	22.9
Other service[1]	39.0	2.6	17.1
Information-knowledge service[2]	27.7	3.2	40.3
Classical industry[3]	26.5	.6	13.6
Extractive[4]	3.6	.2	12.4
Information-knowledge manufacturing[5]	3.2	1.9	29.9

[1] Hospitals; other health services; social welfare services; personal and recreation services; private household services; eating and drinking places and hotels; vehicle sales; retail trade; wholesale trade; automobile service and repair; and guard, cleaning, and repair services.
[2] Education; professional services; business services except janitorial services and detective and protective services; communications; finance, insurance, and real estate; and public administration.
[3] Construction, durable and nondurable goods manufacturing (except those included in information-knowledge manufacturing), transportation, and public utilities.
[4] Agriculture, forestry, fishing, and mining.
[5] Electronic computing equipment; office and accounting machines; radio, TV, and communication equipment; professional and photographic equipment; scientific and controlling instruments; and printing, publishing, and allied industries.
Source: (2).

partially rooted in the tendency to focus on one service-sector trend to the exclusion of others.

Content Change

Occupational shifts toward professional-technical-managerial jobs and industry shifts toward the service sector (and, within the service sector, toward information-knowledge services) are increasing skill requirements in the economy. This increase in skill demand, however, appears moderate, partially reflecting the offsetting influence of growth in relatively low-skill

industries within the service sector. Moreover, the increase in skill demand due to compositional change actually appears to be slowing down over time, rather than speeding up.

These results do not support a strong version of the new economy argument, although they are consistent with a scaled-down version that emphasizes the mixed and moderate nature of current skill changes. However, while many new economy analyses focus on content change, the results presented above are confined to compositional change. That is, many analysts contend that the focus of skill change lies within individual occupations—in changes in how the work for given jobs is done—rather than in how the aggregate distributions of industries or occupations have changed over time.

Content shifts are intrinsically more difficult to measure than composition shifts. Surveys like the decennial Census, Occupational Employment Statistics (OES) survey, and Current Population Survey (CPS) allow us to keep careful track of changes in industry and occupation distributions, but changes in job content are not monitored as closely. For example, the OES survey is conducted on a 3-year cycle and the smaller CPS is done monthly, but there has not been a new edition of the *DOT*—the only survey that tracks job content—since 1977.

Thus, to quantitatively estimate the effect of content shifts on skill levels, the best we can do is to compare the third (1965) and fourth (1977) editions of the *DOT*. Such a comparison found a modest upgrading of skill levels through content change between 1965 and 1977 (*43*).

That comparison of those two *DOT* editions may seriously underestimate the magnitude of content change taking place in the U.S. job structure, however. First, because the last edition contains information that is at least 13 years old, the observed content change results are generally out of date.[10] Even if job content trends have remained unchanged since 1977, the amount of upgrading since 1965 should be larger than that estimated by the study.

Second, content upgrading trends may well have changed since 1977 because the pace of technological change, especially computerization, has accelerated. Personal computers, for example, were not widely available until after 1977, though today they are commonplace. These rapidly evolving new technologies, as they have become integrated into workplace tasks and organization, may have substantially accelerated the rate of job content

[10] The actual job content information in the fourth edition was gathered over a period of years going back to 1966.

change.[11] Some recent case study-based analyses support this interpretation, at least for certain "best-practice" firms (*11, 38, 49, 52*).

Third, the skills measured by the *DOT* reflect its origins in the period when mass production dominated the economy. Thus, the types of skills rated tend to be those common at the time, particularly in manufacturing, rather than cognitively based skills whose importance has increased substantially since then. The *DOT* is probably strongest on those cognitive skills, mainly verbal and mathematical, related to basic academic preparation and weakest on the more applied cognitive skills such as problem solving and the ability to learn and adapt. To the extent these latter skills have become more important, content change estimates based on the *DOT* will be too low.

Finally, there is fairly strong evidence that skill scores across editions of the *DOT* may be affected by a stability bias (*1, 24*). That is, the assessments of job content by *DOT* raters may not have been truly independent between editions, but rather affected by a tendency to assume jobs remained the same. If this stability bias was a factor, *DOT*-based estimates of job content change will be too low, perhaps a great deal too low.

All these arguments suggest that we do not really know the extent of skill content change in the U.S. economy. The actual amount of content change in jobs could range from a modest upgrading to much more dramatic changes. Thus, a weak version of the new economy argument receives the only clear empirical support, but the stronger version of the argument cannot be ruled out, since available data do not allow us to evaluate it. Moderate upward shifts in skill levels, therefore, should be viewed as a lower bound estimate of recent changes in skill demand.

Occupational Projections

The evidence described above comes from analyses of job skill trends between two points in time in the recent past. However, the argument presented at the beginning of this chapter focuses on a continuing economic transition, rather than one that has ended. Therefore, even if historical analyses do not provide clear evidence for the strong version of the new economy argument, analysis of probable future trends in job skill levels could provide that evidence.

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[11] However, the rate of compositional change in this period actually slowed down. If technological change affects job composition and job content in parallel ways, a case could be made for a slowdown in the rate of content change. We believe, however, that the mechanisms by which technological change affects content and composition are different enough to allow for a divergence in outcomes (see (*44*) for a good discussion of this point).

The most direct evidence on future job skill trends comes from a 1987 study (*18*). That study, widely disseminated under the title *Workforce 2000*, assessed skill changes in the economy as a whole to the year 2000 and used direct skill measures based on the *DOT's* general educational development (GED) score combined with the 1984 Bureau of Labor Statistics (BLS) occupational projections. The report finds that, on a scale from 1 to 6, the average GED of jobs in fast-growing occupations will be 3.8, that of jobs in slowly growing occupations will be 2.7, and that of jobs in declining occupations only 1.9. These findings are among the most widely publicized from that report.

Less widely publicized is the estimated overall effect of these changes in the job structure on skill levels: the GED of jobs will rise from 3.1 in the report's base year (1984) to only 3.2 by the year 2000. Furthermore, a more recent study that uses both the 1986 and 1988 BLS projections and a variety of *DOT* skill measures shows that the effect of future compositional change on skill levels appears to be modest and that future compositional change will slow from the previous fairly modest rate of compositional change (*25*) (table 3).

A closer look at the *Workforce 2000* figures reveals part of the reason why estimated overall skill level growth appears relatively modest. The occupational group that makes the largest contribution to total employment growth is the service occupations, dominated by low-skill occupations like cooks, waiters, household workers, janitors, and security guards. Because the GED of this occupational group is only 2.6, substantially lower than that of the overall job structure, the growth of this occupational group makes a negative contribution to overall skill level growth.

These occupations are concentrated in consumer-oriented service industries, the low-skill segment of the service sector. In contrast, the high-skill, high-growth occupations (such as lawyers, doctors, health and legal paraprofessionals, engineers, teachers, technicians, and programmers) are concentrated in professional and business services and government, the high-skill segment of the service sector. Thus, the service sector will probably continue to contain low-skill and high-skill segments, because both will grow substantially. The debate on how to assess service sector growth will also probably continue. Some observers will see the growth of a Nation of hamburger flippers, and others will see the evolution of a Nation of information processors. These assessments will probably depend on which trend within the service sector observers choose to focus on.

Other problems with the *Workforce 2000* report mostly center around its failure to analyze the BLS and *DOT* data in enough detail, so that the kinds

Table 3--Compostional change in skill levels of jobs, 1979-2000

Skill[2]	10-year rates of change[1]		
	1979-86	1986-2000[3]	1988-2000[3]
		Percent	
Handling data	5.07	1.24	1.31
Verbal aptitude	2.65	.66	.72
Specific vocational preparation (SVP)	2.38	.53	.59
Handling people	2.45	.72	.72
General educational development (GED)	2.35	.60	.65
Intellectual aptitude	2.35	.55	.63

[1] To facilitate comparison of time periods, data have been converted to 10-year rates of change—the change that would have occurred if the annual rates of change in each time period had continued for a full 10 years.
[2] All skill measures are from the *Dictionary of Occupational Titles* (*DOT*).
[3] Based on the BLS employment projections for years indicated.
Source: (*25*).

of trends described above can be seen.[12] Despite these problems, *Workforce 2000* and the other studies cited provide some evidence that compositional change in the job structure will probably continue to modestly upgrade cognitive skill levels.

Analyses based on BLS projections of aggregate occupational change, or any other data source, for that matter, can provide no insight on possible future upgrading in job content; projecting changes in job content is intrinsically very difficult. Even lacking such data, however, one can identify several factors that may contribute to future upgrading in job content.

[12] Studies that are in progress will examine these data in detail, including the different ways the trends identified in the BLS projections will probably affect rural and urban areas (see (*25*) for initial results from this research).

Technological change, chiefly more advanced information technology, may require workers with higher levels of cognitive skills for proper implementation of the technology. *Flexible automation* may require workers with adaptability and problem-solving skills, since the focus of production will constantly shift.[13] *International competitive pressures* may call for the deployment of technology in flexible and innovative ways which, in turn, may call for more cognitively sophisticated workers. Because indications are that technological change will continue to accelerate, that flexible automation will become more common, and, especially, that international competitive pressures will intensify, the influence of these factors on content change is potentially large and could increase over time.

This suggests that, while we lack good data on probable future changes in job content, a reasonable possibility exists that these changes could be substantial. Thus, while only the weak version of the new economy argument receives empirical support from analysis of future compositional change, the strong version of the argument cannot be ruled out, especially if U.S. employers respond to competitive pressures with a strategy of job enrichment (see (*25*) for a more extensive discussion of this point).

Overall Assessment

Today's workers must possess somewhat higher, more sophisticated cognitive skill levels than in the past. That skill upgrading trend is likely to continue, at least on some level. This upgrading stems from two sources.

Changes in the industry/occupation structure reflect the rise of the service sector, especially its high skill "information-knowledge" segment and the increased proportion of professional-technical-managerial jobs. The overall increase in skill demand from this source, however, seems modest.[14] Moreover, the rate at which these compositional shifts are increasing skill demand appears to be slowing down, to the point that some analysts believe this source of change in skill levels may be essentially exhausted (*31*).

The second source is changes within occupations in job content as a result of technological and organizational change. This source has contributed toward increasing skill demand in the economy, but the magnitude of that contribution is very difficult to estimate because of lack of appropriate data.

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[13] Flexible automation is based on computer-controlled, integrated production units that can produce various parts or products in small batches. (See (*36*) for a good discussion of the skill requirements of such automation).

[14] However, because skills like education tend to remain fixed after people enter the workforce, a relatively small increase in overall skill demand could significantly affect the labor market situation of workers, especially younger workers.

The outdated and otherwise-flawed *DOT* data suggest moderate change, but some recent case studies suggest far more extensive change, at least in certain "best practice" firms. However, we do not have data to determine the breadth of the new technological and organizational practices documented in the case studies.

These uncertainties complicate current and future estimates of skill demand. The magnitude of content change would affect whether levels of skill demand are changing only moderately, as the data on compositional change suggest, or quite substantially. The only certainty appears to be that skill demand is increasing, at least on some level.

Thus, we treat the weak version of the new economy argument as our lower bound on the skill demand side and the strong version of the argument as our upper bound, contingent on the generalizability of new technological and organizational practices.

Skill Supply in the New Economy

There are two basic sources of skill supply in the economy: academic training through the system of elementary, secondary, and postsecondary schools and vocational training through both schools and workplaces. For each type of training, one must consider both the composition (or amounts) of training received by the population and the content (or quality) of that training.

Academic Training

The amount of academic training received by individuals is typically measured by the number of school years completed and is referred to as educational attainment. Statistics on educational attainment are easily available and probably the most familiar source of data on skill supply in the economy. The content of academic training, however, has no standard measure. The various tests that purport to measure academic skills all cover somewhat different areas and are far less accessible and easy to understand than data on educational attainment.

Trends in Educational Attainment

Average skill levels, measured as educational attainment, have risen dramatically. From 1950 to 1988, the share of the population 25 and over that has graduated from high school has risen from about 35 percent to over 75 percent, while the share of college graduates has risen from 6 to 20

percent. Despite this impressive rise, there are several grounds for concern about the composition of academic training in the population.

One such reason for concern lies in a recent slowdown in the growth of educational attainment. The supply of educated workers, particularly college graduates, grew dramatically in the 1970's, but that growth slowed during the 1980's (*29*). That slowdown may create problems during the 1990's.

School dropout rates are another cause for concern, because they remain quite high in many communities despite the worsening labor market prospects for workers lacking a high school diploma. Dropout rates have actually increased among black and Hispanic youths in some central cities with high concentrations of poverty.[15]

Low educational attainment among experienced workers who are required to learn new job skills may also cause difficulties. Displaced workers, especially, often lose jobs in declining industries and occupations and, hence, are unlikely to become reemployed in their accustomed line of work. Among the approximately 1.5 million full-time workers displaced annually in the United States, those with relatively few years of schooling experience significantly longer spells without work and larger earnings losses once reemployed (*48*).

Finally, workforce projections suggest that the educational attainment of some future labor force entrants may leave much to be desired. *Workforce 2000* projects that an increasing share of new labor market entrants in the coming decade will be blacks, Hispanics, and immigrants, all groups who currently possess below-average levels of schooling and are particularly at risk of not completing high school (*8*).

Workforce projections also show slower growth of the labor force as a whole. These slow growth rates, projected to decline from an annual rate of almost 3 percent in the 1970's to a little over 1 percent in the 1990's, suggest that the economy may have greater difficulty working around possible shortfalls in educational supply (*13*, *14*). Employers who have become accustomed to screening large numbers of applicants to find suitable recruits may have increased difficulty hiring sufficient numbers of workers with adequate basic education.

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[15] Dropout rates in central cities--where 56 percent of black Americans live--are four times the national average rate of 14 percent. In some New York City schools, four out of five freshmen drop out before graduation. Chronically depressed rural areas, particularly in the South, also have high dropout rates.

The factors discussed above indicate that skill supply in the United States may not be keeping pace with increased demand in terms of the amount of academic training. This situation seems consistent with the idea of an "education crisis," although only with a weak version of the argument.

However, many "education crisis" analyses focus on the content of what people learn in school, rather than the amount of time they spend there. That is, many analysts believe the problem lies not with the number of years people attend school, but rather with the level of cognitive skills attained by those years of school attendance. It is here that a strong version of the education crisis argument receives some support.

Perhaps the best known content-related trend is the decline in average scores on widely administered tests, such as the Scholastic Aptitude Test (SAT), from the mid-1960's through about 1980 (table 4). Although average test scores have since recovered some of the lost ground, many other indicators suggest that the content of education received in primary and secondary schools may be unsatisfactory.[16]

Recent analyses of various tests suggest that many high school graduates lack the general cognitive skills and knowledge needed to acquire job-specific skills once in the labor force. The 1986 National Assessment of Educational Progress (NAEP), which provides an overview of the current level of literacy and numeracy of young adults, illustrates this finding (*13*).[17]

The 1986 literacy tests showed that more than 90 percent of Americans aged 21-25 had the most basic reading and reasoning skills, such as the ability to "follow simple directions, solve single-step problems, and make inferences when all of the necessary information appears in a single sentence" (*28*). More than 30 percent, however, had difficulties gathering information from several sentences and solving nonroutine or multistep problems. Although

[16] The increased emphasis on testing students for very basic verbal and computational skills, as well as test-directed classroom drilling, is probably responsible in part for recent improvements in student performances on these tests. However, this emphasis may also be responsible for simultaneous declines in students' abilities to perform higher level reasoning tasks such as solving multistep problems or integrating information from several sources (*33*).

[17] The NAEP is probably our best source of data on the cognitive skill levels outlined earlier in this chapter. The NAEP becomes less useful the farther away one moves from conventional academic skills, like literacy and mathematical problem solving. The NAEP tests have little to say about students' abilities to solve problems in applied situations, to learn and adapt, and to work in cooperative situations. To the extent these skills are becoming more important in today's economy, the NAEP will be an inadequate source of data in some critical areas.

Table 4--Scholastic Aptitude Test (SAT) scores, 1963-86

Year[1]	Verbal	Mathematics	Total
		Score	
1963	478	502	980
1964	475	498	973
1965	473	496	969
1966	471	496	967
1967	466	492	958
1968	466	492	958
1969	463	493	956
1970	460	488	948
1971	455	488	943
1972	453	484	937
1973	445	481	926
1974	444	480	924
1975	434	472	906
1976	431	472	903
1977	429	470	899
1978	429	468	897
1979	427	467	894
1980	424	466	890
1981	424	466	890
1982	426	467	893
1983	425	468	893
1984	426	471	897
1985	431	475	906
1986	431	475	906

[1] Sources are for school year ending in that year. Averages for 1972-1986 are based on college-bound seniors. Averages for 1963-1971 are estimates provided by the College Entrance Examination Board; background information needed for specific identification of college-bound seniors was not available before 1972.
Source: (*46*).

high school graduates scored higher than did dropouts, a substantial fraction were weak in literacy and problem-solving skills.

The level of competence in mathematical and scientific reasoning is probably even lower. This finding should not be surprising because fewer than half of all high school students take a math or science class after the 10th grade. The 1986 NAEP indicates that just 6.4 percent of 17-year-old students "demonstrated the capacity to apply mathematical operations in a variety of

problem settings."[18] Similarly, only 7.5 percent of this group can "integrate specialized scientific information" (*32*).[19]

Comparing cognitive achievement levels of U.S. students with student achievement levels in other countries is also instructive. These comparisons show a large gap between the science and math competence of young Americans and their counterparts overseas, starting as early as eighth grade (table 5). By the end of high school, Japanese students average more than four U.S. grade level equivalents higher in math and science than do American students (about twice the grade level gap between whites and blacks in the United States) (*5*).

This gap between American and foreign students is often attributed to the diversity of the student population in the United States or the failure of the U.S. schools to provide a good basic education to those high school students who are not planning to go on to college. However, the best American high school students also score well below their international counterparts in mathematics and science (*5*). Most observers, however, conclude that the student elite is relatively well served, because much of the elite's learning deficit is later made up by America's diverse and extensive system of higher education.[20]

Many outside of the student elite progress through primary and secondary schools without ever attaining threshold levels of literacy and problem-solving skills. Such students are rarely able to compensate for this deficit through postsecondary education and training. If Japan's schools produce the world's best lower half, many U.S. students complete their schooling without having obtained a solid basis for a lifetime of productive employment and on-the-job learning. As the summary report of the 1986 NAEP mathematics assessment concludes: "The fact that nearly half of the 17-year-olds do not have mathematical skills beyond basic computation with whole numbers has serious implications. With such limited mathematical abilities, these students nearing graduation are unlikely to be able to match

[18] For example, fewer than one in three could answer a question such as: George had 3/4 of a pie. He ate 3/5 of that. How much pie did he eat?" (For a discussion of the results, see (*12*).)

[19] NAEP data only go back to the early 1970's, but the trend line on most NAEP tests roughly parallels that observed for the SAT's and similar tests. NAEP scores generally show a decline in the 1970's, followed by some recovery of lost ground in the 1980's (*12, 27, 46*).

[20] The relatively small proportion of U.S. students majoring in the sciences and engineering is, however, a cause for concern. An overly theoretical engineering curriculum and an MBA curriculum that slights technology may also reduce the contribution of university-educated workers to industrial productivity (*11*).

Table 5--Mathematics achievement of 8th grade students by country, 1982[1]

Country	Sample size	Average correct responses
	Number	*Percent*
Japan	8,091	63.5
Netherlands	5,418	58.1
Hungary	1,754	56.6
Belgium (Flemish)	3,073	54.0
France	8,317	53.5
Canada (British Columbia)	2,168	52.3
International mean	**59,101**	**52.0**
Belgium (French)	2,025	51.5
Canada (Ontario)	4,666	49.5
Scotland	1,320	49.3
England and Wales	2,612	48.4
Finland	4,382	46.4
New Zealand	5,176	46.4
United States	6,648	46.0
Sweden	3,451	43.5

[1] Data are from the Second International Mathematics Study, conducted by the International Association for the Evaluation of Educational Achievement for the U.S. Department of Education, Center for Education Statistics. Reported scores are average percentage correct on 157 items from the study. Eighth grade was defined as that grade in which a majority of students attained age 13.0 to 13.11 by the middle of the school year. For Japan, the 7th grade was used because the Japanese considered the test more appropriate for that grade.

Source: (*46*).

mathematical tools to the demands of various problem situations that permeate life and work" (*12*). Thus, if one looks beyond the amount of academic training people receive to the content of that training, there are strong grounds for speaking of an "education crisis." The case seems particularly compelling to the extent that jobs in the new economy are requiring, or will require in the future, reasonably high levels of literacy,

numeracy, and problem-solving. American workers do not appear to be developing these skills through their academic training.

The evidence for a crisis is sharpest, however, when considered in the context of international economic competition. If competitive pressures really do call for enrichment of job content to boost productivity, the American workforce seems ill prepared to handle such enrichment. Our international competitors, in contrast, appear to have a fairly solid base of workforce cognitive skills with which to pursue technological innovation and productivity enhancement. This difference could yield a significant competitive advantage to our economic rivals.

Vocational Training

The other source of skill supply in the economy is vocational training through schools and workplaces. Vocational training can, at least in theory, offset the harmful effect of low academic achievement by teaching specific job skills and contextual problem solving. Indeed, individuals who do poorly on general-purpose tests of reasoning skills are sometimes quite adept at applying the same reasoning skills in job-specific contexts that are more familiar and comfortable.

There are no measures of the amount and content of vocational training received by the workforce that are comparable to those for educational attainment and achievement. This reflects the generally haphazard and poorly organized system of vocational training in the United State—a system, in fact, frequently referred to as a "nonsystem."

A fair amount of vocational training takes place in the United States. To begin with, about 5 million students enroll annually in high school vocational education programs. Postsecondary institutions have also become an important source of vocational training. While just 13 percent of community college enrollments were in vocational programs in 1965, that proportion has now climbed to about two-thirds. Many of these schools also offer remedial programs designed to improve reading, writing, communication, and mathematical skills that could be considered vocational in nature (*21, 34*).

The most important source of job training for most of the workforce, however, is on-the-job training. A 1983 BLS study found that, although 45 percent of all workers needed no specific training to qualify for their job, 28 percent received their qualifying training on the job, and 9 percent received company-provided formal training off the job (*50*). Estimates of employer costs for worker training confirm the importance of this source in promoting worker skills. Spending on formal training programs in 1983 was estimated

at about $30 billion annually, and the implicit costs of informal instruction and learning by doing are probably much higher (*10*).

If the data on the amount of vocational training tend to be vague, data on the content of that training are even weaker. Perhaps the most is known about vocational training in secondary schools. Until recently, most of the accumulated evidence about these programs suggested that relatively few participants acquired skills that substantially enhanced their employment prospects (*51*). However, more recent evidence suggests that vocational programs in secondary school do benefit some students, but only those who take a sequence of vocational courses specifically relating to their future occupation (*4, 8*).

The limited effectiveness of high school vocational training contrasts with what appears to be a much more dynamic and successful record for postsecondary vocational training. Numerous accounts credit community and technical colleges with playing a valuable role in providing vocational training closely tailored to the hiring needs of local employers (*20*). However, because little actual data on the content of these training programs exist, these anecdotal evaluations should be treated cautiously.

The extensive "nonsystem" of employer-provided training is very difficult to describe from a content standpoint, also because of a lack of appropriate data. However, two potential problems of this nonsystem may be noted. The first is that a relatively high proportion of formal training is targeted to professional employees, with the amount of training received varying directly with the amount of prior education of the employee (*9*). The second is that training for line workers tends to be of the "follow Joe around" variety, with little attempt to systematically impart needed cognitive skills to workers. These patterns contrast rather strongly with those in West Germany and Japan, where employer-provided training tends to be broadly targeted to the entire production workforce and oriented toward complementing the academic education system through cultivation of pertinent cognitive skills (*20*). Employer-provided training in the United States seems too diffuse and poorly targeted to play a similar complementary role to the U.S. educational system.

Although a fair amount of vocational training takes place in the United States today, the content of this training appears to make it an unreliable source of skill supply. Thus, problems posed by an "education crisis"—of whatever dimension—become even sharper, because vocational training cannot be relied upon to take up the slack.

Overall Assessment

The evidence presented here indicates that talk of an education crisis may be justified, although the depth of such a crisis is open to question. The crisis, such as it is, stems from two sources.

The first source has to do with the amount of academic training people are receiving. The growth of supply of workers with high levels of educational attainment is apparently slowing down. Dropout rates remain high, and low educational attainment among experienced workers hinders the ability of these workers to adapt to the new economy. Finally, the future workforce will grow slowly, with new workforce entrants disproportionately composed of workers with historically low levels of educational attainment. All these factors mean that levels of educational attainment may not be adequate to meet skill demands from a changing economy.

The second source stems from the *content* of the academic training received by workers. The cognitive skills imparted to most Americans by their years in school are probably not high, are particularly deficient in key areas linked to the new economy, and have declined in recent years from their already-modest levels, although some of that lost ground was recovered in the 1980's. Moreover, the cognitive skills of the U.S. workforce appear markedly lower than those of their counterparts in other developed countries, a situation that augurs poorly for U.S. economic competitiveness. These factors suggest that educational content in the United States is substantially below desirable levels.

The situation with vocational training is less clear than that with conventional academic training. Although vocational training may not be facing a crisis, it is an unlikely candidate to remedy cognitive skill deficiencies traceable to an "education crisis" of either small or large scale. This reality could complicate efforts to deal with the negative effect of educational system problems.

Whether these educational system problems should properly be viewed as a relatively small-scale crisis or a more serious, large-scale crisis depends on several factors. To the extent that the problem is located in levels of educational attainment, the crisis seems more small-scale and potentially solvable through enhanced educational attainment growth rates. To the extent that the content of education is judged to be the critical problem—as, for example, it appears to be in the context of international competition—the crisis seems deeper and less susceptible to straightforward solutions.

Issues for Rural Areas

The weight of the evidence presented in this chapter suggests that an imbalance between skill demand and supply is evolving, at least in some form. Some type of new economy transition is increasing skill demand, while an education crisis of some dimension is limiting skill supply. Furthermore, depending on such hard-to-measure factors as content change within jobs, this imbalance may be, or could become, substantial and serious.

These changes in skill demand and supply will affect the types of jobs available, how people are rewarded for doing those jobs, and the general economic development prospects of different areas. These trends, therefore, raise a number of issues that should be explored for rural areas.

Not all of those issues can be explored, however, because of limited available data. For example, the issue of content change within jobs is critical to assessing skill demand. Thus, knowing how much content change has taken place within rural, as opposed to urban, jobs would help us understand how skill demand varies between rural and urban areas and consequent implications for job availability and compensation levels. However, this issue is no easier to investigate on the rural-urban level than it is on the national level; adequate data do not exist.

The issue of educational content and actual levels of cognitive skills is also critical to an assessment of skill supply. Therefore, an accurate assessment of how educational content varies between rural and urban areas would help us understand how the supply of cognitive skills available to employers differs between the two areas. National level analyses, at least, are possible here, but data limitations (chiefly relating to confidentiality) still preclude analysis on the rural-urban level.

These data problems mean that the strong, content-driven versions of the new economy/education crisis arguments cannot be tested for rural areas. However, existing data do allow us to explore the implications of the weaker versions of these arguments for rural areas. Because only the weaker versions of the arguments will be tested, findings from these investigations should be viewed as constituting a lower bound for the problems and challenges rural areas will face in years ahead.

The weak versions of the new economy/education crisis arguments focus around compositional (distributional) changes in skill demand and supply. On the demand side, the changing distribution of jobs among different industries and occupations seems to be increasing skill demand. On the supply side, changing distributional patterns of educational attainment seem to be holding back skill supply.

Skill demand and supply deriving from these distributional trends can be estimated somewhat easily using existing data, and these estimations can be done both nationally and at the rural-urban level to see how demand and supply differ between the two types of areas. Such estimations also can be pursued on the level of skill categories rather than overall skill levels. In this way, the relative demand for low-skill and high-skill jobs can be specified.

Estimates on this level can tell us a great deal about the differences in job availability between rural and urban areas. These estimates also allow us to examine the relationship between demand and supply by estimating the income derived from jobs at different skill levels. Together, these estimates can then allow us to assess whether individuals in rural labor markets are being comparatively advantaged or disadvantaged by new economy distributional changes.[21]

Such analyses will help illuminate how new economy/education crisis trends affect the fate of *individuals* in rural areas. The types of jobs available and their relative levels of compensation (both at different skill levels within rural areas and at the same skill level between rural and urban areas) are clearly matters of much concern to these individuals. However, the economic fate of rural *places* cannot be reduced to the well-being of individuals in rural areas (although they are certainly related). Many rural individuals may well prosper while the places they live in (or used to live in) continue to decline.

Thus, another useful analysis would look at how skill demand and supply trends are affecting the development of local economies, not just the individuals within those economies. In particular, such an analysis should look at skill supply and local economies. If skill demand is increasing, one would expect the local supply of skills to be a key factor in local economic development. This idea can be tested by looking at local distributions of educational attainment and their relation (or lack thereof) to job generation in local areas.[22] Such an analysis can be done nationally, and at the rural-urban level, so that any special relationship between skill supply and rural economic development can be understood.

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[21] In another chapter, we have operationalized skill demand by using the 1980 distribution of education by job type as a standard and performing shift-share analyses on this basis. Using actual skill scores from the *DOT* to perform these analyses would have been preferable, but time pressures did not permit this to be done. The series of studies being conducted by Teixeira and Mishel will, however, use the *DOT* scores to look at similar skill demand questions.

[22] An analysis of educational content, not just distributions of educational attainment, would be useful, but data limitations preclude that approach.

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Chapter 3

The Education Crisis and Rural Stagnation in the 1980's

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Demand for worker education and skills rose during the 1980's, while young adults were completing fewer years of education. This education crisis was accompanied by a rural crisis marked by high unemployment, weak employment growth, declining earnings relative to urban areas, and net outmigration to urban areas. This chapter examines these crises and their interrelationships. We found two sources of the rural economic problems of the 1980's. First, the heavily rural production sector industries—agriculture, mining, and routine manufacturing—lost employment during the 1980's. Second, rural areas did not maintain their share of faster growing industries or of high-education production sector jobs. We found no evidence that lack of supply of highly educated workers in rural areas was behind these two rural trends. During the 1970's, when rural education levels were even lower relative to urban education, rural areas experienced higher growth in high-education production sector jobs than urban areas. The premium paid young adults for higher education levels rose much faster in urban than in rural areas during the 1980's, suggesting that demand for the better educated increased disproportionately in urban areas. And, a relatively high proportion of better educated rural residents migrated to urban areas. Our results suggest that rural economic problems in the 1980's stemmed from lack of employer demand, particularly for highly educated workers.

Introduction

The United States experienced both an education crisis and a rural crisis in the 1980's. The education crisis resulted from the growing dependence of the "new economy" on a highly educated national workforce, a rise in demand for worker education and skills that was increasingly unmet by the training of young adults entering the labor market. The growing imbalance

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between the skills of the workforce and the higher skills desired by employers—and related changes such as deunionization—has been linked to declining earnings for less educated workers and a growing income inequality between those with the desired training and the remainder of the workforce (*1*).[23] The rural crisis, which came on the heels of what many called a rural "renaissance" in the 1970's, was marked by high rural unemployment, weak employment growth, a decline in real earnings, and outmigration to urban areas. The rural workforce has considerably less schooling than the urban workforce, which suggests that the two crises were related.

The ways in which the education crisis and the rural crisis were interrelated are not clear, however. One possible thesis is that the rural crisis stemmed directly from the low education levels of the rural workforce. From this perspective, which we call the education supply thesis, the growth and skill levels of rural jobs are limited by the education levels of rural workers. The national economic trends in the 1980's hurt rural areas because prospective employers were no longer looking for reliable, low-skill, low-pay workers. Rural workforce training was inadequate for the new economy and stymied rural growth.

Alternatively, the rural crisis could have resulted from the urban orientation of the new economy. According to this argument, which we call the demand hypothesis, employers requiring highly schooled workers tend to be urban employers because of organizational needs, such as access to specialized information and services. They may also require access to a large pool of labor with specialized skills, a pool which sparsely settled areas cannot generate. From this perspective, the problem is less that rural education levels are low than that the new jobs requiring high education are unsuitable for rural areas. The "new economy" is an "urban economy."

Whether the rural problem has been one of education supply or employer demand is critical for one's choice of rural development strategies. If the problem has been a lack of supply of educated workers in rural areas, then raising rural education levels is key to rural economic growth. But, if the problem has been one of employer demand, then strategies to decentralize the national economy by enhancing rural transportation and information infrastructures are key to rural economic growth. If the demand hypothesis is correct, raising rural education levels would improve rural worker opportunities, but in urban areas. Working to raise rural education levels

[23] Italicized numbers in parentheses identify literature cited in the References at the end of this chapter.

would thus do little to promote local rural economic development.[24] On the other hand, decentralization strategies will have little benefit if the bottleneck is rural labor training and skill.

This chapter reports the results of our study of the interrelationships between the education crisis and the rural crisis. Our analysis focused on the production sector—goods-producing and related services industries—which we see as more critical to national and local development than the consumer sector—industries which provide services largely to residential consumers and depend on the vitality of the local production sector. In brief, we found two sources of rural economic problems in the 1980's. First, the types of production industries that lost employment in the 1980's are the most heavily rural—agriculture, mining, and routine manufacturing. Second, rural areas did not maintain their share of faster growing industries or of high-education production sector jobs in general. As a result, the rural-urban division of labor, which allocates low-skill jobs to rural areas and high-skill jobs to urban areas, actually increased during the decade.

At the same time, we found no support for the hypothesis that low rural education levels were responsible for the rural crisis and inhibited rural employment growth in high-education jobs in the 1980's. First, the relatively low education levels of the rural workforce permitted growth in high-education jobs in the 1970's. In fact, the shift of jobs from urban to rural areas in the 1970's was even greater for high-education jobs than for jobs typically filled by people with a high school education or less. Second, the premium paid young adults for higher levels of schooling rose much faster in urban than in rural areas in the 1980's, suggesting a greater increase in demand relative to supply for highly educated workers in urban areas. Finally, rural areas did not retain the better educated who already lived there in the 1980's. With the growing rural-urban earnings gap for the more highly educated, a relatively high proportion of those living in rural areas migrated to urban areas in the 1980's, increasing the rural-urban gap in workforce education.

Our results indicate that rural economic problems in the 1980's stemmed from a lack of employer demand, but they do not explain the increase in the rural-urban division of labor, with low-education jobs more concentrated in rural areas and high-education jobs more urban. Several possible factors may have contributed to this shift. The increase in competition in the production sector, brought about in part by the internationalization of markets, may have heightened the importance of locational comparative

[24] The major benefit would appear to be that any local labor surplus would be reduced. This might not be seen as a benefit by all local employers, however, since it would tend to raise local labor costs.

advantage. Urban auto industry and other high-wage routine production jobs, typically filled by workers with low education, lost out to rural jobs, but rural high technology, information-intensive jobs lost out to their more centrally located urban counterparts. Also, the internationalization of markets may have increased the importance of information access, strengthening the comparative advantage of urban areas for information-intensive activities. The concentration of the financial sector in major cities, for instance, was probably spurred by their increasingly international clientele. In addition, the growing shortage of highly educated labor force entrants nationally may have made access to existing pools of high-skill workers—primarily urban—more important. Finally, on the supply side, dual-career households are likely to prefer the greater choices of urban residence, and their numbers are growing. Whether any or all of these factors will continue to dominate in the 1990's, it is difficult to tell.

Our analysis has three major themes, which, though interrelated, are dealt with sequentially. The first is the change in the educational requirements of the national economy and its relationship to change in the rural and urban education requirements. The second is the education levels of the work force or education supply. The third is earnings for workers with different education levels. Our assumption is that changes in earnings across education groups and between rural and urban areas broadly reflect the outcome of the supply and demand for education. Because both the education and rural crises began in the 1980's, we compare the 1970's and 1980's to identify the sources of change. The methods, rationale, and data sources for our analyses are detailed in an appendix.

Industry Structure and the Educational Requirements of Jobs

Did rapid technological change, the growing internationalization of markets, rises in defense spending, and other factors associated with the new economy in the 1980's create an unusually large shift in jobs away from those with low education requirements to those with high? The studies reviewed in Chapter 2 tend to agree that the educational requirements of the workplace rose in the past decade but that the rise was small compared with the 1970's rise. We found that, overall, the rate of increase in educational requirements of jobs was even slightly slower in the 1980's than before.

When we looked at the production sector, however, where the internationalization of markets, increases in defense spending, and related changes in the 1980's were likely to have had the greatest effects, we found a sharper rise in educational requirements than had occurred in the 1970's. This rise occurred despite a considerably slower percentage growth in the total number of production sector jobs in the 1980's.

About half of the shift in production sector job educational requirements in the 1980's was due to the employment decline in industries typically requiring low worker education levels—agriculture, mining, and manufacturing industries with routine production processes—and the rise in producer services such as finance and legal services, which require relatively high education levels. The other half of the shift occurred within industry groups, as the number of low-education jobs in mining and manufacturing declined and high-education jobs increased.

Rural areas have relatively large shares of low-skill, low-technology industries and, within industries, rural areas have relatively large shares of the low-education jobs. Urban areas, in contrast, have relatively large shares of high-skill, high-technology industries and jobs. This division of labor was highly unfavorable to rural areas in the 1980's. The fact that rural types of industries and jobs tended to decline in employment over the decade while urban types grew helps explain why rural areas did more poorly than urban areas during the 1970's.

But, this was not the whole story. Rural areas tended not to participate in the new economy during the 1980's, with the result that the rural-urban division of labor increased. The growth in production sector jobs requiring high education was confined almost entirely to urban areas. In manufacturing, a rural mainstay, rural areas gained in jobs typically requiring a high school education or less, but actually lost some higher education jobs to urban areas in the 1980's. Urban areas had just the opposite experience. The number of manufacturing jobs typically requiring at least some college grew substantially, and the number of low-education jobs declined.

Comparisons with the growth patterns of the 1970's suggest that the rural problem was not industry mix or the low education levels of the rural workforce. Rural areas also had a disadvantageous mix of production sector industries in the 1970's, a period when rural employment growth outpaced urban growth. Rural education levels were also low in the 1970's. But while only the rural shares of low-education industries and jobs increased in the 1980's, the rural shares of high- as well as low-education industries and jobs rose in the 1970's.

Economic Sectors and the Rural-Urban Division of Labor

We divided the economy into two sectors for our analysis: a production sector and a consumer sector. Global competition, rapid technological change, and other changes associated with the new economy tend to affect most the production side of the economy—industries involved in the production of goods and the service industries associated with these producers. Within the production sector, there is an increasingly

international division of labor as nations and their urban and rural regions attempt to establish, maintain, and expand niches in global markets. These exigencies are less relevant to consumer sector businesses, which sell to residents in local trade areas. While these businesses depend on the vitality of the local production sector for generating a clientele, they do not themselves compete in the broader economy. Since residents have many of the same needs everywhere, and most needs are met locally, there is relatively little territorial division of labor among these industries.

As with most categorizations, the idea of two economic sectors is neater than the reality. Several industries, such as banking and transportation, serve both producers and residential consumers. Because of their central role in the internationalization of markets, we assigned banking, legal, accounting, and related services to the production sector. Industries involved with distribution—wholesale, transportation, communication, and utilities—were assigned to the consumer sector, because we felt that the territorial division of labor for these industries depends on the location of other industries and consumers. Using this delineation, about 40 percent of U.S. jobs were production sector jobs in 1980, and 60 percent were consumer sector jobs.[25]

Even with the somewhat arbitrary classifications, our analysis captures sharp differences between the two sectors. Metro and nonmetro areas have markedly dissimilar niches in the production sector. About 65 percent of the nonmetro jobs in 1980 were in resource-based industries (agriculture, forestry, and mining) and routine manufacturing (textiles, automobiles, and other industries with large numbers of routine, low-skill production jobs and relatively few research and management jobs) (table 1). On the other hand, nonmetro areas have relatively few jobs in the research-and-development-intensive, high-skill complex manufacturing and producer services. The index of dissimilarity, the percentage of jobs that would have to be moved from one industry group to another to equalize the metro and nonmetro industry distributions, is 28.1 in the production sector for 1980. Metro-nonmetro consumer sector differences were relatively minor: the consumer sector index of dissimilarity is only 4.1.[26]

There is also a rural-urban distinction within industry groups. Nonmetro areas tend to specialize in production jobs and metro areas specialize in management and research. Thus, the proportion of jobs in the production sector that were directly related to producing goods in 1980 was nearly twice

[25] See app. II for the classification of industries.

[26] For an excellent analysis of the rural-urban division of labor in the South, see (*4*). Both that study and (*10*) have gradations of rural-urban settings.

Table 1--Job distribution in metro and nonmetro areas by sector

Sector and industry group	1980		1988	
	Metro	Nonmetro	Metro	Nonmetro
	Percent			
Production sector:				
Agriculture, forestry, and fishing	2.8	16.2	2.3	15.6
Mining	1.7	6.7	1.4	4.2
Routine manufacturing	31.0	41.6	23.9	41.8
Complex manufacturing	29.2	18.0	26.4	16.0
Producer services	35.3	17.5	46.0	22.3
Total	100.0	100.0	100.0	100.0
	(37.3)[1]	(41.2)	(35.7)	(38.3)
Consumer sector:				
Distribution[2]	19.7	17.1	17.9	14.9
Retail and personal	32.5	33.8	35.8	38.4
Health, education, and related	29.8	29.3	28.7	29.3
Government	8.9	7.9	7.7	7.0
Construction	9.1	11.9	9.8	10.4
Total	100.0	100.0	100.0	100.0
	(62.7)	(58.8)	(64.3)	(61.7)
Index of dissimilarity:				
Production sector		28.1		34.0
Consumer sector		4.1		3.7

Note: See appendix I for method used.
[1] Numbers in parentheses are sector employment as a percentage of total employment.
[2] Communications, utilities, ground and water transportation, and wholesale trade.
Sources: (*13,15,16*).

as high in nonmetro areas (60 percent) as in metro areas (35 percent). And the proportion of production sector jobs that were managerial and professional-technical jobs was more than twice as high in metro areas (35 percent) as in nonmetro areas (13 percent). The different production sector niches of metro and nonmetro areas are reflected in the education levels of their jobs. The more heavily nonmetro industry groups tend to have jobs with lower educational requirements than the more metro industry groups (table 2). Also, with agricultural jobs the exception, the nonmetro mix of jobs in each industry group has lower education requirements than the metro mix. We estimated that in 1980 31 percent of the nonmetro production sector jobs were the types that, in the Nation as a whole, were

Table 2--Distribution of jobs by education requirements, 1980

Table 2--Distribution of jobs by education requirements, 1980

Sector and industry group	Metro: School years typically required by job					Nonmetro: School years typically required by job					Metro-nonmetro difference relative to nonmetro average	
	Under 12	12	Over 12	Total	Average	Under 12	12	Over 12	Total	Average	1980	1988
	Percent											
Production sector:	21	41	37	99	12.8	31	43	25	100	12.2	5.4	7.2
Agriculture, forestry, and fishing	36	41	23	100	12.0	35	43	14	100	12.0	-.2	-.4
Mining	22	38	39	100	12.9	32	45	23	100	12.1	7.3	9.5
Routine manufacturing	34	44	22	100	12.0	40	43	16	100	11.7	2.8	3.8
Complex manufacturing	19	44	37	100	12.8	25	47	28	100	12.4	3.8	6.0
Producer services	11	37	52	100	13.6	14	39	101	100	13.4	1.8	2.2
Consumer sector:	19	40	42	101	13.1	21	40	39	100	12.9	1.2	3.3
Distribution	19	47	34	100	12.6	22	48	30	100	12.4	1.8	1.7
Retail and personal	25	46	29	100	12.6	26	46	28	100	12.4	.6	.6
Health, education, and related	11	27	62	100	14.4	12	27	61	100	14.3	.7	1.2
Government	10	39	52	101	13.6	11	39	50	100	13.5	.8	.4
Construction	30	45	26	101	12.2	32	45	23	100	12.0	1.4	1.4
Total	20	40	40	100	13.0	25	41	33	100	12.6	3.0	3.3

Note: See appendix I for method. Totals may not add due to rounding.
Sources: (*13,15,16*).

typically taken by people with less than 12 years of school, compared with 21 percent in metro areas. On the other hand, 37 percent of the metro jobs typically required schooling beyond high school, compared with 26 percent in nonmetro areas. The metro average schooling required was more than 5 percent higher than the nonmetro average, which still seems deceptively small given the differences in percentage distributions.

Consistent with the overall similarities of metro and nonmetro consumer industries, metro-nonmetro differences in education required in consumer sector jobs in 1980 were considerably smaller than was the case in the producer sector. Average educational requirements were higher in metro areas but only 1.2 percent higher. Only in the distribution industries was the metro-nonmetro difference in the education level of consumer sector jobs notable.

The Rise in Educational Needs, 1970-79 and 1980-88

Patterns of industrial employment change differed in three broad ways between the 1970's and 1980's for the Nation as a whole. First, overall growth in employment slowed, especially in the production sector (table 3). Second, with the farm crisis, the energy bust, and increases in foreign competition, employment in agriculture, mining, and routine manufacturing declined in the 1980's after growing in the 1970's. The shift in these more rural, low-education industries was especially notable in mining, which had a 32-percent gain in employment in the 1970's and a 22-percent loss between 1980 and 1988. Even complex manufacturing, however, had almost no employment growth in 1980-88, after expanding by more than 25 percent in the 1970's. Third, growth in the consumer sector industries, which tend to require relatively high levels of education (health, education, and government), tapered off considerably in the 1980's, while growth in retail and personal services increased.

The overall rate of increase in educational requirements of the economy resulting from shifts toward high-education jobs was somewhat lower in the 1980's than in the 1970's, a finding consistent with several studies cited in chapter 2. Because of the heightened national and international competitive pressures of the 1980's, however, and the growth of financial activities, the production sector showed a much stronger shift towards high-education jobs in the 1980's than it had in the previous decade. The decennial rate of rise in the average job educational requirements was 2.5 percent in the 1980's, half again as fast as the 1.6 percent rate in the 1970's.

In part, this acceleration reflects the greater industrial change in the 1980's—the job declines in agriculture, mining, and manufacturing, with continuing

Table 3--Change in employment and job education requirements by industry group

Sector and industry group	1970-79		1980-88	
	Employ-ment	Average job education level [1]	Employ-ment	Average job education level [1]
	Percent			
Total	26.5	1.2	18.5	1.0
Production sector:	22.1	1.6	12.6	2.5
Agriculture, forestry, and fishing	3.7	-.1	-1.8	-.3
Mining	3.2	2.0	-22.3	3.6
Routine manufacturing	1.9	.1	-6.6	.7
Complex manufacturing	28.5	.4	2.5	2.6
Producer services	54.7	1.0	47.9	.5
Consumer sector:	29.4	.8	22.2	.1
Distribution	17.8	.7	10.5	.7
Retail and personal	27.9	.3	35.5	-0
Health, education, and related	40.4	0	18.7	.6
Government	26.6	1.4	6.2	1.2
Construction	28.8	.5	24.8	.5

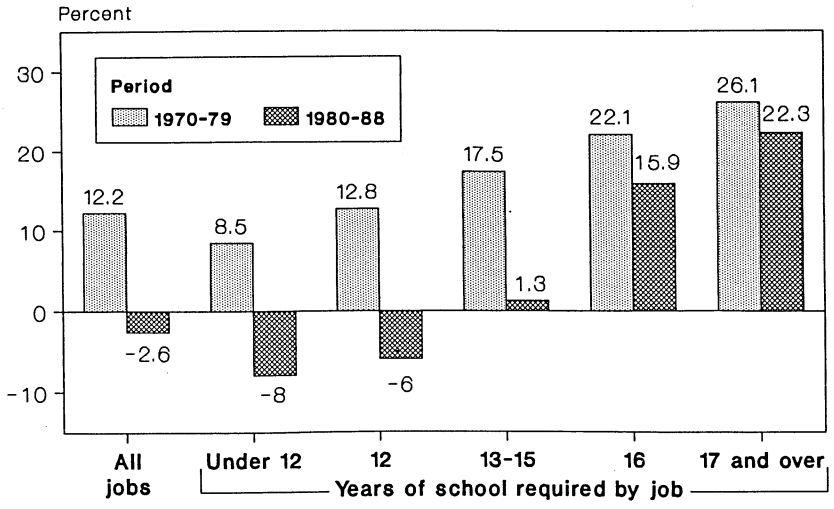
Note: See appendix I for methods.
[1] Calculated as 10-year rate for greater comparability between time periods.
Sources: (*12,13,14,15,16*)

producer services growth. But the acceleration is also apparent within industry groups, as production work declined and management and professional staff increased. In manufacturing, jobs typically filled by people with less than 12 years of school grew by more than 8 percent from 1970 to 1979 but declined by 8 percent during 1980-88 (fig. 1). Despite the overall decline in manufacturing employment in the 1980's, jobs for people with college or higher education continued to grow substantially. This pattern of change in the 1980's reflects the loss of production jobs to other countries, brought on by the high value of the dollar in the early 1980's. Technological displacement of low-skill labor and the growth of complex manufacturing with its relatively high demand for education were also important.

In contrast to the production sector, the consumer sector was apparently unaffected by the exigencies of the new economy in the 1980's (table 3). The modest rise in education needs in this sector in the 1970's dropped to

Figure 1

National manufacturing employment change by job education requirements



Sources: *(12,13,14,15,16).*

an almost negligible rate in the 1980's. This flatness was related to the smaller contributions of the health, education, and related industries to consumer sector growth in the 1980's. Also, the overall shortage and rising cost of highly educated young adult workers in the 1980's made the expansion of high-education jobs more costly and therefore (other things being equal) less likely in the 1980's than it had been a decade earlier.

This analysis of changing job educational requiremnets suggests one reason for the controversy noted in chapter 2 about whether skill requirements are rising rapidly in the new economy. The answer depends on where one looks. Analysts of the production sector, where the rise in educational needs accelerated during the 1980's, are much more likely to see an education crisis than analysts of the economy of a whole, where the rise in needs tapered off. Another reason for the controversy is the unavailability of measures to assess changes in the skill content of the individual jobs.

The Rural Economic Niche

The rural economic problems of the 1980's—weak employment growth, long periods of high unemployment, and stagnant or declining earnings—were to some extent a reflection of problems experienced by rural types of industries—agriculture, forestry, mining, and routine manufacturing—in the

1980's. But, perhaps more significant for the future prospects of rural areas, there was also a deterioration in the rural economic niche. As the production sector shift toward jobs requiring high education levels accelerated in metro areas, it all but disappeared in rural areas. The decennial rate of increase in the average education level of production sector jobs rose in metro areas from 1.6 percent during 1970-79 to 2.9 percent during 1980-88 (table 4). The nonmetro rate of increase exceeded the metro rate during 1970-79, but dropped to only 0.6 percent during 1980-88.

In manufacturing, the nonmetro economic niche deteriorated both in relation to metro areas and absolutely. Routine manufacturing, with relatively low-skill, low-education jobs, continued in the 1980's as in the 1970's to shift out of metro areas into nonmetro areas to take advantage of lower rural wages. Perhaps the best known shift involved the auto industry. Complex manufacturing, however, which had moved into nonmetro areas in the 1970's, shifted back to metro areas in the 1980's. The number of complex manufacturing jobs rose by 4 percent in metro areas during 1980-88, but fell by 8 percent in nonmetro areas. Within both these industry groups, the average educational levels of the jobs remained unchanged in nonmetro areas during 1980-88, while rising substantially in metro areas.

The rural loss of economic importance in the broader economy is best captured by comparing the types and the education levels of jobs that grew in metro and nonmetro areas. In 1980, the rural-urban division of labor in manufacturing was already considerable. Due both to the greater tendency for the more complex industries to locate in urban areas and the tendency, within industries, for management and research to be located in urban areas and routine production activities to be rural, metro and nonmetro areas had very different job mixes. About 16 percent of the metro jobs were managerial and professional jobs in 1980, but only 8 percent of the nonmetro jobs fell in this category (table 5). In contrast, 79 percent of the nonmetro jobs were production jobs, compared with 63 percent in metro areas. During the 1980's, these differences increased markedly. Managerial and professional jobs grew rapidly in metro areas but declined in nonmetro areas. Production jobs, however, moved in the other direction, growing only in nonmetro areas. This pattern is in sharp contrast to the 1970's, when all types of jobs increased relatively rapidly in nonmetro areas.

These patterns are repeated when we examine changes according to the education level of jobs (fig. 2). During the 1980's, while metro areas lost low-education jobs and gained high-education jobs, nonmetro areas gained in only low-education jobs. According to our data, there were actually fewer nonmetro high-education manufacturing jobs in 1988 than there had been at the beginning of the decade. In brief, management and research became

Table 4--Change in employment and job education requirements

Period, sector and industry group	Metro		Nonmetro	
	Employ-ment	Average job education level [1]	Employ-ment	Average job education level [1]
		Percent		
1980-88:				
Total	20.5	1.1	11.4	.6
Production sector	15.4	2.9	3.5	.6
Agriculture, forestry, and fishing	-4.5	-.5	-.3	-.2
Mining	-7.9	4.0	-34.6	1.2
Routine manufacturing	-11.0	1.2	4.1	-.1
Complex manufacturing	4.4	2.9	-7.7	.1
Producer services	50.4	.5	31.8	0
Consumer sector	23.5	0	16.9	.2
Distribution	12.4	.6	2.2	.8
Retail and personal services	36.3	-0	32.9	0
Health, education, and related	19.2	.7	17.1	0
Government	6.9	1.1	3.2	1.5
Construction	32.8	.4	1.4	.5
1970-79:				
Total	22.4	1.1	36.3	1.4
Production sector	20.5	1.6	25.7	1.7
Agriculture, forestry, and fishing	1.7	-.2	4.3	-.1
Mining	26.8	3.4	35.5	1.2
Routine manufacturing	-2.1	0	9.3	.5
Complex manufacturing	24.2	.6	43.8	.2
Producer services	49.0	1.0	80.1	1.3
Consumer sector	23.6	.8	44.3	.9
Distribution	11.6	.9	38.7	.3
Retail and personal services	23.2	.2	39.3	.6
Health, education, and related	35.9	-.1	52.0	.5
Government	17.1	.16	58.1	1.2
Construction	22.2	.5	41.9	.6

Note: See appendix I for method.
[1] Calculated as 10-year rate for greater comparability between time periods.
Sources: (*12,13,14,15,16*).

Table 5--Occupational distribution and change in manufacturing

Area type and occupational group	Distribution		Change	
	1980	1988	1980-88	1970-79
			Percent	
Metro:				
Managerial and professional	16.3	22.8	34.5	27.6
Support, other white collar	20.5	20.0	-6.0	6.0
Production worker	63.2	57.3	-12.6	6.2
Total	100.0	100.0	-3.5	9.3
Nonmetro:				
Managerial and professional	7.9	7.8	-.8	44.2
Support, other white collar	12.3	11.5	-6.0	22.0
Production worker	79.7	80.6	1.7	16.2
Total	100.0	100.0	.5	19.1

Note: See appendix I for method.
Sources: (*12,13,14,15,16*).

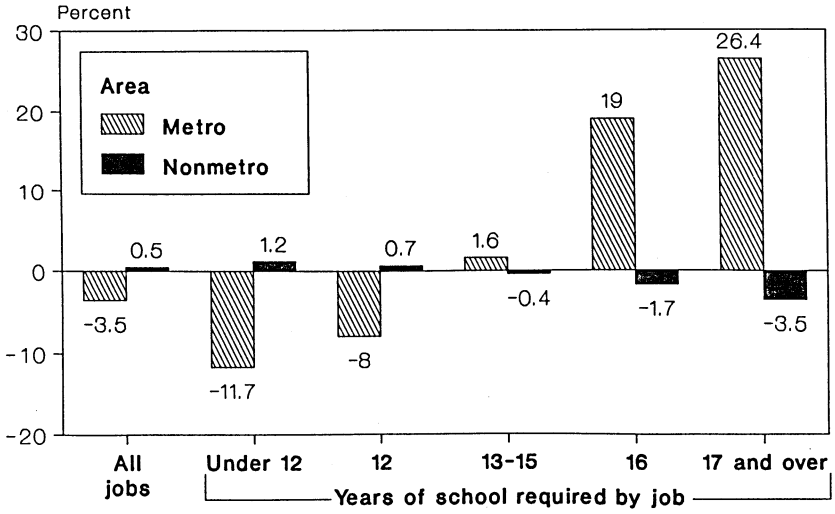
even more concentrated in metro areas in the 1980's, while production became more concentrated in nonmetro areas.

Our measures of disparity show a substantial increase in the rural-urban division of labor in the production sector as a whole in the 1980's. As shown in table 1, the index of dissimilarity for production sector industry employment was 34 in 1988, about 25 percent greater than it had been in 1980. The average of education requirements of production sector jobs was 7.2 percent higher in metro than in nonmetro areas in 1988, also about a 25 percent greater difference than found at the beginning of the decade (table 2).

Measures reflecting the division of labor in the consumer sector changed very little. The fact that people need services at the local level appears to preclude extensive rural-urban division of labor in this sector. The much slower consumer sector employment growth in nonmetro areas (16.7 percent) compared with metro areas (23.6 percent) was probably in large part a reflection of the inability of the relatively weak nonmetro production sector to generate as much local demand for consumer services as was generated in metro areas.

Figure 2

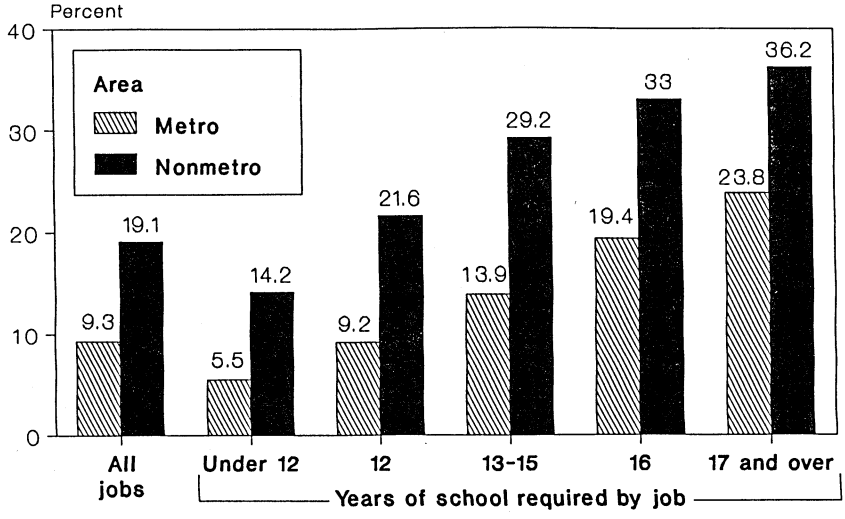
Manufacturing employment change by job education requirements, 1980-88



Sources: *(13,15,16).*

Figure 3

Manufacturing employment change by job education requirements, 1970-79



Sources: *(12,14).*

Whatever the reasons for the deterioration of the rural economic niche in the 1980's, they were not present in the 1970's. Nonmetro production sector employment grew faster than metro employment in this period, and the education levels of the nonmetro jobs increased at about the same rate as metro levels (table 4).[27] In manufacturing, nonmetro areas gained both high- and low-education jobs at a faster rate than metro areas (fig. 3). The rural-urban division of labor remained much the same during this period. The index of dissimilarity for the production sector, calculated on the same basis as in table 1, was 25.4 in 1970 and 24.3 in 1979.[28] Also, metro-nonmetro differences in the education levels of jobs remained the same.[29]

The education levels of jobs rose in the 1970's and, in the production sector, rose even faster in the 1980's. The rural economy participated in the rise in the 1970's but was left behind in the 1980's. While the education levels of manufacturing jobs rose rapidly in metro areas, these levels actually declined in nonmetro areas during the past decade. The analysis of job trends is only half the story, however. The other half is the education of the workforce, particularly the new entrants.

Education Levels of the Population and Workforce

The education levels of the working age population increased substantially in the 1980's but at a rate that was only about half of what it had been in the 1970's. Among young adults, the primary source of new highly educated workforce members, education levels stopped increasing between the 1970's and the 1980's, and actually began to decline. This reversal was a major precipitator of the national education crisis.

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[27] Our data are biased toward finding stronger nonmetro growth in the 1970's than in the 1980's. The metro-nonmetro delineation used in our data sources for 1970-79 is the one used in the 1970 Population Census. It does not take into account commuting patterns identified in the 1970 Census. The 1980-88 delineation, however, is based on a 1984 classification which took into account commuting patterns identified in the 1980 Census (see app. I). Since counties newly classified as metro based on heavy commuting to metro centers are usually rapidly growing counties, our 1970-79 statistics show faster rates of nonmetro growth than they would have if the 1970 commuting had been taken into account. The difference is not trivial: 1970-80 employment change based on the Censuses and using the 1970 metro area definition adjusted for commuting was 26.5 for metro areas and 30.7 for nonmetro areas (*8*). The comparative statistics from the present study are 22.4 percent and 36.3 percent (table 4). Aside from the magnitude of the differences, we found no inconsistencies between the earlier study and the present one. That study also found, for instance, that all industry groups grew faster in nonmetro than metro areas in the 1970's.

[28] The Index has smaller values in the 1970's than in 1980 because the 1970 delineation of metro and nonmetro areas was used in the 1970-79 analysis.

[29] A shift-share analysis of metro and nonmetro job changes in the 1970's and 1980's reenforces these conclusions. While nonmetro areas lost their share of high-education jobs in the production sector in the 1980's, this was a new development. Nonmetro areas gained considerably in their share of these jobs in the 1970's (app. table 1).

The nonmetro working age population had considerably less schooling than the metro population in 1980, and, while education levels increased in both metro and nonmetro areas in the 1980's, the nonmetro rate of increase was considerably lower. Thus, for workers as well as the jobs they filled, rural-urban educational disparities increased in the 1980's. In contrast, the education levels of the working age population increased as rapidly in nonmetro as in metro areas in the 1970's. The major reason for the divergence in the 1980's appears to be migration. While the inmigration to nonmetro areas from metro areas in the 1970's was largely education neutral, the nonmetro outmigration in the 1980's was especially heavy for higher education groups. Thus, this analysis, like the analysis of job education requirements, suggests that education levels did not hinder rural growth in the 1980's. Rural areas were net exporters of educated workers.

National Changes in Schooling Completed

If we consider changes in the education levels of the working age population in the 1980's in isolation, evidence of an education crisis seems weak. The number of people aged 18-64 who had not completed 12 years of school fell by nearly 20 percent between 1980 and 1988, while the number who had completed 16 years of school rose by more than 50 percent (table 6). The average education level of this age group increased by 2.2 percent (table 7). Education levels are higher in the workforce than in the population at large because a relatively high percentage of high school dropouts are also dropouts from the workforce. Labor force participation rose among the more highly educated in the 1980's and declined somewhat among those who had not finished 12 years of school. As a result, the 2.8-percent rise in average education in the labor force aged 18-64 was greater than the corresponding rise for the population.[30]

But while average education increased in the 1980's, the rate of increase was much lower than it had been in the 1970's. Average education in 1979 was 5 percent higher in the working age population than it had been in 1970 and 5.4 percent higher in the labor force aged 18-64. As we saw earlier, rates of

[30] Both population and workforce increases in average education were well above the 1-percent decennial rate of increase in the education requirements of jobs we reported in the previous section. Direct comparisons of changes in workforce education with changes in our measure of job education requirements are not very useful, however. Our measure of changes in education requirements is based on which jobs grew and which jobs declined and does not take into account changes in the nature of the jobs themselves, some of which may lead to higher education requirements. We feel that when the mix of jobs shifts towards those requiring higher education, the requirements of individual jobs probably also shifts upward. Thus, our measure shows less change than would be the case if we could assess changes in the educational requirements of individual jobs. Our measure is a gauge or indicator rather than a direct measure of educational requirements.

Table 6--Education completed by people aged 18-64

School years completed	1980	1988	Change 1980-88	Change 1970-79
	--- *Millions* ---		--- *Percent* ---	
Total population	135.3	148.2	9.5	17.9
Under 12	35.3	28.5	-19.2	-23.8
12	53.1	60.3	13.7	33.1
13-15	25.7	29.7	15.8	51.7
16	11.6	17.8	52.8	75.2
17 and over	9.6	11.8	23.6	70.1

Sources: (*12,13,14,15,16*).

Table 7--Average education of population and labor force, ages 18-64 and 25-34

Age group and base	1980	1988	Change 1980-88	Change 1970-79
	---- *Years* ----		---- *Percent* ----	
Ages 18-64:				
Population	12.2	12.5	2.2	5.0
Labor force	12.9	13.2	2.8	5.4
Ages 25-34:				
Population	13.3	13.2	-.3	6.3
Labor force	13.5	13.4	-.6	6.4

Sources: (*12,13,14,15,16*).

change in educational requirements in the economy were fairly similar across the two decades. This suggests there was a smaller surplus (or a greater shortage) of highly educated workers in the 1980's than in the 1970's. Employers had more problems upgrading the education levels of existing jobs as older workers retired and establishing new jobs at high education levels.

The increase in average education in the 1980's among people 18-64 actually masks a decline in the education levels of young adults. People aged 25-34—

new entrants to the labor force—had generally lower education levels in 1988 than the same age group had had in 1980. This drop contrasted sharply with the previous decade when the average education of people in this age group grew by more than 6 percent. Education levels of the overall workforce continued to rise in the 1980's only because young adults entering the workforce still had more years of schooling than those retiring from the labor force.

The schooling side of the education crisis is most apparent when we look at annual change in the education levels of young adults (fig. 4). During the mid-1970's, spurred by the baby-boom, the numbers of college-educated young men and women began to grow at rates of about 10 percent per year.

These growth rates declined considerably over the rest of the decade, however, and into the 1980's. For men in the 1980's, the growth in the number of people with 4 or more years of college has been slightly slower than the growth rate of this age group as a whole. At the same time, the number of young men who had not completed high school, which had declined markedly in the early and mid-1970's, began to increase in the latter part of the decade, and the rate of growth soon exceeded that of college graduates. (Some of the apparent growth is due to Census Bureau upward reestimates of Hispanic and other minority populations in 1980 and again in 1985.)

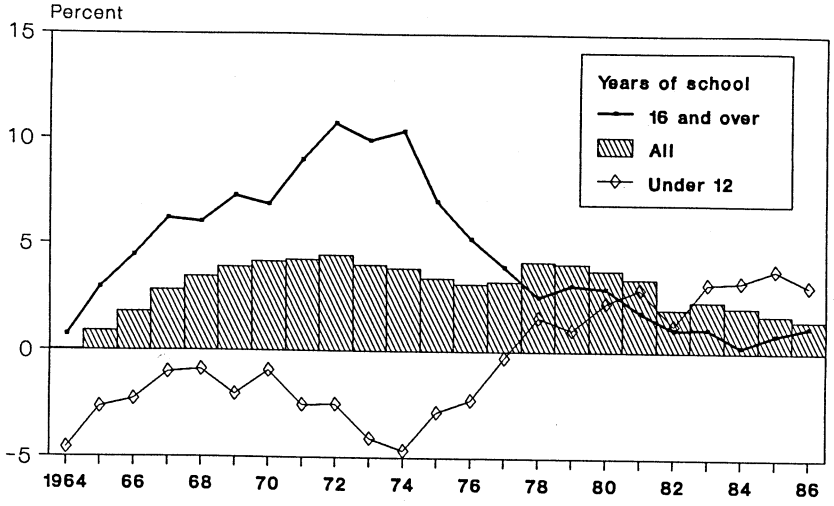
Among women aged 25-34, the number of those with college education rose extremely rapidly from the late 1960's through the late 1970's (fig. 5). The number continued to increase in the 1980's, but at much lower rates. In 1972, the number of women aged 25-34 with 4 years of college was growing at a rate of 12 percent per year; by 1985 the growth rate had dropped to around 3 percent. Over the same period, growth in the total number of women in this age group only dropped from 4 percent per year to 2 percent.

Several possible explanations for the declining educational levels of young adults are possible. First, the Vietnam War appears to have kept many young men in school who would normally have entered the job market. Once the threat of being drafted was past, an important incentive to stay in school disappeared. Thus, the growth in the number of young men with 4 or more years of college was abnormally high in the early 1970's, and the subsequent tailing off of growth is the downside of the Vietnam bubble.

This explanation is not entirely satisfactory, however, as women show much the same patterns of growth in education levels over the period. Second, rising costs and declines in aid and loans for higher education may have had a discouraging effect on post-high school education (see ch. 4). Third, immigration from Third World countries has been rising, and many young

Figure 4

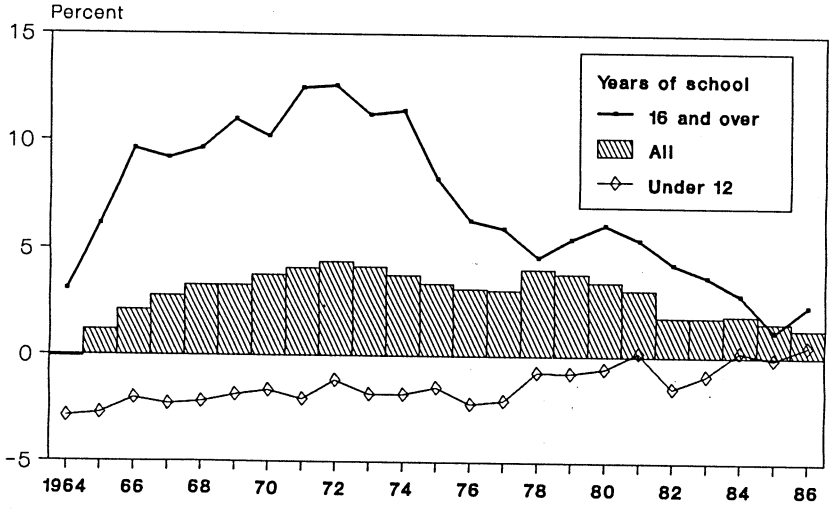
Annual population growth rate of men aged 25-34, by education level



Sources: *(17,18).* Note: 4-year averages.

Figure 5

Annual population growth rate of women aged 25-34, by education level



Sources: *(17,18).* Note: 4-year averages.

immigrants have relatively few years of schooling. Finally, the low premium paid to young adult college graduates in the mid-1970's may have prompted many to bypass or drop out of college.

Rural Education Levels and Trends

Rural education levels were considerably lower than urban levels in 1980, and rural areas fell even further behind between 1980 and 1988. Nearly a third of the nonmetro working age residents in 1980 had not finished 12 years of school, compared with about a fourth of the metro residents (table 8). The proportion of the working age population that had completed at least 1 year beyond high school was 27 percent in nonmetro areas, but 37 percent in metro areas. In nonmetro areas as in metro areas, education levels rose in the 1980's as the number of working age people with less than 12 years of school fell and the number with 16 or more years rose. The increase in average education was greater in metro than in nonmetro areas, however, primarily because of the much faster metro rise in working-age residents with 16 years of school completed.

The rural education situation for the young adult workforce deteriorated in the 1980's, as their education levels fell 1.3 percent, much faster then in metro areas (table 9). A continuation of this trend would eventually mean declining education for the nonmetro labor force as a whole and a major rural-urban education gap.

The growth in the rural-urban education gap was new to the 1980's. During the 1970's, average education of the workforce aged 18-64 rose 5.5 percent in both metro and nonmetro areas. Among young adults, the nonmetro rise in education was greater (7.2 percent) than the metro rise (6.2 percent), which reduced the metro-nonmetro education gap for this age group. In the 1960's, the rise in nonmetro education kept pace with the metro rise despite net outmigration from nonmetro to metro areas (*8*).

That the relatively large rural decline in young adult education levels in the 1980's was responsible for the shift of high-education jobs from rural to urban areas seems unlikely. The causal direction seems, rather, to have been the other way: the shift in high-education production sector jobs from rural to urban areas resulted in a relatively large decline in rural young adult education levels. The mechanism was migration. Our image of small towns and open country areas is one of general stability, but in- and outmigration are considerable, especially among young adults. Between 1975 and 1980, more than 30 percent of the nonmetro young adult population moved out of their county, with about 20 percent moving to a metro area (fig. 6).

Table 8--Metro and nonmetro education distribution, population aged 18-64

School years completed	1980 Levels		1980-88 Change	
	Metro	Nonmetro	Metro	Nonmetro
	---- Percent ----		*---- Percent ----*	
Under 12	24.4	31.8	-18.0	-22.5
12	38.4	41.8	13.8	13.4
13-15	20.0	15.8	17.1	10.1
16	9.4	6.2	58.6	22.6
17 and over	7.9	4.5	23.8	22.7
Total	100.0	100.0	11.7	2.4
	---- Years ----		*---- Percent ----*	
Average	12.8	12.2	2.8	2.3

Sources: (*12,13,14,15,16*).

Table 9--Average education of labor force in metro and nonmetro areas

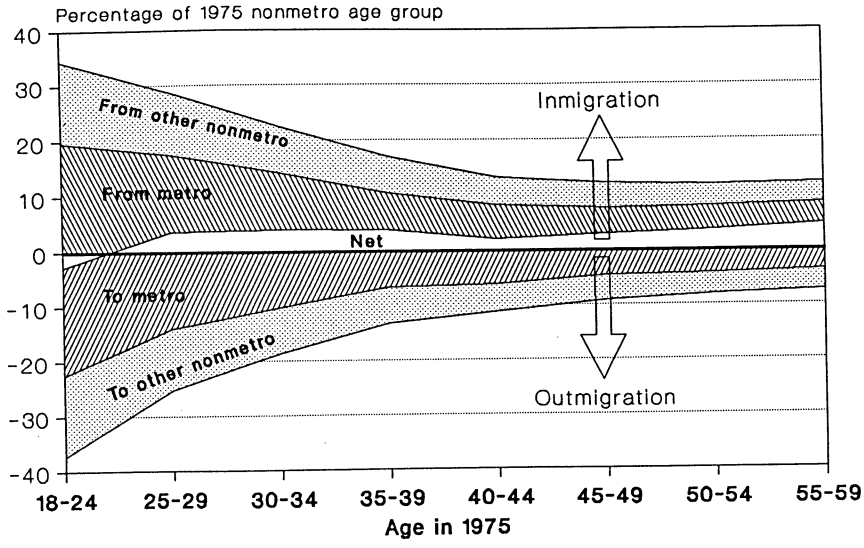
Age group and area type	Level		Change	
	1980	1988	1980-88	1970-79
	---- Years ----		*---- Percent ----*	
Ages 18-64:				
Metro	13.0	13.4	2.9	5.5
Nonmetro	12.4	12.7	2.3	5.5
Ages 25-34:				
Metro	13.6	13.5	-.5	6.2
Nonmetro	13.0	12.8	-1.3	7.2

Sources: (*12,13,14,15,16*).

During the same period, about the same number became new residents in a new nonmetro county, with about 20 percent of the inmigrants moving in from a metro area. While migration rates are lower for other age groups,

Figure 6

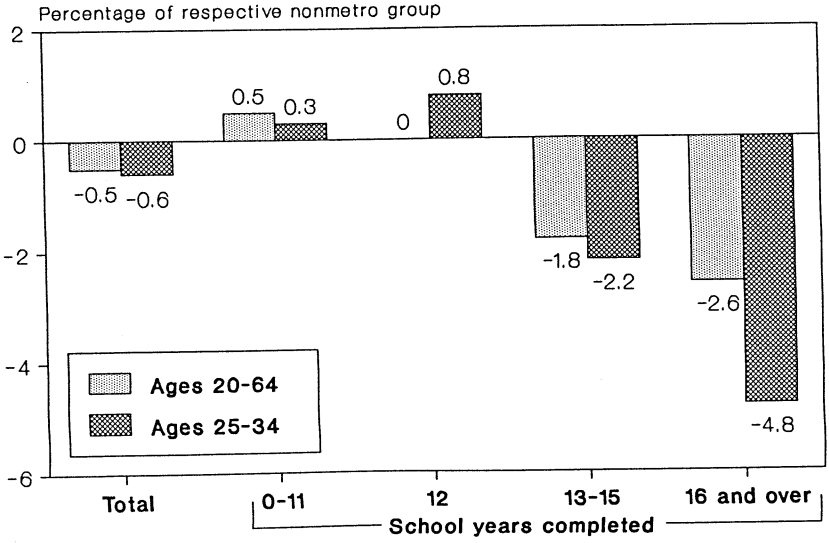
Nonmetro county migration, 1975-80



Source: *(13).*

Figure 7

Net nonmetro migration to and from metro areas, 1988-89



Source: *(17).*

they are still substanial. Together, working age migrants to and from metro areas between 1975 and 1980 equaled about 20 percent of the nonmetro working age population, a proportion sufficient to have a major effect on the education levels of nonmetro workforces.

Between 1988 and 1989, the nonmetro area loss of its college-educated population (ages 20-64) to metro areas averaged 3 percent per year (fig. 7).[31] Among young adults, ages 25-34, the rate of loss was twice as large. Net outmigration diminished for lower levels of education, even becoming slightly positive for people who had not finished 12 years of school. The overall effect was a "brain drain" from nonmetro areas, especially among young adults. Although migration patterns varied considerably in the 1970's, this pattern was quite different from the migration pattern of 1975-6, when net inmigration to nonmetro areas was higher among those with some college than it was among those who had not completed 12 years of school.[32]

To assess the potential effect of migration on nonmetro education levels, we applied the 1988-89 rates to the nonmetro education distribution in table 8 and calculated the number of years these rates would have to persist in order to yield the 0.6 percentage point difference found between metro and nonmetro 1980-88 changes in average education. We found that if these migration rates had persisted in 3 of the 8 years (and migration in other years was education neutral), it could account for the metro-nonmetro difference. Although somewhat crude, this calculation clearly shows that migration could account for all of the relatively low growth in average education 1980-88 in nonmetro areas compared with metro areas. While we have no information on college attendance by metro and nonmetro youth, the proportion of nonmetro youth who finished high school rose in the 1980's more quickly than it did in metro areas (see ch. 5), suggesting some convergence in educational aspirations between metro and nonmetro areas. It is quite possible that the education attained by nonmetro young adults rose or at least fell more slowly than that attained by metro youth but that the brain drain resulted in a more rapid fall in nonmetro young adult education levels.

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[31] The CPS data tapes for 1985-86, 1986-87, and 1987-88 migration contained coding errors which precluded their use here. Provisional adjustments to take into account the most severe of these errors resulted in estimated migration rates similar to the 1988-89 rates for both 20-64 and 25-34 age groups, but with no inmigration at low education levels. The 1988-89 migration seems to have been representative of the last half of the decade.

[32] In 1975-76, there was a net inmigration of young adults to nonmetro areas of 1.1 percent. All education groups had net inmigration to nonmetro areas. For those completing 16 or more years of school, the inmigration was 1.8 percent (*18*).

In sum, education levels of the working age population as a whole continued to increase in the 1980's, but much more slowly than in the previous decade. Among young adults, average education actually fell in the 1980's after rising rapidly in the 1970's. The changes between the decades were especially marked in the nonmetro population and workforce. The more acute nonmetro decline in young adult education does not, however, appear to have been of nonmetro origin. Rather, highly schooled young adults, who had migrated into rural areas in the 1970's, moved out of rural areas in the late 1980's at a high rate, lowering the average education for this age group in rural areas.

Education and Earnings

Although people with high school or less education fared poorly in both urban and rural areas in the 1980's, earnings trends make clear that for college-educated young adults, opportunities were much greater in urban areas than in rural areas during this period. The metro-nonmetro earnings gap increased during this period, especially for those with 16 and more years of schooling. Although there may have been other reasons for the nonmetro outmigration, the growing earnings gap helps explain the nonmetro brain drain. Conversely, the narrowing of the metro-nonmetro earnings gap in the 1970's helps explain the inmigration to nonmetro areas in the 1970's. These patterns of change in the metro-nonmetro earnings gap are further evidence that rural economic problems in the 1980's were more a cause than a result of low rural education levels.

National Trends in Earnings

After rising rapidly in the 1950's and 1960's, the incomes of U.S. workers (adjusted for inflation) began to stagnate in the 1970's and, for male workers, to fall (*6*). While incomes declined in both the 1970's and 1980's, the patterns of change varied considerably for workers at different education levels. Less educated workers were generally able to maintain their incomes in the 1970's, but their incomes fell considerably in the 1980's (table 10). Earnings decline was generally greater for men than for women, despite the relatively rapid growth in the number of women in the labor force. The incomes of workers with more than a high school education followed the opposite pattern, falling in the 1970's and then rising in the 1980's, although not substantially.

Differences by education level were more pronounced among young adult workers (ages 25-34) than among the workforce in general. Young adults are less set in their occupations and industries than older workers and more often on the job market; hence, their earnings are more responsive to labor

Table 10--Average income (3-year average) of full-time, full-year workers by age group, gender, and education

Age group, gender, and years of school	Income Level			Change	
	1968-70	1977-79	1986-88	1969-78	1978-87
	-- 1987 dollars --			*-- Percent --*	
Ages 25 and over:					
Males--					
11 or less	21,726	23,014	21,358	5.9	-7.2
12	27,720	29,263	27,238	5.6	-6.9
13-15	32,982	32,261	31,875	-2.2	-1.2
16	41,721	40,638	40,877	-2.6	.6
17 or more	47,656	48,458	50,501	1.7	4.2
Total	28,910	32,219	32,717	11.4	1.5
Females--					
11 or less	12,228	13,340	13,484	9.1	1.1
12	15,688	16,931	17,807	7.9	5.2
13-15	18,509	19,289	21,331	4.2	10.6
16	22,050	21,875	25,960	-.8	18.7
17 or more	26,793	28,167	31,945	5.1	13.4
Total	16,096	18,136	20,795	12.7	14.7
Ages 25-34:					
Males--					
11 or less	20,167	20,243	17,457	.4	-13.8
12	24,855	25,325	22,990	1.9	-9.2
13-15	28,015	27,151	26,055	-3.1	-4.0
16	33,948	30,477	32,792	-10.2	7.6
17 or more	37,168	35,939	38,207	-3.3	6.3
Total	26,370	27,367	26,324	3.8	-3.8
Females--					
11 or less	11,489	13,400	12,324	16.6	-8.0
12	14,993	16,141	16,188	7.7	.3
13-15	17,324	18,244	19,446	5.3	6.6
16	21,256	20,418	24,394	-3.9	19.5
17 or more	23,310	24,270	28,548	4.1	17.6
Total	15,999	17,875	19,566	11.7	9.5

Note: Adjusted for inflation using Personal Consumption Expenditure Index.
Sources: (*17*).

market conditions and shifting opportunities.[33] Also, education levels fluctuated most widely in this age group, rising in the 1970's and then falling in the 1980's.

Research on earnings has shown that there is no single, simple explanation of the trends of the past two decades (*2, 6, 7*). For workers with less education, several factors contributed to declining earnings in the 1980's: (1) the declines in mining and manufacturing production jobs, both relatively high paying compared with consumer sector jobs; (2) the renewed growth in the number of young adults with low education, which depressed wages; and (3) the declining power of unions in the face of the relative labor surplus and heightened international competition. These factors had more effect on men's earnings than women's, partly because women were more often in low-wage, nonuinionized, consumer sector jobs initially. Also, education levels did not decline among women as they did among men.

For workers with college training, the earnings decline in the 1970's appears to have been largely the result of the extraordinary number of college graduates entering the labor market. Earnings in jobs typically taken by young adults with high education fell in the 1970's. In the 1980's, earnings decline in these jobs ceased with the slowdown in the growth of this education group. High-education workers also benefited in the 1980's from the production sector growth in high-education jobs, as production sector jobs are much higher paying than consumer sector jobs at high levels of education. The net result was a slight gain in real earnings for workers with college training in the 1980's.

The distinct earnings trends for the low- and high-education groups meant declining earnings differences across education groups in the 1970's as the payoff for college training went down but increasing inequality across education groups in the 1980's as the premium for college education rose and the earnings for those with high school or less schooling declined.

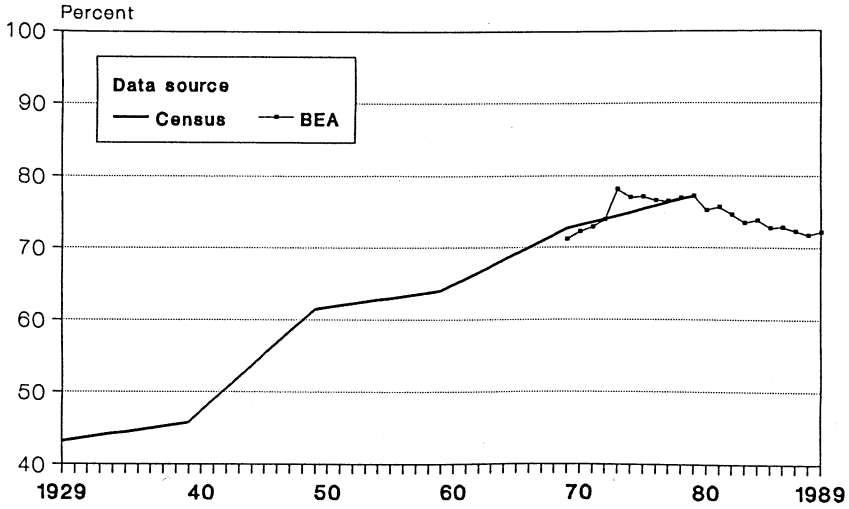
The Rural Earnings Deterioration

Rural incomes have been below urban incomes in this century, but the gap was generally closing until the mid-1970's (fig. 8). During the 1980's, nonmetro areas lost ground fairly steadily. The rural composition of jobs and workers bears some of the responsibility for the decline in the 1980's. Low-education workers did poorly in this period and, because nonmetro areas

[33] The available published data include incomes rather than earnings. We have assumed that, for full-time, full-year workers, incomes are almost entirely composed of earnings. This assumption may be less valid for older workers, which may also help explain why incomes for young adults seem more responsive to labor market conditions.

Figure 8

Nonmetro per capita income as a percentage of metro income



Sources: *(5,19).*

have a high proportion of these workers, this situation had a greater effect on rural earnings than on urban earnings. The slower increase in the education level of jobs and workers in nonmetro areas compared with metro areas also tended to reduce nonmetro income gains relative to metro gains.

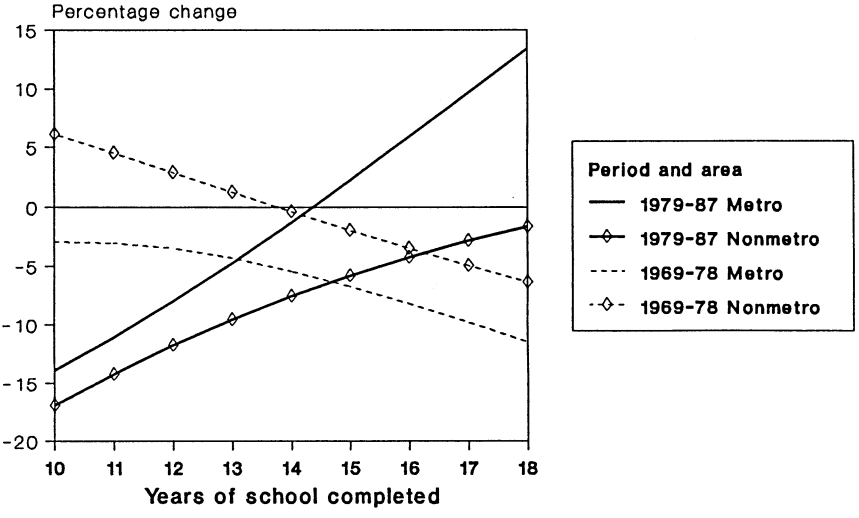
But, the decline was due to more than the low education levels of the nonmetro workforce. Nonmetro earnings deteriorated for young workers at all education levels in the 1980's. Earnings estimates for young men working full-year, full-time indicate that they fared much worse in nonmetro than metro areas, especially at higher levels of education (fig. 9).[34] Earnings for high-education workers rose in metro areas, but fell in nonmetro areas. This pattern contrasts sharply with the 1970's, when metro earnings declined more than nonmetro earnings. It helps explain the migration shift from nonmetro inmigration in the 1970's to outmigration in 1980's.

The more rapid decline in earnings in nonmetro areas created considerable rural-urban earnings disparities. In 1979, men aged 25-34 earned about 10 percent more in metro areas than in nonmetro areas, a difference which was

[34] For a discussion of the methods used to estimate earnings change by education, see appendix I.

Figure 9

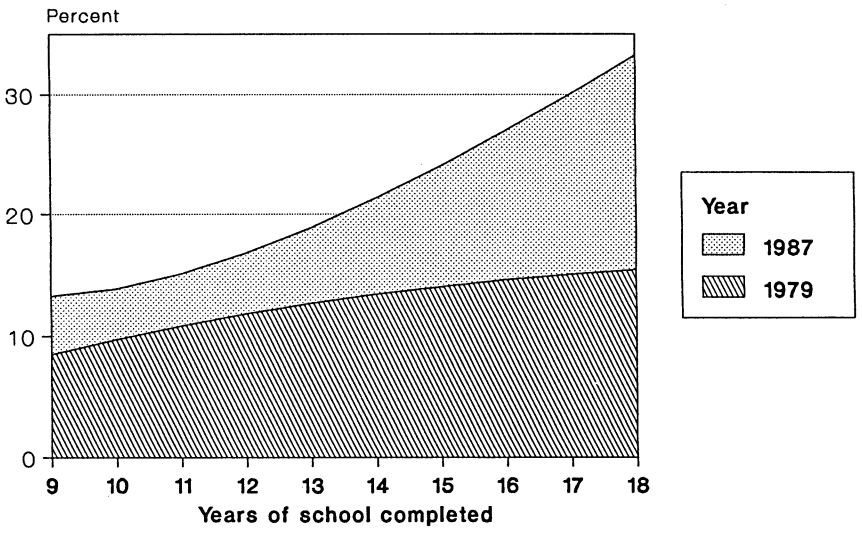
Changes in estimated earnings, male full-time workers, aged 25-34



Sources: *(12,13,14,15,16).* Note: adjusted for inflation.

Figure 10

Metro earnings excess over nonmetro earnings, male full-time workers, aged 25-34



Sources: Earnings equations using *(13,15,16).* See appendix I.

probably not far from the difference in the cost of living (fig. 10). By 1987, however, the difference according to these estimates was about 15 percent for high school graduates and well over 30 percent for those with education beyond college. Even with rises in urban housing costs, these earnings differences are well above anyone's estimate of cost of living differences. Separate analyses showed similar rural-urban shifts for men aged 35-64.

Earnings changes during 1980-87 were more positive for women and varied less by education level. Nevertheless, nonmetro women fared less well in the 1980's than metro women across all education levels (fig. 11). Young nonmetro women already bore a considerable financial sacrifice for their choice of residence in 1979, when the metro earnings advantage for women 25-34 was about 20 percent for all education levels (fig. 12). But this metro earnings advantage rose further, to nearly 30 percent, by 1987.

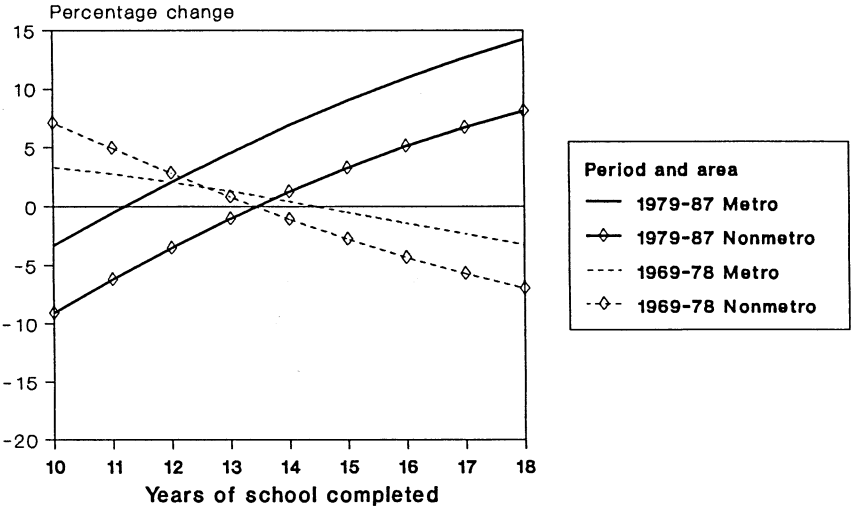
We investigated the sources of these earnings changes in each decade by looking at the typical income levels of jobs taken by young adults at the beginning of the decade, the changes in the income levels of those jobs, and the changes in the jobs occupied by young adults. We could explain some of the 1970's nonmetro earnings gains on metro areas by the smaller nonmetro shift to lower paying jobs. In the 1980's, the shift of the highly educated to high-paying jobs was less pronounced in nonmetro areas than in metro areas, which is consistent with the relatively slow growth of the nonmetro production sector. Also, earnings in nonmetro types of jobs declined more than earnings in metro types of jobs. But, together these differences could account for only part of the nonmetro earnings deterioration. This finding suggests that, in general, nonmetro pay did not keep pace with metro pay even where the same types of jobs were concerned. Thus, for instance, earnings for accountants or lawyers probably went up faster in urban than in rural areas.

Whatever its sources, the growth in metro-nonmetro earnings disparities, undoubtedly contributed to the net outmigration of better educated working-age adults from nonmetro to metro areas in the 1980's. Moreover, although the inmigration to rural areas in the 1970's was consistent with people's residential preferences, the move was clearly facilitated by the decline in earnings opportunities in metro areas.

Our analysis of earnings provides no support for the thesis that rural economic problems in the 1980's were the result of the low education levels of the rural workforce. In fact, the greater metro rise in the pay premium for education suggests that, in relation to demand, the shortage of highly schooled workers was greater in the already education-rich metro areas.

Figure 11

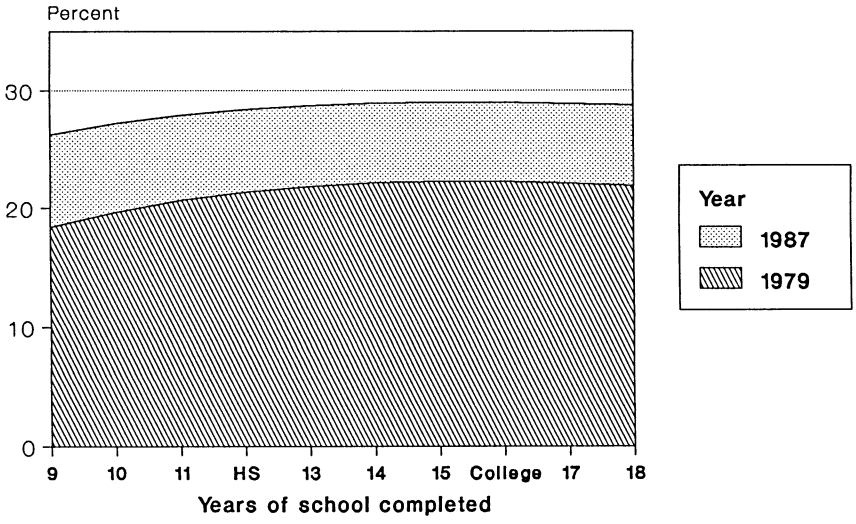
Changes in estimated earnings, female full-time workers, aged 25-34



Sources: *(12,13,14,15,16).* Note: adjusted for inflation.

Figure 12

Metro earnings excess over nonmetro earnings, female full-time workers, aged 25-34



Sources: Earnings equations using *(13,15,16).* See appendix I.

Education does pay off in nonmetro areas, more so now than 10 years ago. Our estimates indicate that, adjusting for inflation, nonmetro young men at all education levels earned less in 1987 than they did in 1979, but the decline was substantially greater for those with less education. But, higher nonmetro education levels would not have attracted notably more production sector jobs out of metro areas in the 1980's. Instead, more nonmetro workers would have been drawn to metro areas. The forces creating high-education production jobs in the 1980's were also making urban location more important.

Conclusion

The education crisis of the 1980's was provoked by real changes. At the national level, there was both a shift in production sector labor demand towards more highly educated workers and a slowdown in the growth rate in the supply of these workers. Although much national attention has been given to high school dropouts, the slowdown is equally important at higher levels of education. The proportion of high school graduates going on for higher education stopped increasing in the late 1970's and even declined among men. In the context of a shift in demand toward more highly schooled workers, the supply situation contributed to rising earnings inequality between those with high and those with low education. In rural areas, however, current economic problems appear to stem from a lack of demand. Rural areas do have relatively low education levels, but we found no evidence that this was a significant impediment to rural employment growth. Jobs for the better educated shifted from rural to urban areas even as the costs of the highly educated urban workers increased in relation to the costs of their rural counterparts. The better educated workers, apparently responding to these increasing pay gaps in the 1980's, became less likely to move to rural areas and more likely to leave them.

Rural worker earnings and the well-being of their communities were adversely affected by the trends of the 1980's in several ways. First, rural workers tend to have low education levels, and workers with low education generally had declining real incomes. Second, rural types of production sector industries and jobs did not do well in the 1980's. Third, the rural-urban division of labor increased, allocating more low-skill production sector jobs to rural areas while increasing high-skill jobs in urban areas. The weak rural production sector employment growth resulted in limited growth in rural consumer sector industries, with the combined effect of reducing overall demand for labor in rural areas. In combination, these changes contributed to declining nonmetro incomes relative to metro incomes, especially at high education levels.

We have treated the nonmetro United States as an undifferentiated whole in our analyses, when clearly there are major differences in workforce education levels and economic opportunities both among nonmetro areas and among racial and ethnic groups. Work by Falk and Lyson shows that the rural-urban division of labor in manufacturing increased in the South between 1977 and 1981, with black belt counties faring the poorest (*4*). We carried out some preliminary analyses, grouping States according to the 1980 education levels of their nonmetro areas, and compared the premium paid for education in the nonmetro areas of the low-education States with the premium paid in the nonmetro areas of high-education States. As expected, the premium was slightly greater in low-education States, but the differences between the nonmetro areas were much smaller than the metro-nonmetro differences we presented here. The situation was similar for earnings in general. The low-education nonmetro areas, all in the South, were apparently less affected by the declining earnings than other nonmetro areas and are no longer characterized by low pay, once we take education levels into account. There is an important exception, however. The earnings data showed that while nonmetro black men, most of whom live in the South, made gains in the 1970's, they became more disadvantaged in the 1980's. In sum, although we feel, on the basis of some preliminary analyses, that our findings are generally valid for nonmetro areas, a thorough analysis of differences among nonmetro areas and among population groups is clearly in order.

Finally, what of the future? Current education supply problems may be somewhat self-correcting. Individual decisions on how far to continue schooling probably take the anticipated payoff into account. Thus, one reason that today's young adults may have relatively little education beyond high school may be that at the time they were deciding whether to continue school—in the mid-1970's—there was relatively little payoff for going beyond high school. Since then, the pay premium for education has risen considerably and may be inducing today's youth to continue their education. To the extent that the local labor market is relevant to this decisionmaking, however, this incentive may be less effective in rural areas, where the pay premium for high education has risen less substantially.

The rural economic problems of the 1980's have abated to some extent. The value of the dollar has fallen internationally, making U.S. goods (and U.S. labor) less expensive in world markets. This change has stimulated some resurgence of manufacturing, from which rural areas have benefited more than urban ones, and has probably eased the pain of the recent national recession for rural areas. Producer services industries, relatively immune to recession in the past, were hard hit in the recent recession, especially finance, insurance, and real estate. These problems may have acted to decrease the urban premium paid to highly educated workers and further

even out some of the rural-urban disparity. But the real concern is less the current trends than the longrun prospects for the rural economy.

The most disturbing finding in this study is that low rural education levels are not the cause of lagging rural growth. The sharpening of the rural-urban division of labor in the 1980's consigned rural areas largely to low-skill, routine production work. This is an unfortunate economic niche, as it offers low wages and an uncertain future. Many Third World countries also specialize in these types of activities and may well become even stronger competitors in the world market. If education were the bottleneck, then we would know where to concentrate resources, and we would have some assurance that local investments in education would lead to greater rural prosperity. But such does not appear to be the case. Rurality itself may be the bottleneck, which makes it difficult to know how, or, indeed, whether development strategies can bring rural areas and their residents a more rewarding participation in the new economy.

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Appendix I: Methods

Analysis of trends requires that the same information be collected for the same areas over the time period being analyzed, preferably with the same survey instrument. Evidence of changes in education required by jobs and worker education levels in metro and nonmetro America remains piecemeal, at least partly because data collected on residence, occupations, and industries varied during 1970-88.

The two primary sources of education data, the decennial Census and annual Current Population Survey (CPS), changed both metro-nonmetro designations and occupation and industry classifications during the 1970's and 1980's. Because of this lack of a consistent time series, we used several combinations of Census and CPS data to investigate metro-nonmetro differences in educational requirements of jobs and the supply of education in the working-age population.

Common to all our estimates of education required and supplied was the use of five levels of educational attainment (years of schooling completed): less than high school (0-11 years), high school graduate (12 years), some college (13-15 years), college graduate (16 years), and 5 or more years of college (17 or more years).

Adjustments for data differences

We made adjustments for some of the differences among the Census and CPS files. Unclassified cases on the CPS files were allocated to metro and nonmetro areas, adjustments were made for differing metro-nonmetro designations on the 1980 Census and 1987-88 CPS files, and 1987 and 1988 CPS data were averaged.

Unclassified Cases on the CPS Files

The public use files from the 1979, 1987, and 1988 March CPS's identify most persons by their metro or nonmetro residence. However, a small proportion is left unclassified for confidentiality reasons. We assigned the unclassified cases to metro and nonmetro areas in proportion to Census Bureau published numbers of persons in each area. Specifically, when we calculated the number of people in nonmetro areas using the 1979 CPS, we multiplied the weights of the unclassified cases by .75 and added them in with the normally weighted nonmetro cases. And, when we calculated the number in metro areas, we multiplied the weights of the unclassified cases by .25 and added them in with the normally weighted metro cases. For the 1987 and 1988 CPS files, we used the same procedures, except that the

unclassified cases were reweighted by .80 when added to the nonmetro cases and reweighted by .20 when added to the metro cases.

We had no way to assign the truly nonmetro unclassified cases to nonmetro areas and the truly metro cases to metro areas. Our weighting procedure averages the characteristics of the unclassified cases and adds them disproportionately to nonmetro areas. The higher educational attainment and occupational status of metro residents in general leads us to believe the average characteristics of the unclassified groups are an overestimate of the status of the nonmetro portion of that group.

Nationally, the unclassified cases accounted for only 6 percent of persons 18-64 years old in the 1979 CPS and less than 1 percent of that age group in the 1987 and 1988 CPSs (app. table 1). Within metro and nonmetro areas, the reweighted unclassified cases generally account for less than 3 percent of the population. The exception is nonmetro areas in 1979, where the reweighted unclassifieds accounted for 14 percent of all cases. We feel that even at that level the slight upward bias in the characteristics of the unclassifieds does not significantly bias our nonmetro results.

Differences in Metro-Nonmetro Designations

The 1980 Census and the 1987 and 1988 CPS files differ slightly in their metro-nonmetro designations. The 1980 Census public use file uses a metro-nonmetro definition that does not consider 1980 intercounty commuting in determining whether a county is part of a metropolitan area but relies on 1970 commuting patterns. The metro-nonmetro designation used in the 1987 and 1988 CPS files uses the 1980 commuting patterns. A few counties considered metro by the 1980 Census lost their metro status when current commuting was considered. A larger number of counties considered nonmetro by the 1980 Census were reclassified to metro by commuting patterns. If the metro-nonmetro designation on the 1980 Census file had been based on current commuting, the nonmetro population in 1980 would have been 4.7 percent smaller.

Measures of growth in jobs and labor supply by education level would overestimate metro growth and underestimate nonmetro growth if we did not adjust for this difference in designations. The specific adjustments we made are explained in the education required and education supply sections below.

The 1970 Census and the March 1979 CPS use 1970 metro-nonmetro designations. There was no way to adjust either decade's metro-nonmetro classification to match the other decade.

Appendix table 1--Distribution of unclassified cases by residence, population 18-64 years old

Year/area	Number	Distribution
	Thousands	*Percent*
1979 CPS	130,170	100.0
Metro	88,513	68.0
Cases coded metro	86,513	(97.7) [1]
Unclassified cases reweighted by .25	20,000	(2.3)
Nonmetro	41,657	32.0
Cases coded nonmetro	35,657	(85.6)
Unclassified cases reweighted by .75	6,000	(14.4)
1987 CPS	146,735	100.0
Metro	115,155	78.5
Cases coded metro	114,938	(99.8)
Unclassified cases reweighted by .20	217	(.2)
Nonmetro	31,580	21.5
Cases coded nonmetro	30,710	(97.2)
Unclassified cases reweighted by .80	870	(2.8)
1988 CPS	148,198	100.0
Metro	116,505	78.6
Cases coded metro	116,294	(99.8)
Unclassified cases reweighted by .20	211	(.2)
Nonmetro	31,693	21.4
Cases coded nonmetro	30,852	(97.3)
Unclassified cases reweighted by .80	841	(2.7)

[1] Numbers in parentheses are percent distribution of cases within the residence category.
Sources: Computed using (*14,15,16*).

Averaging the 1987 and 1988 CPS's

We used an average of the 1987 and 1988 March CPS weighted counts of employed persons to get a more reliable measure of employment in our detailed industry and occupation categories. We would have done the same for 1978 and 1979, but the Census Bureau adjusted the CPS weighting procedure in 1979 to correct for earlier overestimation of the nonmetro population, making metro-nonmetro estimates from the March 1978 and March 1979 CPS files somewhat incomparable. In any case, the problem of

unreliability has been more important in the 1980's due to both smaller CPS samples and a smaller nonmetro population.

Estimates of Education Requirements

Education required is the education level that is desired to perform the work involved in a job. In both decades, our estimates of education need are based on the education levels of full-time, full-year workers in each of 18 industry groups. Within each industry group, workers were further disaggregated into 19 occupational groups in the 1970's analysis and 25 occupational groups in the 1980's analysis.[35] Not all industries employed workers in all occupations, so the number of job types totaled 325 in the 1970's and 443 in the 1980's.

Data Adjustments

Although the same technique was used to estimate education required in the 1970's and in the 1980's, industry and occupation coding during each decade differed. The occupation classification used during the 1970's was developed for use in classifying 1970 Census data. And, the industrial classification was the 1967 Standard Industrial Codes (SIC) system developed by the Office of Management and Budget and updated by the Office of Federal Statistical Policy and Standards (OFSPS). The occupational classification used during the 1980's was the new Standard Occupational Codes (SOC) developed in 1977, and the industrial classification used was the 1977 SIC system.

Using a conversion chart developed by the Population Section at the Bureau of the Census, we recoded the 1970 occupational codes to match the 1980 codes as closely as possible. We used 25 occupational categories in the 1980's but only 19 occupational categories in the 1970's because supervisory and nonsupervisory workers in several occupations were distinguished in the coding of the 1980's datasets but not in the 1970's datasets. To the best of our ability, we also matched the 1970 and 1980 industrial codes.

For the 1970's, we calculated education required within each industry-occupation job type based on the distribution of full-time, full-year workers by education level from the 1970 Census. For the 1980's, we calculated education required within each job type based on the distribution of full-time, full-year workers by education level from the 1980 Census.

This calculation of educational need assumed, in effect, that supply and demand were in equilibrium across job types at the time of each Census: that is, that the Census distributions reflected the distribution of education

[35] See Appendix II for definitions for occupation and industry categories.

across job types desired by both employers and employees (the distribution is adequate to perform the work while fully using the skills of the workers). The education of full-time, full-year workers was used to address this concern. Less fully employed workers are more likely to be students working part-time and others used by employers to fill temporary needs. The less fully employed may have more or less education than that necessary to do the job on a more permanent basis. We used the educational distribution of full-time, full-year workers to reflect as accurately as possible the education required by each job type.

Using full-time, full-year workers for the entire analysis, however, would have biased the distribution of employment in favor of industries that employ higher proportions of those workers. Retail industries and other employers of high proportions of part-time workers would have been underrepresented.[36]

To incorporate the educational requirements of jobs reflected in the educational levels of full-time, full-year workers and also to analyze the distribution of all employed workers, we used the proportion of full-time, full-year workers at each education level within a job type as "standard educational requirements" and applied those proportions to all workers employed in that job type. We applied the 1970 "standard" to national, metro, and nonmetro workers in 1970 (Census data) and 1979 (March CPS data). We applied the 1980 "standard" to national, metro, and nonmetro workers in 1980 (Census data) and 1987/88 (March CPS data).

Before applying the "standard" education proportions, we adjusted for the difference in metro-nonmetro classification between the 1980 Census and the 1987-88 CPS's by subtracting 4.7 percent (959,000) of total nonmetro jobs in 1980 and adding it to metro jobs. We assumed that the industrial and occupational distribution of these jobs was intermediate between the metro and nonmetro distributions. The number of jobs reassigned from nonmetro to metro in each industry/occupation group was determined as follows:

[36] We also found in preliminary analyses of full-time, full-year workers that the Census and CPS may differ in their classification of primary and secondary teachers by work status. The CPS appears to count a much higher proportion of these teachers as full-time, full-year workers than does the Census. We could find no appreciable difference in the survey questions used to determine full-time, full-year status. It may be a difference between self-identification on the mailed Census form versus enumerator interpretation on the CPS form.

$$\text{industry/occupation adjustment} = \frac{959{,}000 * ((\text{noccind}/\text{nadjtot} + \text{moccind}/\text{madjtot})/2)}{1 - 959{,}000 * ((1/\text{nadjtot} - 1/\text{madjtot})/2)}$$

Where:

noccind = nonmetro number in industry/occupation group
moccind = metro number in industry/occupation group
nadjtot = total nonmetro jobs minus the 959,000
madjtot = total metro jobs plus the 959,000

The Education Requirements Estimation Procedure

Here is a simplified example of our education requirements estimation process. In 1980, there were 320 (for example, not in reality) full-time, full-year social workers throughout the United States who were distributed by education as follows:

		Years of education				
Item	Total	0-11	12	13-15	16	17+
Full-time, full-year social workers	320	18	46	80	111	65
"Standard" proportion in each education category	1.00	.06	.14	.25	.35	.20

Education required of all social workers nationally and in metro and nonmetro areas in 1980 and 1987/88 was then estimated by multiplying the total number of social workers in those areas and years by the "standard" proportions (estimated numbers are in bold type):

Year/area	Total	Years of education 0-11	12	13-15	16	17+
1980:						
Total	410	25	57	102	144	82
Metro*	309	19	43	77	108	62
Nonmetro*	101	6	14	25	36	20
1988:						
Total	514	31	72	128	180	103
Metro	400	24	56	100	140	80
Nonmetro	114	7	16	28	40	23

* Adjusted to reflect 1987/88 metro-nonmetro designation.

In the full-scale analysis, the educational distribution of workers in each of the industry/occupation job types in each decade was computed. Then workers in each educational category were summed across all job types to total requirements for each level of education. Education required in production and consumer industries was also estimated for each year by summing the number of workers at each education level across the occupation/industry categories in production and consumer industries.[37]

This method assumes that the same education required by occupations and industries in 1970 and 1980 was required in 1979 and 1987/88, respectively. Educational upgrading of jobs is not taken into account. Retirees have typically had less education than their replacements. Also, technological change in manufacturing processes requires a more highly educated labor force. Thus, our estimates of change in requirements for more highly educated workers undoubtedly underestimate actual increases in need (as we have defined it). We assume that this change has not occurred unevenly enough to seriously bias our results.

Average Education Required

For each decade, average education required was calculated in a four-step process:

1) Each education level was assigned an "average education":

[37] See Appendix II: For definitions for the industries categorized as production and consumer.

Education level	Average education
0-11	10
12	12
13-15	14
16	16
17+	18

2) The number of workers at each education level in each industry/occupation category was multiplied by the appropriate "average education"

3) The products of this multiplication were summed across education levels over industry/occupation categories

4) These totals were divided by the total number of workers to arrive at average education required.

Average education required was computed for all workers in metro and nonmetro areas and for production- and consumer-sector workers in each area. Change in average education in each decade was computed as a 10-year rate to standardize the time period base from 9 years between 1970 and 1979 and 7.5 years between 1980 and 1987/88 to 10 years each.

Job Redistribution

Another measure of change in education requirements that we calculated but felt was too complicated to report in the body of this chapter is job redistribution. This measure is a shift-share type indicator based on the difference between actual growth in nonmetro jobs by education level and the growth that would be expected had nonmetro jobs in each industry/occupation category grown at the same rate as metro jobs.

For each decade, redistribution of jobs by education level between metro and nonmetro areas was estimated in a five-step process:

1) For each education level within each industry/occupation category, the number of nonmetro workers in 1970 (1980) was subtracted from the number of nonmetro workers in 1979 (1987/88) to obtain actual change.

2) For each education level within each industry/occupation category, the number of nonmetro workers in 1970 (1980) was multiplied by the

percent the cell changed in metro areas from 1970 to 1979 (1980 to 1987/88) to obtain expected change.

3) Actual change, expected change, and total nonmetro workers in 1970 (1980) at each education level were then summed to overall, production, and consumer sector totals.

4) Actual and expected change totals were divided by 1970 (1980) workers to obtain actual and expected percent change at each education level.

5) Expected percent change was subtracted from actual percent change to obtain the percent of all, production-sector, and consumer-sector jobs at each education level that were redistributed to or from metro areas in each decade.

Appendix table 2 shows the results of this analysis. Differences between the 1970's and 1980's are striking when the education required of production- and consumer-sector jobs are considered. Jobs at all education levels in both production and consumer sectors shifted from metro to nonmetro areas in the 1970's. And, the shift from metro to nonmetro areas was greatest for jobs typically requiring more than a high school education.

In contrast, only jobs requiring a high school education or less in the production sector continued to shift to nonmetro areas in the 1980's. Production-sector jobs requiring higher education shifted to metro areas. And, all types of consumer-sector jobs shifted to metro areas in the 1980's. This shift was greater the lower the education required.

These job redistribution estimates are compatible with the changes in average education by sector reported in table 4. The faster growth of high-education jobs in nonmetro areas in the 1970's is reflected in the greater increase in nonmetro average education in both industrial sectors. And, in the 1980's, the nonmetro loss of higher education production sector jobs to metro areas is consistent with the smaller increase in average education in the nonmetro production sector. Although nonmetro job growth did not match metro growth at any education level in the consumer sector, nonmetro growth was faster in higher than lower education jobs while metro growth was fairly evenly distributed across education levels. These growth patterns resulted in a slight increase in average education in the nonmetro consumer sector and no change in average education in the metro consumer sector.

Appendix table 2--Change in jobs by industrial sector and education required

Industrial sector and education required	1980-88				1970-79			
	Metro	Nonmetro			Metro	Nonmetro		
	Actual change	Actual change	Expected change	Actual-expected change	Actual change	Actual change	Expected change	Actual-expected change
All industries:	20.5	11.4	15.0	-3.5	22.4	36.3	19.0	17.4
Less than 12 years	15.0	8.1	8.9	-.9	15.9	26.6	13.0	13.5
12 years	17.3	10.7	12.9	-2.2	21.4	38.3	19.2	19.1
13-15 years	23.1	13.8	19.5	-5.7	27.8	48.3	26.3	22.1
16 years	29.8	14.9	24.8	-9.9	33.8	50.7	31.2	19.5
17 or more years	29.6	17.1	24.7	-7.5	38.2	58.2	35.2	22.9
Production sector:	15.4	3.5	.8	2.7	20.5	25.7	11.4	14.2
Less than 12 years	.9	1.4	-6.8	8.2	11.8	16.4	6.3	10.2
12 years	8.6	2.5	-2.5	5.0	19.1	28.0	11.7	16.3
13-15 years	22.4	5.8	8.6	-2.8	27.6	41.4	19.7	21.6
16 years	37.5	8.8	22.4	-13.6	37.9	50.5	29.3	21.2
17 or more years	44.0	14.3	31.1	-16.8	49.5	67.8	44.3	23.5
Consumer sector:	23.5	16.9	24.9	-7.9	23.6	44.3	24.6	19.7
Less than 12 years	24.5	15.0	24.3	-10.3	18.6	36.4	19.6	16.8
12 years	22.7	16.9	24.6	-7.7	22.9	45.9	24.7	21.2
13-15 years	23.4	18.0	25.3	-7.3	28.0	52.0	29.8	22.3
16 years	25.0	17.9	26.1	-8.1	31.1	50.8	32.0	18.7
17 or more years	23.6	17.9	22.8	-4.9	33.8	55.8	33.0	22.8

Sources: (*12,13,14,15,16*).

Estimates of Education Supply

Education supply is the number of people at each education level who are available for work. To estimate the supply of education, we relied on four population subgroups. We looked at 18- to 64-year-olds and 25- to 34-year-olds, the total population in each age group and those in the labor force. The total population in either of these age groups is clearly an overestimate of the number of people available for work. Some people are not available for work due to early retirement, caring for children, mental or physical disability, or other reasons. Those in the labor force underestimate the number available for work. Some of those who are not working or looking for work (not in the labor force) may be available for work but are not looking because they feel there is no job available. Others might enter the labor force if family circumstances changed (such as divorce or the youngest child entering school), if a job with the "right" hours or wage rate became available, or for some other reason. We presented education levels for both populations because somewhere between the total population and the labor force lies the supply of labor.

To adjust for the difference in metro-nonmetro designations between the 1980 Census and the 1987/88 CPSs, 4.7 percent of the nonmetro number in 1980 was reassigned to metro. The education of this group was assumed to be midway between the education of the metro and nonmetro populations. An assignment process like that used to allocate the jobs adjustment across industry/occupation groups was used to distribute the adjustment to supply across education categories. Also, the same average education computation as used in the education demand section was used to measure education supplied by age/labor status group.

Figures 4 through 6 use data sources or age groups not standard to the rest of the chapter. Figures 4 and 5 show population growth rates for men and women 25-34 years old by education completed. Published CPS data for 1963 through 1987 were combined into overlapping 4-year averages. Growth in education supply was then computed from the averages. The averaging smoothed annual fluctuations due to sampling variability. The migration data shown in figure 6 came from the 1980 Census file, but we presented a wider range of age groups to show that net migration of nonmetro residents to metro areas was concentrated among persons of working age.

Returns to Education

We looked at returns to education as an indicator of the intersection of supply and demand for education. The average incomes by education level presented in table 10 were calculated from published CPS data. As in the case of education supply, 3-year averages were computed to smooth annual

fluctuations caused by sampling variability, particularly in the small samples of men and women 25-34 years old who were employed full-time, full-year.

Incomes in all years were adjusted to 1987 dollars using the Personal Consumption Expenditures (PCE) Deflator rather than the better known Consumer Price Index (CPI). Until 1983, the homeowner portion of the CPI was very sensitive to mortgage rates and housing prices. In 1983, a rental equivalency approach was incorporated, making the CPI measure of homeowner costs similar to that used in the PCE. While heavy weighting of home purchase costs in the CPI was appropriate for younger workers (who have generally not yet purchased a home), it may have overstated inflation for older workers (*6*). We chose to use the PCE to measure inflation in a consistent manner over the two decades.

The earnings of full-year, full-time workers shown in figures 9-12 were estimated from regressions of earnings on years of schooling, the square of years of schooling, age, an age-education interaction term, and dummy variables representing South-Non-South residence and Black-other race. The estimates depicted in figures 9-12 were derived for the total nonmetro and metro population aged 25-34 working full-time, assuming that the proportion black and in the South remained constant over the respective decades.

As expected, the return to an extra year of education is higher at higher education levels; completing 8th or 9th grade makes less difference than completing 1 or 2 years of college. Also, education makes more difference in earnings of people late in their careers than for those just starting out.

Comparisons involving Census and CPS data

Much of our analysis relied on comparisons between Census data from the beginning of a decade and CPS data from near the end of that decade. CPS data are benchmarked to be previous Census, but some of the changes we found over a decade may reflect differences in CPS and Census data collection methods rather than actual change. Where possible, we tried to check our results against other data. For instance, the Bureau of Economic Analysis has industry employment data by which, like our data, show an increasing rural-urban division of labor and in the 1980's. Also, earnings changes in the 1980's (figures 9-12) would have shown much the same patterns had we used the 1979 CPS instead of the 1980 Census for the base year. The 1979 CPS, however, showed higher nonmetro earnings at all education levels than the 1980 Census, a reflection of the narrower delineation of metro areas used in 1979 CPS. Finally, comparisons of the 1980's with the 1970's are largely unaffected by any biases from using both the Census and the CPS since these possible biases apply equally to both decades.

Appendix II: Definitions

Industry Categories Used in Education Demand Analysis:

Production-sector industries:

Agriculture, forestry, and fishing

Mining

Textile and apparel manufacturing

Other routine manufacturing usually done by small firms:
lumber, wood, and furniture products; cement, concrete, gypsum, plaster, and clay products; screw machine products; miscellaneous fabricated metal products; mobile dwellings and campers; cycles and miscellaneous transportation equipment; watches, clocks, and clock-work-operated devices; miscellaneous durable manufacturing industries; meat and dairy products; fruit, vegetable, and seafood canning and preserving; confectionery and related products; miscellaneous plastic products; and leather and leather products

Other routine manufacturing usually done by large firms:
glass and glass products; blast furnaces; steel works; metal rolling and finishing mills; other primary iron and steel industries; metal stamping; farm machinery and equipment; electrical household appliances; motor vehicles and equipment; railroad locomotives and equipment; bakery products; beverages; tobacco products; paper and allied products; and rubber products

Complex manufacturing usually done by small firms:
nonmetallic mineral and stone products; fabricated structural metal products; nonelectrical metal-working machinery; electrical machines, equipment, and supplies; optical and health service supplies; printing, publishing, and allied industries, except newspapers; soaps and cosmetics; and varnishes, paints, and related products

Complex manufacturing usually done by large firms:
engines and turbines; construction and material handling machines; office and accounting machines; electronic computing equipment; radio, television, and communication equipment; aircraft and parts; scientific and controlling equipment; photographic equipment and supplies; ordnance; grain-mill products; industrial chemicals; plastics, synthetics, and resins; drugs and medicines; agricultural chemicals; miscellaneous chemicals; petroleum refining; and miscellaneous petroleum and coal products

Higher technology producer services:
banking; security, commodity brokerage, and investment companies; insurance firms; real estate and combined real estate-insurance-law offices; advertising firms; commercial research, development, and testing laboratories; business management and consulting services; computer

programming services; legal services; engineering and architectural services; accounting, auditing, and bookkeeping services; and miscellaneous professional and related services

Lower technology producer services:
custodial and other services to residences and other buildings; employment and temporary help agencies; detective and protective services; electrical repair shops; miscellaneous repair services; and hotels and motels

Consumer-sector industries:

Information services and air transportation:
telephone, telegraph, and miscellaneous communication services; and air transportation

Transportation, except air:
postal service; railroads; railway express services; street railways; taxicab services; trucking, warehousing, and storage services; water transportation; pipelines, except natural gas; and services incidental to transportation

Public utilities:
electric, gas, steam supply, water supply, sanitary service, and other utilities

Wholesale trade

Retail trade

Professional consumer services:
newspaper publishing and printing; radio and television broadcasting; financial credit agencies; offices of physicians, dentists, chiropractors, and other health practitioners; other health services; elementary and secondary schools; colleges and universities; libraries; other educational services; museums, art galleries, and zoos; religious organizations; welfare services; residential welfare facilities; and nonprofit membership organizations

Personal consumer services:
horticultural services; private household services; lodging places, except hotels and motels; laundering, cleaning, and other garment services; beauty and barber shops; shoe repair and dressmaking shops; entertainment and recreation services; and convalescent institutions

Government

Construction

Occupational Categories Used in Education Demand Analysis:

Executives, administrators, and managers:
legislators, chief executives, administrators, and officials in public administration; financial, personnel, labor relations, purchasing, marketing, advertising, public relations, medical, health, property, and real estate

managers; funeral directors; education and related field administrators; protective service administrators; postmasters and mail superintendents

Management-related workers:
accountants, auditors, underwriters, financial officers, management analysts, purchasing agents, buyers, business agents, promotion agents, inspectors, and compliance officers

High-education professionals:
architects, physicians, dentists, veterinarians, college and university teachers, lawyers, and judges

Medium-education professionals:
computer systems analysts, operations analysts, systems analysts, actuaries, statisticians, mathematical scientists, natural scientists, optometrists, podiatrists, social scientists, and urban planners

Lower education professionals:
engineers, registered nurses, pharmacists, dieticians, therapists, physicians' assistants, teachers other than college and university, educational and vocational counselors, librarians, archivists, curators, social workers, clergy, religious workers, and recreation workers

Artistic professionals:
authors, technical writers, designers, musicians, composers, actors, directors, painters, sculptors, craft-artists, artist printmakers, photographers, dancers, editors, reporters, announcers, athletes, and public relations specialists

Technicians and technologists:
technicians and technologists working in health, engineering, drafting, surveying, mapping, and sciences; airplane pilots and navigators; air traffic controllers; broadcast equipment operators; computer programmers; and legal assistants

Sales supervisors and representatives (supervisors and representatives are in separate categories in the 1980's analysis):
sales proprietors; sales representatives in fir...ı æ, business services, mining, manufacturing, and wholesale trade

Sales workers:
sales workers in retail and personal services including sales counter clerks, cashiers, and door-to-door sellers; demonstrators; promoters; sales models; and auctioneers

Administrative support supervisors and workers (supervisors and workers are in separate categories in the 1980's analysis):
supervisors of computer equipment, financial records, communications equipment, and distribution workers; computer equipment operators; financial records processing clerks and machine operators; adjusters; and investigators

Clerical workers:
secretaries, stenographers, typists, information clerks, other than financial records processing clerks, office machine operators, communications

equipment operators, mail clerks and carriers, messengers, dispatchers, shipping and receiving clerks, stock and inventory clerks, meter readers, weighers, samplers, measurers, checkers, expediters, general office clerks, bank tellers, proofreaders, data-entry keyers, statistical clerks, and teachers' aides

High-education service workers (supervisors of high- and low-education service workers are in a separate category in the 1980's analysis):

dental assistants; health aides; therapy assistants; nursing aides; orderlies; barbers; hairdressers; cosmetologists; welfare service aides; and publicly employed firemen, policemen, marshals, constables, detectives, sheriffs, bailiffs, and correctional institution officers

Low-education service workers:

private household workers; privately employed guards, police, and detectives; crossing guards; food and beverage preparation and serving workers; building cleaning workers; elevator operators; pest control workers; amusement and recreation facility attendants; ushers; guides; public transportation attendants; baggage porters; bellhops; and child care workers

Farmers and farm managers*

* In the 1980-87/88 analysis this category also includes fishing vessel captains and officers. Captains and officers were not separated from other fishers in the 1970-79 data, so they are in the Laborers group in the 1970/79 analysis.

Laborers (labor supervisors are in a separate category in the 1980's analysis):

farm workers; groundskeepers; gardeners; animal caretakers; agricultural product graders, sorters, and inspectors; horticultural nursery workers; forestry workers; timber cutting and logging workers; fishers; hunters; trappers; construction laborers; helpers in mechanic, repair, construction, and extractive industries; production helpers; garbage collectors; stevedores; stock handlers and baggers; machine feeders and offbearers; garage and service station attendants; vehicle washers; equipment cleaners; and hand packers and packagers

Precision production workers (supervisors of precision production workers, machine operators, and hand fabricators, graders, checkers, and packers are in a separate category in the 1980's analysis):

mechanics and machinery repairers; brickmasons, stonemasons, carpenters, electricians, painters, plasterers, plumbers, roofers, glaziers, and other construction tradespersons; drillers, explosives workers, and other mining occupations; tool and die makers, machinists, metal engravers, and other precision metal-working occupations; cabinet makers, furniture and wood finishers, and other precision woodworkers; dressmakers, tailors, shoe repairers, upholsterers, and other precision textile and apparel workers; bookbinders; dental laboratory technicians; optical goods workers; medical appliance technicians; butchers and meat cutters; bakers; precision

inspectors, testers, and graders; water and sewage plant operators; power plant operators; and stationary engineers

Machine operators:

metal and plastic working machine operators; woodworking machine operators; printing machine operators; textile and apparel machine operators; gluing, packaging, extruding, mixing, separating, compressing, roasting, washing, folding, crushing, slicing, and cutting machine operators; motion picture projectionists; and photographic process machine operators

Hand fabricators, graders, checkers, and packers:

welders; cutters; solderers; blazers; hand cutters, trimmers, molders, casters, painters, engravers, printers, grinders, and polishers; and production inspectors, checkers, examiners, testers, samplers, weighers, graders, and sorters

Transportation and material moving workers (transportation supervisors are in a separate category in the 1980's analysis):

truck, bus, and taxicab drivers; parking lot attendants; rail and water transportation workers; longshore equipment operators; hoist, winch, and crane operators; excavating and loading equipment operators; grader, dozer, and scraper operators; and industrial truck and tractor equipment operators

Chapter 4
Education and Local Employment Growth in a Changing Economy

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Education is frequently argued to be one of the most important factors in improving the U.S. economy. As a personal development strategy, the value of better education is undeniable. However, education alone may not necessarily foster local economic development. Once we take into account local differences in industrial structures, we find that average schooling levels were relatively unimportant in determining which local rural economies grew and which declined during both the 1970's and the 1980's. For many employers, the specific job skills and relevant experience of the local labor force may have been more important than the average number of years of school completed by the population. Unless the quality of job opportunities in rural economies improves, the best and the brightest rural workers will continue moving to the cities for better job opportunities.

Education is frequently argued to be one of the most important factors in improving the U.S. economy. An often heard argument is that we must improve the educational resources of workers throughout the nation by reducing dropout rates and increasing the quality and quantity of educational achievements. According to this argument, increased efforts to raise the average years of schooling completed by the population, to improve the quality of instruction in our schools, and to better motivate students and teachers are necessary for the United States to remain competitive in an increasingly competitive global economy. Moreover, these improvements in educational achievement are thought to be especially critical for those local economies in the rural and Southern parts of the country with large concentrations of poorly educated residents.

However, education alone may not necessarily foster local economic development. Raising the educational credentials of local workers is not a

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sure-fire way to develop local economies or to raise the quality of life in rural areas. By taking such a stand, we are not claiming that education is unimportant or should be ignored. Rather, we maintain that the term "education" can be used to mean many different things. The term "local economic development" can also be used in a variety of ways. And the causal relationships between education and local development are both complex and subject to change over time.

Our study differs from previous studies in four important respects. First, most studies of local growth have used counties to represent local economies. Counties, however, are political units rather than economic units. The economic activities of an area can extend far beyond the county boundaries. People frequently live in one county and work or shop in another. A firm may offer employment not only to residents in its own county but also to residents in neighboring counties. Moreover, to the extent that location decisions are based on the qualifications of the local labor pool, employers may well consider the characteristics of all potential workers within commuting distance. Therefore, in this analysis we use commuting zones--clusters of counties grouped together on the basis of shared commuting--to represent the area in which most of the local population lives and works. (See Commuting Zones, appendix A.)

Second, although many studies of the relationship between education and local growth have controlled for the local industrial structure, previously used measures typically have not taken into account the performance of industries at the national level. Because of the importance of changes in national demand for locally produced goods and services, our measure of the local industrial mix was constructed to reflect how well local industries performed over the period at the national level. (See Local Industrial Structure, appendix B.)

Third, average schooling levels disguise a great deal of variation in local educational achievements. Thus, the average schooling levels in two locations may be identical, but one area may have a population in which most of the residents complete high school but do not go on to college, whereas in the second area, part of the population does go on to college and the other part fails to finish even twelfth grade. Therefore, in addition to examining the independent relationship between average years of schooling completed and local employment growth, we also investigated the growth effects of the two ends of the educational attainment distribution: the percentage of the local population completing college and the local dropout rate.

Fourth, many analyses of local employment growth have been limited to specific areas of the country. Because of the long history of regional

diversity in this country and the vast differences in the economic and social structures in metro and nonmetro areas, our study covers local economies throughout the United States and contrasts the patterns of employment growth in metro and nonmetro areas.

Overview of Findings

When we examine the importance of local educational achievements for local employment growth, we find that more and better education is rarely the complete answer. Between 1969 and 1979, when the nonmetro economy as a whole was growing, the average years of schooling completed by the local population in nonmetro areas did little to help determine where that growth occurred. Nonmetro areas with low levels of average schooling grew at least as fast as those with higher levels, other things being equal. And, between 1979 and 1988, when the national economy as a whole was not doing so well, we also find that neither the average level of schooling in nonmetro areas nor the two extremes of local educational attainments--the percentage completing college and dropout rates--made any independent contributions to the rate of local nonmetro growth.

Only in metro areas during the 1970's do we find patterns of local growth significantly related to local educational achievements. During the 1980's, average schooling in metro areas had no net impact on local employment growth; however, the local dropout rate, and to a lesser extent, the percentage completing college, did contribute to higher metro growth rates.

We also find that, during both periods and in both metro and nonmetro areas, the initial mix of jobs and the initial level of earnings per job in the local economy were much more important predictors of changes in employment than were local educational achievements.

Previous Research and Policy

The relationship between education and rural development has been of interest to researchers and policymakers for many years. Rural labor programs of the early 1970's viewed education and training as an indispensable part of any rural development strategy. However, the emphasis of these programs was on education and training as a development strategy for rural people, not for developing rural places (*10*).[38] As a personal development strategy, the value of better education is undeniable. Education has long been and continues to be one of the best investments

[38] Italicized numbers in parentheses identify literature cited in the References at the end of this chapter.

that can be made for improving one's life chances. Individuals with higher levels of schooling generally earn more money, work in better jobs, and are less likely to be unemployed or poor than individuals with lower educational achievements.

However, as McGranahan and Ghelfi and others have argued, the personal benefits derived from efforts to enhance the educational resources of rural workers may not extend to benefits for the local economy itself (*7,13*). As workers gain greater skills and training, they are more likely to move, leaving the rural areas of this country for better jobs in the larger, urban places.

In the 1980's, with the emergence of the "new economy," education began to attract much more attention. According to many analysts, as U.S. industries adapt their technologies and management systems to a rapidly changing national and international environment, their labor needs become more and more centered around better educated workers (*17*). Industrial and occupational shifts in the economy are said to result in fewer jobs for people with limited education and cognitive skills, and more jobs for people with superior analytical and technical abilities.

Whether this increased demand for better educated workers extends to all local economies throughout the United States is not clear. The mixes of industries and occupations found in local economies do not always correspond to the national industrial and occupational structure. Because jobs vary in terms of their educational requirements, variations in local industrial and occupational structures will probably lead to variations in the local demand for education. For example, demand for better educated workers during the 1980's appears to have increased more in metro than in nonmetro areas. Moreover, local economies, especially those in rural areas, are more likely to be specialized in only a few primarily resource-based and routine manufacturing industries (*5*). These rural industries have not traditionally required an exceptionally well-educated workforce.

Previous empirical research analyzing the relationship between education and local employment growth has produced mixed results (*9*). The Southern Growth Policies Board (SGPB) found that the educational credentials of the local population were directly related to employment growth between 1977 and 1982 in the nonmetro South (*15*). In a followup study, SGPB found adult literacy, the presence of 4-year colleges and research universities, and the number of scientists, engineers, and technicians living in a county to be positively related to employment growth in the nonmetro South during 1977-84 (*16*). In contrast, although Schaeffer and Sander found that States and large urban areas with higher educational attainment levels had significantly higher employment growth rates between 1970 and 1980, they

also found that higher educational attainment levels in rural and semirural areas did not lead to significantly higher employment growth (*12*). A study for the National Governors' Association found that the percentage of the population aged 25 and older with more than a high school education had no significant effect on employment growth rates during 1979-84 in 548 rural counties in the Midwest (*4*).

Each of these studies focused on a different region of the country or on different time periods or both. These studies differ more importantly in terms of how they accounted for other characteristics of the local economy that may be related to both education and local growth. The two SGPB studies that demonstrated a positive effect of education focused primarily on the simple two-way association between education and local growth, without controlling for other local characteristics. The other studies, which reported no significant relationship between education and local growth, did take other characteristics of the local economy into account.

In this chapter, we analyze the workings of the local economy itself to find answers to these questions: What makes one local economy grow while others decline? How do the internal characteristics of a growing local economy differ from a declining one? And what is the role of education in this growth process?

A Model of Local Employment Growth

New jobs in a local economy are generated when a firm moves into the area from some other location, when an existing local enterprise expands its workforce, or when a new local business opens its doors. These new job creations are most likely to occur in those local economies with a combination of high demand for the goods and services produced by new and expanding establishments and an appropriately qualified workforce.[39]

Within many industries, the demand for locally produced goods is primarily driven by conditions beyond the boundaries of the local economy. For example, the demand for coal or information-processing equipment (used here as examples of basic or export-based industries) is determined more by macroeconomic conditions in the world economy than by the specific needs of the local population. Thus, when the national or international demand for coal or computers is high, local economies with jobs in coal mines or electronic plants will probably grow. And, when these external demands for coal or computers decrease, the number of local jobs in mining or in electronic equipment manufacturing will probably decline.

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[39] Other characteristics of the local economy, including location and size, may also be important in determining local growth.

Moreover, the fortunes of the export-based industries will affect the local demand for goods and services in other local industries. For example, when mining or manufacturing jobs are expanding, local workers in these jobs are more likely to have increased purchasing power, thereby benefiting local service establishments. And, when the demand for these products declines and local mining or manufacturing workers are laid off, the other parts of the local economy will also probably contract.

Thus, national and international conditions drive the demand for locally produced goods and services. But, once these macroeconomic forces determine how much is to be produced, characteristics of the local economy help determine where that production will take place.

Local Educational Levels

The educational qualifications of the local population may be expected to make important contributions to local job growth. If other things are equal, relocating or expanding firms may choose one area over another because of the educational characteristics of the local population. However, what constitutes an appropriately qualified workforce varies by industry.

Firms in high-tech industries typically require a local economy with a better educated workforce. For example, when a digital electronics company is seeking a location for a new branch plant, the owners and managers may well favor an area with a concentration of well-educated, highly skilled workers to meet the company's demand for labor. A study of the rapidly growing producer service sector in the Northwest found that businesses considered the education system as the single most important factor in maintaining growth (*1*).

Firms in routine production and resource extraction industries are likely to find that the same well-educated population is a liability rather than an asset. For example, a survey of manufactures in rural Wisconsin during 1969-74 found that employers were attracted to areas with large pools of unskilled workers rather than a trained labor force (*3*). And, as motor vehicle production has become more and more routinized, many employers are relocating to rural areas with cheaper, less unionized labor.

A similar set of contrasts is found among service industries. Consumer service establishments (such as retail stores and fast-food restaurants) typically employ less educated workers, while those establishments serving the local business community (such as legal services and banking and finance) have traditionally hired better educated workers.

Local Industrial Structures

Because of industrial differences in national demand, the local mix of industries at the beginning of a period can also be expected to affect local employment growth. A local economy dominated by rapidly growing industries will tend to grow faster than one dominated by stagnating or declining industries. For example, local economies in Texas prospered when demands for domestically produced oil skyrocketed during the oil crisis in the 1970's. The presence of certain types of industries may also attract other similar establishments. One of the most familiar examples of this effect is the phenomenal growth of California's Silicon Valley. The local industry mix may also play a role in determining which local economies lose jobs during a period of decline. For example, when an industry is in a state of overall decline, multibranch enterprises in that industry may shut down those plants that are most geographically isolated.

Local Labor Costs

The cost of the local labor supply is a third major factor that can affect the rate of local employment growth. If other things are equal, employers will prefer areas with cheaper labor. Because women, younger people, and minorities tend to earn less than their more experienced white male counterparts, local economies with larger concentrations of women, blacks, and Hispanics in the workforce and those with younger populations will probably grow faster than other areas, although without necessarily improving the earnings paid by local jobs.[40]

Population Settlement Patterns and Location

Other characteristics of the local economy that might affect employment growth include population settlement patterns and location. The higher population density and greater access to transportation and communication networks in metro areas offer significant advantages over sparsely settled, more isolated nonmetro areas. At the same time, the cheaper land, taxes, and labor typically found in nonmetro areas may benefit some types of employment growth. The well-known pattern of regional growth as jobs moved from the Northeast and Central regions of the country to the South and West has been attributed to cheaper land, tax incentives, and lower labor costs.

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[40] A counterargument about the effects of minority concentration can also be made. There is some evidence that expanding and relocating firms avoid areas in the South with very heavy concentrations of blacks (*2*).

Figure 1 graphically represents this process by which new jobs are generated (or old jobs lost) in a local economy. The boxes on the left side of the diagram represent conditions in the local economy at the beginning of the period, and the box on the right side represents the end result of employment growth during the period. For example, the arrow connecting high local educational levels and employment growth shows that the level of education achieved by the local population at the beginning of the period is expected to affect the rate of local employment change during the rest of the period. The positive sign above the arrow is based on the conventional expectation that local economies with high educational levels will generally grow faster (or decline more slowly) than local economies with lower levels of education.

The two-way arrows linking local educational levels, local industrial mix, local labor costs, and geography suggest that these characteristics of the local economy at the beginning of the period are interrelated. These associations between the educational levels in an area and other local characteristics complicate our evaluation of the role of education in local growth. Thus, local economies with a mix of fast-growing industries employing relatively expensive, highly skilled workers will probably contain a well-educated population. Other local economies with a mix of fast-growing industries employing cheaper, less skilled workers will probably contain a relatively poorly educated population.

Because these local characteristics are measured at the same, initial point in time, we cannot empirically determine the direction of causality. That is, we cannot use available data to establish whether a good mix of industries is the result or the cause of a well-educated population.

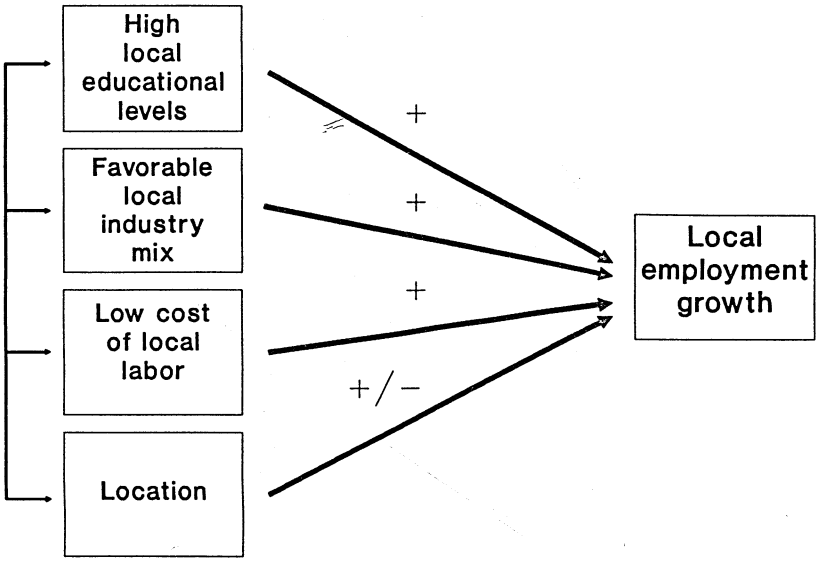
If all of these local characteristics make significant, independent contributions to local growth and if these initial conditions are interrelated, then we must examine the effects of all local characteristics together. Otherwise, we run the risk of combining the separate contributions of all the local characteristics and attributing the consequences to only one factor. For example, by estimating just the association between education and growth, we may make the mistake of giving education part of the credit for higher growth that is really due to the local industrial mix. However, by estimating the growth effects of education and industry mix simultaneously, we can evaluate which of these two characteristics makes the more important contribution to local growth.

An Empirical Analysis of Local Employment Growth

We start by establishing a baseline description of the relationship between local schooling levels and total employment growth in the commuting zones

Figure 1

A model of local employment growth



during the 1980's. Because of the critical differences in local economies based on population settlement patterns, we estimate this relationship separately for metro and nonmetro commuting zones. The maps in figures 2 and 3 show little positive association between local schooling levels in 1980 and employment growth between 1979 and 1988. For example, in 1980, even though almost all of the nonmetro commuting zones in the Southeast had below average levels of schooling, many had average or above change in employment. In contrast, the Great Plains States have long had a well-educated population, but during the 1980's, saw below average employment growth.

These maps illustrate the simple two-way association (or lack thereof) between education and local employment growth. However, as noted above, these local economies vary, not only in terms of education, but in a variety of other local social, demographic, and economic characteristics that may also be related to economic growth.

To separate out the independent role that education plays in local growth, we use multiple regression analysis to estimate the unique, or net, effects of local educational achievements on employment growth in both metro and nonmetro commuting zones, controlling for other characteristics of the local

Figure 2
Nonmetro average schooling levels, 1980

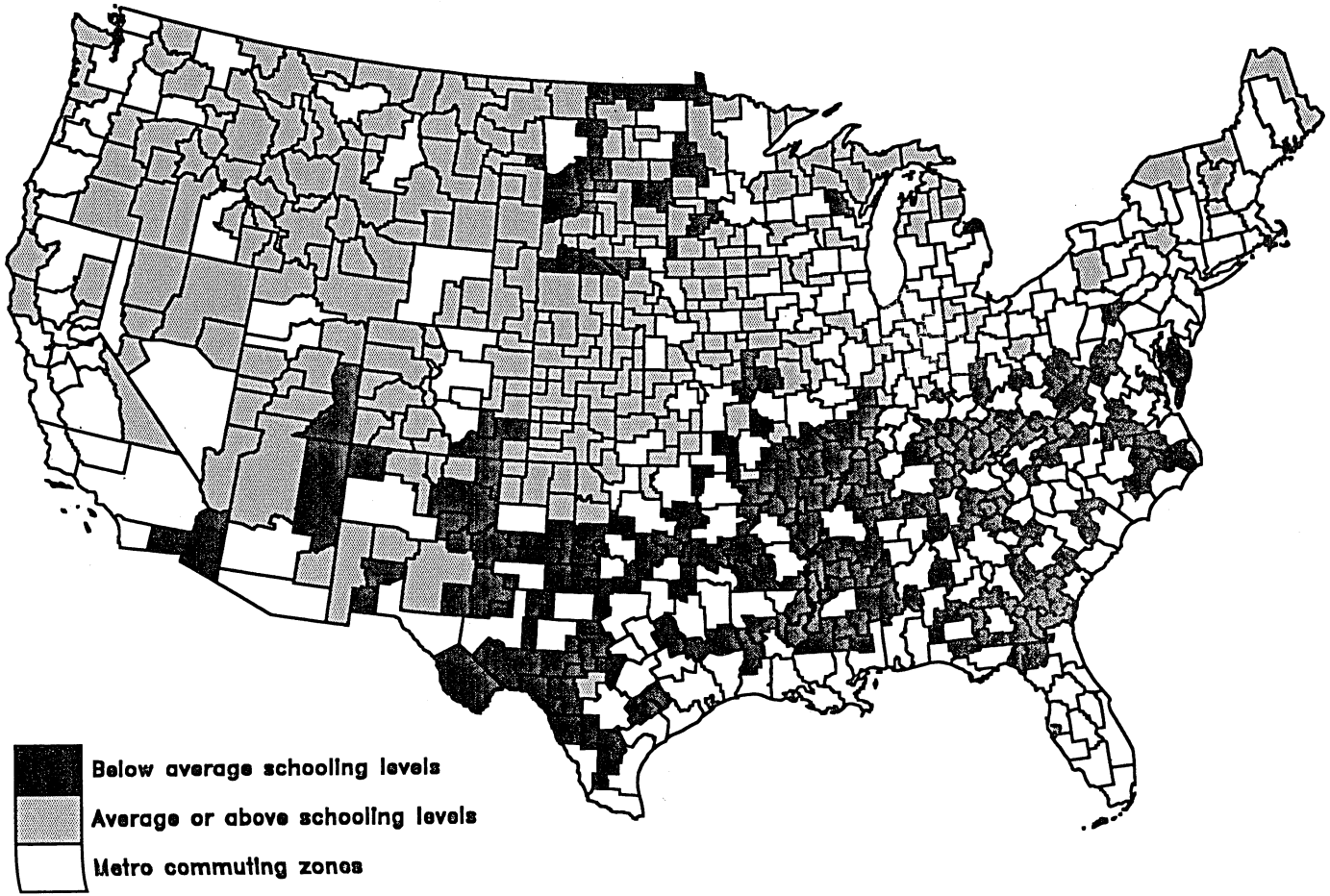


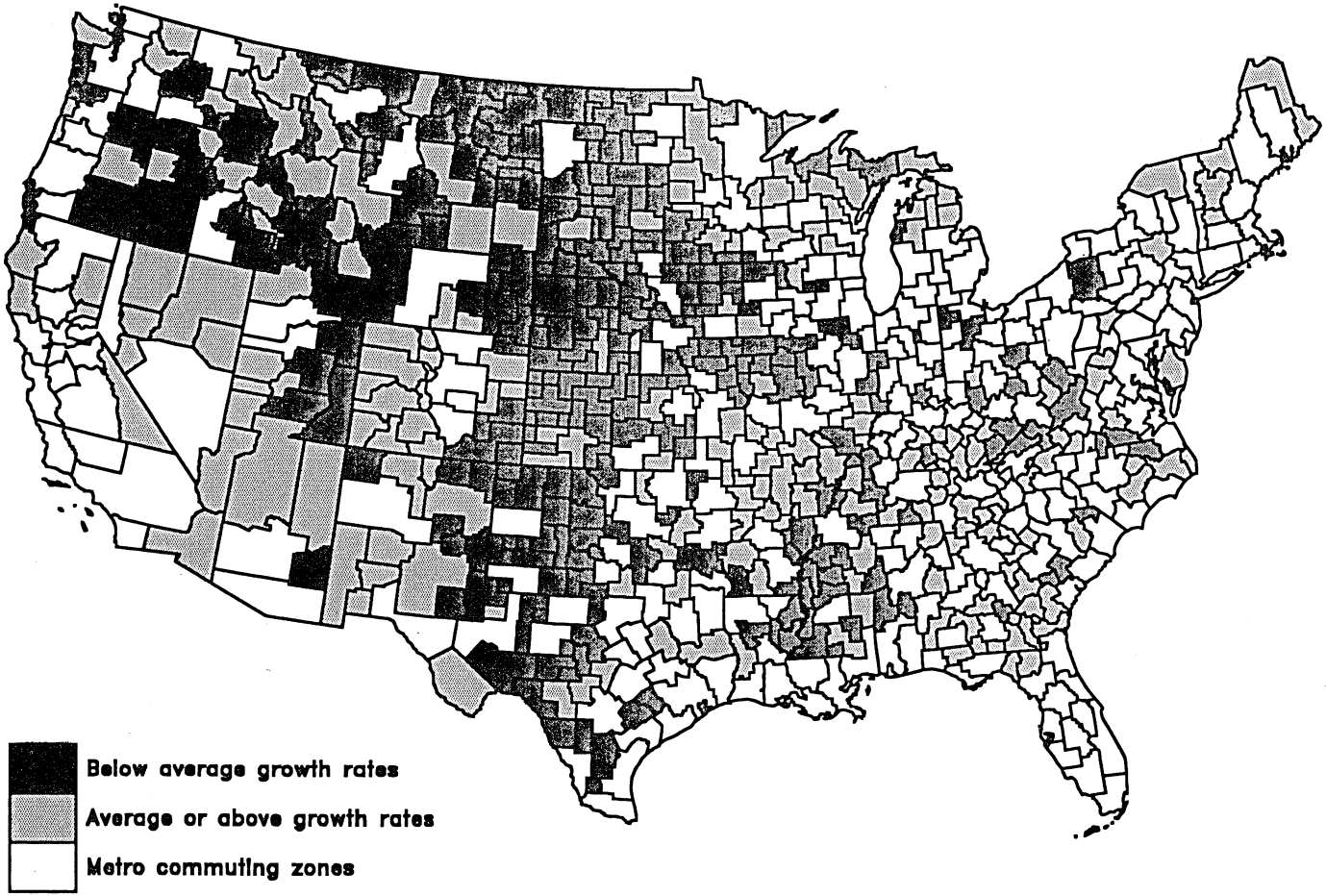
Figure 3

...lopment growth, 1979–88

Metro commuting zones

Figure 3

Nonmetro annual average employment growth, 1979–88



economy that might be expected to affect the rate of growth.[41] Although we include these control variables as proxies for other potentially important attributes of local economies, we do not discuss their independent contributions to local growth, except as they alter our estimation of the relationship between education and local growth.[42]

The Net Effects of Average Schooling Levels

Figure 4 compares the estimated net effects of average schooling levels on employment growth in the 1970's and 1980's. The height of the bars in this figure indicates the difference in local employment growth between two commuting zones that are identical in everything except local schooling levels. For example, if two metro areas were in the same region and had similar industrial structures, labor costs, and other demographic characteristics in 1969, the metro area with an average schooling level of 12 years would have grown at an annual rate during the 1970's that was 0.4 percentage point higher than its neighbor with an average of only 11 years of schooling.

During the 1970's, higher schooling levels had significant positive effects on employment growth in metro commuting zones, but no effects in nonmetro areas, once we take into account other characteristics of the local economy.[43] Because firms tend to locate research and management activities in metro areas and production activities in nonmetro areas, this finding is not too surprising.

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[41] For both metro and nonmetro commuting zones, we regressed the average annual employment growth rate for the 1970's and the 1980's (1970's = 1969-79; 1980's = 1979-88) on the average schooling levels, the local industrial mix, the level of earnings per job, the percentage of the workforce that is female, the percentage of the population that is black, the percentage that is Hispanic, the average age of the local population, the log of the total population in the commuting zone, three dummy variables for the western, midwestern, and northeastern regions of the country, and a proxy measure for high amenity areas (the percentage of total commuting zone employment found in retirement destination counties):

$$\begin{aligned}\text{Average annual employment growth} = {} & b_0 + b_1\text{SCHOOL} + b_2\text{INDUSTRY MIX} + b_3\text{EARNINGS PER JOB} \\ & + b_4\text{PCTFEMALE} + b_5\text{PCTBLACK} + b_6\text{PCTHISPANIC} + b_7\text{AGE} \\ & + b_8\text{LOG OF POPULATION} + b_9\text{WEST} + b_{10}\text{MIDWEST} \\ & + b_{11}\text{NORTHEAST} + B_{12}\text{AMENITIES} + e.\end{aligned}$$

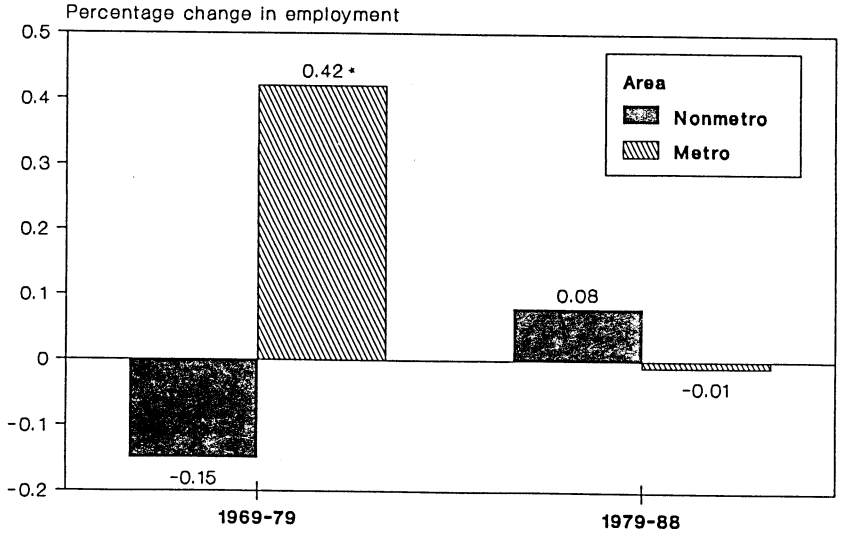
All of the independent variables (SCHOOL through AMENITIES) are measured at the beginning of the period--1969/70 for the 1970's model and 1979/80 for the 1980's model.

[42] The complete results from all regression analyses are presented in appendix C.

[43] The net effect of average schooling in nonmetro commuting zones is not statistically significant from zero ($p \leq 0.05$).

Figure 4

Net effects of a 1-year increase in education on employment change



* Significant at 0.05 level.

During the 1980's, the estimated independent effect of schooling levels on local growth was statistically insignificant in both metro and nonmetro areas. This pattern is extremely puzzling if the United States is heading toward a "new economy" dominated by jobs demanding higher levels of education. That is, one would expect local educational levels to be more important in the 1980's than they were in the 1970's. However, not all jobs in all local economies require well-educated workers. Many jobs continue to be filled by workers with few skills and little education. Moreover, many of the better educated workers continue to move to where the better jobs are.

Our analysis of two alternative measures of local educational achievements supports this interpretation. In a second set of regressions, we replaced average years of schooling completed by the local population with two alternative measures of local educational resources: (1) the percentage completing college and (2) the dropout rate.[44]

[44] These two measures are defined as the percentage of the local population aged 25 and older who had completed 4 or more years of college and the percentage of the local civilian population aged 16 to 21 who were not in school in 1980 and had not completed high school.

The Net Effects of the Percentage Completing College and Dropout Rates

When we examine the independent effects of these two variables on local growth, we gain some insights into why average schooling levels only negligibly affected local metro growth in the 1980's (figs. 5 and 6). Our analysis indicates that, if other things are equal, both those metro areas with a sizable college-educated population and those metro areas with high dropout rates tended to grow faster than other local economies during the 1980's.[45] Thus, average years of schooling did not significantly affect local metro growth in the 1980's because the local advantages of having a relatively large college-educated population and the local advantages of having a relatively large dropout population cancel each other out.

This second analysis may help solve one puzzle, but it raises another: Why did metro areas with higher dropout rates grow faster in the 1980's than metro areas with lower dropout rates (other things being equal)? One possible explanation is that some employers are still seeking local economies where the labor pool is relatively uneducated and nonunionized, and other employers are seeking local economies where the local labor pool is very well educated. Our estimate of the contributions made by other local characteristics to employment growth provide additional support for this argument (see app. tables 1 and 2). Higher earnings per job and higher average age of the local population limited local employment growth in both metro and nonmetro commuting zones. The share of workers who are female increased the rate of local growth. All three of these patterns support the argument that at least some employers continue to seek areas with cheaper labor.

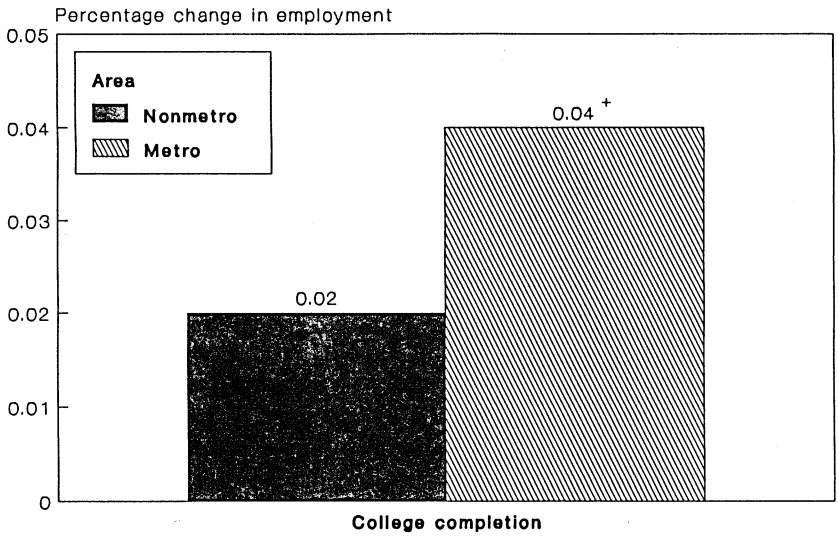
A second possible explanation for the positive effect of dropout rates on local employment growth is that young people in expanding local economies may be more likely to drop out of high school. To test this explanation, we included a measure of employment growth between 1978 and 1979 as a predictor of growth between 1979 and 1986. Even controlling for this earlier growth, a high local dropout rate continued to enhance the rate of growth in metro areas during the 1980's.

A third possible explanation is that, although some local economies in the 1980's may require highly skilled, better educated workers to fill some jobs, they may also need sufficient numbers of relatively unskilled, relatively inexpensive workers to take care of the needs of other workers and local

[45] This pattern was stronger when we estimate the effects of dropouts and college on employment growth between 1979 and 1986. Extending the analysis to 1988 weakened the impact of the percentage completing college on metro employment growth.

Figure 5

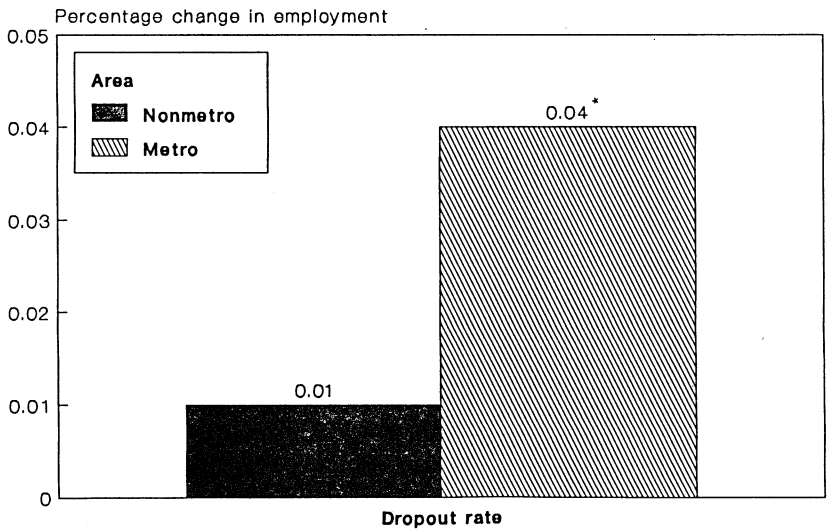
Net effects of a 1-percent increase in college completion rates on employment change, 1979-88



+ Significant at 0.10 level.

Figure 6

Net effects of a 1-percent increase in dropout rates on employment change, 1979-88



* Significant at 0.05 level

businesses, such as washing dishes, delivering packages, vacuuming floors, and caring for children.

Discussion

The role of education in local employment growth is much more complicated than previous studies have suggested. In contrast to the two studies by the Southern Growth Policy Board, we found that average schooling levels were relatively unimportant factors in determining local employment growth in nonmetro areas during both the 1970's and 1980's and in metro areas during the 1980's. For policymakers to make sense of these conflicting results, there are several differences between our analysis and the SGPB analyses that must be addressed.

First, our analysis incorporated other characteristics of the local economy that are related to both education and local growth. Thus, we addressed the question of whether or not local schooling levels contribute to growth independently of other factors such as the initial job mix, the cost of labor, and location. Second, the earlier studies examined only nonmetro counties in the South. We evaluated the consequences of schooling levels for growth in commuting zones throughout the country, accounting for regional differences.

To assess how critical these differences are for our conclusions about the effect of education on local growth, we reestimated the association between average schooling levels and employment growth without taking the other characteristics of commuting zones into account. We found that, if we fail to consider any other local characteristics, higher schooling levels appear to significantly benefit employment growth in both metro and nonmetro commuting zones in both the 1970's and 1980's.[46]

When we take into account the initial industry mix, the initial level of earnings per job, and region, the importance of schooling levels for local employment growth declines substantially.[47] And when we take into account all of the other local characteristics, the net impact of schooling drops even more.

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[46] Although statistically significant, the metric coefficient in nonmetro areas (that is, the estimated percentage point change in employment associated with each additional year of average schooling completed) is small—0.18.

[47] In both the 1970's and the 1980's, the estimated effect of schooling on nonmetro employment growth is not statistically different from zero, when we control for just initial industry mix, earnings per job, and region.

We also estimated the models, with and without our measures of other local industrial mix, just for commuting zones in the South. Again, we find that in the South in the 1980's, without accounting for the initial mix of jobs, average schooling levels appeared to make a strong, positive contribution to local growth. When we statistically control for the job mix, local labor costs, and region, however, higher average schooling levels have no significant independent benefits for local growth. (The results from these additional analyses are presented in app. C.) Thus, the disparity between our findings that average schooling levels had only trivial effects on local growth during the 1980's and the SGPB's findings that "education and economic development go hand in hand" appears to reflect the critical role played by the types of industries in the local economy, the local cost of labor, location, and amenities in determining where employment growth occuss.

Implications

We found that, in both metro and nonmetro commuting zones, in both the 1970's and the 1980's, the initial mix of local industries and other local characteristics were more important determinants of local growth than were local educational levels. This finding suggests that for many employers, the kinds of specific job skills and relevant work experience of the local labor force have been more important than simply the average number of years of school completed by the local population.

Nevertheless, education does independently affect local employment growth, at least in metro areas. In the 1970's, local metro economies with better educated populations tended to grow faster than others, all other things being equal. However, for a metro economy in the 1980's to have benefited from improved educational credentials, the improvement must have been made in the percentage of the population completing college. Raising the average years of schooling completed from 11 to 12 years apparently had few, if any, benefits in terms of new jobs for local economies in the 1980's. Moreover, for local economies without the resources to produce such a consequential improvement in local schooling levels, our findings indicate that even in the new economy of the 1980's, some employers were still being attracted by a supply of cheap, unorganized labor, as indicated by the positive effect that dropout rates had on local metro employment growth.

The neglible effects of local schooling levels on employment growth in nonmetro areas are somewhat discouraging for rural policymakers. Our findings support those from McGranahan and Ghelfi's analysis in suggesting that, unless efforts to alter the local job mix are successful, improved rural education will only contribute to a furthering of the rural brain drain (*7*).

Nevertheless, several qualifications to these findings are critical. Employment growth is not the same as economic and social development. Our analysis focuses only on changes in the numbers of jobs, not on changes in the quality of jobs. Many of the new jobs created in areas with high dropout rates may not be, and in fact probably are not, "good" jobs. For example, in a study of nonmetro counties in the South that grew rapidly due to tourism, Smith found that most of the new jobs created in these areas were seasonal and offered extremely low wages and few, if any, benefits (*14*).

Although our study suggests that local economies may benefit (in terms of the number of jobs) from a pool of low wage, uneducated workers, we have not examined the question of how large that pool needs to be. Thus, there may well be some kind of saturation point, beyond which the serious disadvantages of a large dropout population begin to outweigh any advantages to the local economy.

Because we do not have the data necessary to compute dropout rates in 1970, we cannot tell whether the positive relationship between local job growth and a relatively large pool of poorly educated workers is a new pattern for the 1980's or whether this relationship continues the movement of jobs from the unionized, better educated areas in the older manufacturing belt to the unorganized, relatively poorly educated areas that characterized much of the job growth in the South during the 1970's.

Our analysis has only focused on the contributions made by the existing stock of educational resources in a local economy. However, as McNamara, Kriesel, and Deaton argue, we also need to investigate the role of current investments in local educational systems (such as per pupil expenditures) in local economic growth (*8*). For example, the positive effect of the percentage completing college on local growth probably ensures that good quality local schools will become more and more necessary to attract and retain well-educated workers with children. Thus, parents who have completed college may not be willing to raise their families in areas with mediocre local schools and high dropout rates. Without good, comprehensive data on the quality of local school systems, however, we cannot examine this dimension of the complicated relationship between educational resources and local employment growth.

Our analysis for the 1980's extends only to 1988. During the middle of the period, in 1981-82, the national economy was experiencing one of its worst recessions in decades. By 1986, most metro economies were showing significant signs of recovery. Recovery in nonmetro areas, however, was considerably slower. For example, the overall nonmetro unemployment rates did not fall to their pre-recession levels until 1989 (*11*). What the 1990's will bring is still uncertain. However, the most recent data available

indicate that the nonmetro economy has not yet recovered from the most recent recession.

Despite these caveats, our research provides strong support for our contention that education can not be viewed as a "quick-fix" solution to nonmetro problems. Moreover, our research suggests that the dynamics of growth in local economies, including the role of education, are quite strongly linked with both structural and cyclical trends in the national economy.

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Appendix A—Commuting Zones

The commuting zones used in this analysis are newly defined subareas of the labor market areas (LMA's) developed by Charles Tolbert and other members of the Southern Regional Research Project S-184. Following the procedures used to define LMA's, we began with measures of the number of shared commuters between all pairs of counties in the United States (*6*, *18*). These measures were then used as the input for a hierarchical cluster analysis. The results from the cluster analysis indicate the strength of the commuting ties between groups of counties. Counties with the strongest ties are joined together in a commuting cluster first, with other counties being brought into the cluster in order of the strength of their ties to that cluster.

We maintained consistency in the degree of interconnectedness within the clusters by using the normalized average distance between groups of counties.[48] "As a rule of thumb, a normalized average distance of 0.98 was considered sufficient distance between sets of counties to treat them as separate LMA's....Those counties with commuting relationships strong enough to make them cluster at a normalized distance of less than 0.98 were considered to be parts of the same LMA" (*18*).

When delineating the LMA's, we included two additional criteria: (1) each cluster had to have a population of at least 100,000 and (2) every county had to be included in an LMA. These two criteria created some LMA's that are significantly larger geographic areas than the actual commuting patterns would indicate. When using the local economy as the unit of analysis, these *additional criteria are unnecessary.* Thus, in defining commuting zones, we dropped both of these criteria (*6*). That is, counties with commuting relationships strong enough to make them cluster at a normalized distance of less than 0.98 are said to represent a commuting zone, regardless of population size. And counties that fail to show a sufficiently strong commuting tie with any other county are treated as isolates.

We identified 763 commuting zones (including isolates) in the 48 contiguous United States, Hawaii, and the District of Columbia, compared with 381 LMA's.[49] Of these commuting zones, 508 do not contain any metropolitan area, and are referred to as "nonmetro commuting zones" in the following analyses.

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[48] The normalized average distance is a computed statistic that standardizes the strength of the commuting linkages within a cluster of counties. The higher the normalized average distance number, the weaker the connections within the county group.

[49] We excluded Alaska because the commuting patterns in this State do not follow the typical patterns of adjacent counties tending to share more commuting than nonadjacent counties.

Appendix B—Local Industrial Structure

Our measure of the local industrial structure is based on the expected growth in a local economy, given the initial number of jobs in each industry in the area, and the national growth rate in each of those industries.[50] We computed this expected growth measure in three steps.

First, we multiplied the number of jobs in each local industry at the beginning of the period by its national growth rate over the entire period. This step resulted in the number of new jobs expected in each local industry, assuming that the local industry grew at the same rate as the national industry. For example, if a local economy had 200 coal mining jobs in 1969, and the coal mining industry grew by 10 percent nationally between 1969 and 1979, we would expect the number of local coal mining jobs to be 220 in 1979 (220 = 200 + (200 x .10)).

In the second step, we summed the number of expected jobs in each local industry to get the total number of jobs expected in the local economy. For example; if the same local economy with 200 coal mining jobs in 1969 also started the period with 50 retail service jobs, 3 health service jobs, 10 banking jobs, and 2 miscellaneous service jobs (for a total of 265 jobs in 1969), and if these four industries grew nationally at rates of 10 percent, 20 percent, 7 percent, 15 percent and 4 percent, we would expect the local economy to have 297 jobs by 1979, where:

$$297 = (220 = 200 + (200 \times .10)) + (60 = 50 + (50 \times .20)) + (3.2 = 3 + (3 \times .07)) + (11.5 = 10 + (10 \times .15)) + (2.1 = 2 + (2 \times .04)).$$

Finally, for each local economy, we computed the expected growth rate as the percentage change between the total number of actual local jobs at the beginning of the period and the total number of expected jobs at the end of the period. To continue with our example from above, the expected growth rate in the local economy would be 12.1 percent, where:

$$12.1 = (297 - 265 / 265) \times 100.$$

Thus, this measure of expected growth reflects the industrial composition of an area, weighted by the performance of its industries at the national level.

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[50] We used the most detailed industry codes available in the Bureau of Economic Analysis (BEA) data. With only a few minor exceptions, these BEA industry codes correspond to the two-digit Standard Industrial Classification codes.

Appendix C—Reading a Regression Table

In regression analysis, the metric coefficients for each commuting zone characteristics show the difference in employment growth that can be attributed to local variations in that characteristic. For example, if the metric coefficient for years of school equaled 0.5, then a 1-year difference in schooling levels would be associated with a 0.5-percentage point difference in growth rates.

The standardized coefficients take into account the fact that the commuting zone characteristics are measured in different units. Some characteristics are measured as years, some as percentages, some as dollars. By standardizing the coefficients, we can compare the relative importance of one characteristic with another. For example, if the standardized coefficient for years of schooling was 0.1 and the standardized coefficient for initial industry mix was 0.5, we could conclude that the initial industry mix is a much more important factor in explaining local employment growth than are years of schooling.

Asterisks indicate the statistical probability (P) that the estimated effect is significantly different from zero:

+	$P \leq 0.10$,
*	$P \leq 0.05$,
**	$P \leq 0.01$,
***	$P \leq 0.001$.

Regression results also include a summary measure indicating how well all of the commuting zone characteristics, taken together, account for differences in growth rates among commuting zones. If the commuting zone characteristics included in our analysis had accounted for all of the local variations in growth rates, this summary measure, the adjusted R^2, would equal 1.00. An R^2 value of 0.31 would indicate that the commuting zone characteristics explained slightly more than 30 percent of the variation.

Appendix table 1--Regression results showing the effects of average schooling levels and other local characteristics on average annual employment change in nonmetro and metro commuting zones, 1969-79

Characteristics of commuting zones at beginning of period	Percentage employment growth in--			
	508 nonmetro commuting zones		255 metro commuting zones	
	Metric	Standardized	Metric	Standardized
Years of school	-0.15	-0.08	0.42**	0.23
Initial industry mix	.14***	.47	.14***	.63
Earnings per job (in $1,000's)	-.01*	-.10	-.03***	-.47
West	.60*	.14	.71**	.17
Midwest	-.54**	-.14	-.93***	-.29
Northeast	-.93*	-.07	-1.32***	-.31
Percent female	.12***	.22	-.03	-.05
Percent black	-.04***	-.27	.00	.00
Percent Hispanic	-.03***	-.15	.01	.04
Age	-.15***	-.24	-.11***	-.17
Log of population	.10	.06	.06	.04
High amenity area	.02***	.27	.02***	.20
Constant	2.20		3.68*	
Adjusted R^2 x 100	48.00		66.77	

\+ $P \leq .10$.
* $P \leq .05$.
** $P \leq .01$.
*** $P \leq .001$.

Appendix table 2--Regression results showing the effects of average schooling levels and other local characteristics on average annual employment change in nonmetro and metro commuting zones, 1979-88

Characteristics of commuting zones at beginning of period	Percentage employment growth in--			
	508 nonmetro commuting zones		255 metro commuting zones	
	Metric	Standardized	Metric	Standardized
Years of school	0.08	0.05	-0.01	-0.00
Initial industry mix	.09***	.30	.10***	.32
Earnings per job (in $1,000's)	-.01***	-.19	-.02***	-.34
West	-.25	-.08	.04	.01
Midwest	-.71***	-.24	-.30+	-.09
Northeast	.62+	.06	-.17	-.04
Percent female	.07***	.17	.16***	.24
Percent black	-.01**	-.12	-.01	-.04
Percent Hispanic	-.02***	-.14	.00	.01
Age	-.08***	-.17	-.05	-.07
Log of population	.04	.03	.44***	.29
High amenity area	.01***	.32	.02***	.34
Constant	.16		-6.95***	
Adjusted R^2 x 100	48.48		69.72	

\+ $P \leq .10$.
* $P \leq .05$.
** $P \leq .01$.
*** $P \leq .0001$.

Appendix table 3--Regression results showing the effects of college completion rates, dropout rates, and other local characteristics on average annual employment change in nonmetro and metro commuting zones, 1979-88

Characteristics of commuting zones at beginning of period	Percentage employment growth in-- 508 nonmetro commuting zones		255 metro commuting zones	
	Metric	Standardized	Metric	Standardized
Percent with college	0.02	0.05	0.04+	0.13
Dropout rate	.01	.00	.04**	.16
Initial industry mix	.09***	.29	.10***	.29
Earnings per job (in $1,000's)	-.01***	-.19	-.02***	-.38
West	-.19	-.06	.06	.01
Midwest	-.65***	-.22	-.03	-.01
Northeast	.67+	.07	.10	.02
Percent female	.07***	.17	.14***	.22
Percent black	-.01**	-.13	-.01	-.05
Percent Hispanic	-.02***	-.15	-.00	-.01
Age	-.08***	-.16	-.04	-.05
Log of population	.04	.03	.42***	.27
High amenity area	.01***	.33	.02***	.33
Constant	-.65		-7.28***	
Adjusted R^2 x 100	48.41		70.50	

\+ $P \leq .10$.
* $P \leq .05$.
** $P \leq .01$.
*** $P \leq .001$.

Appendix table 4--Regression results showing the effects of average schooling levels with and before and after controlling for other local characteristics, on average annual employment change in nonmetro and metro commuting zones, 1979-88

Characteristics of commuting zones at beginning of period	508 nonmetro commuting zones			255 metro commuting zones		
	(1)	(2)	(3)	(1)	(2)	(3)
			Standardized coefficients			
Years of school	0.12**	0.08	0.05	0.24***	0.12+	-0.01
Initial industry mix		.46***	.30***		.58***	.32***
Earnings per job (in $1,000's)		-.24***	-.19***		-.40***	-.34***
West		-.16**	-.08		-.08	.01
Midwest		-.34***	-.24***		-.18**	-.09+
Northeast		.05	.06+		-.05	-.04
Percent female			.17***			.24***
Percent black			-.12**			-.04
Percent Hispanic			-.14***			.01
Age			-.17***			-.07
Log of population			.03			.29***
High amenity area			.32***			.34***
Adjusted R^2 x 100	1.16	34.38	48.48	5.62	54.75	69.72

\+ P≤.10.
* P≤.05.
** P≤.01.
*** P≤.001.

Appendix table 5--Regression results showing the effects of average schooling levels, before and after controlling for other local characteristics, on average annual employment change in nonmetro commuting zones in the South, 1979-88

Characteristics of commuting zones beginning of period	Percentage employment growth in-- 173 Southern nonmetro commuting zones		
	(1)	(2)	(3)
	Standardized coefficients		
Years of school	0.14+	0.14	-0.08
Initial industry mix		.27**	.29***
Earnings per job (in $1,000's)		-.42***	-.13+
Percent female			.32***
Percent black			-.32***
Percent Hispanic			-.35***
Age			-.28***
Log of population			-.05
High amenity area			.34***
Adjusted R^2 x 100	1.35	24.20	50.61

\+ P≤.10.
* P≤.05.
** P≤.01.
*** P≤.001.

Chapter 5
Education and Training Policy: Skill Upgrading Options for the Rural Workforce

Paul L. Swaim and Ruy A. Teixeira*

The particular needs of rural areas must be addressed if they are to participate fully in national efforts to upgrade worker skills. Rural students lag in the cognitive skills increasingly demanded by growing sectors of the economy, and rural governments and employers often lack the resources to implement adequate education and training programs. Curriculum reform and better coordination among local schools, job training programs, and employers could result in important gains. However, increased State and Federal aid may also be needed. If education and training reform is to do more than improve the employment opportunities of outmigrants, it may need to be part of a comprehensive rural development strategy.

Introduction

A highly skilled workforce appears essential in an increasingly competitive global economy. Many, however, detect "a rising tide of mediocrity" in American schools. Thus, educational reform is widely viewed as a key to restoring the international competitiveness of American industry. The severe setbacks experienced by rural areas in the 1980's have similarly increased concerns that rural workers' human capital is especially inadequate.

This chapter considers public policies for upgrading worker skills. We organize our discussion around the two major public providers of job-related skills: schools and job training programs. Although these sources overlap somewhat, schools and training programs are distinct institutions serving different goals and populations. However, several common themes clearly emerge.

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The first theme is the need to identify the types of skills that are most needed and the mix of classroom instruction and applied training best suited to develop those skills. An overall increase in the amount of schooling and job training may be desirable, but supplying the right type of education and training to the right people is probably more important. In particular, the workforce preparation system should better serve the academic and vocational training needs of the noncollege-bound "lower half."

The second theme is that evaluation studies have identified education and job training programs that work. Other, less carefully evaluated proposals also hold considerable promise. However, some of the programs that appear most effective are expensive. Investing in improved worker skills may thus strain the fiscal capacity of many governmental units, raising difficult questions concerning affordability and the distribution of costs.

A final theme is the "fit" between national reform proposals and the needs and resources of rural communities. In many ways, rural areas are different. Education and training policies should reflect these differences.

Economic Returns to Skill Upgrading

Americans have advocated school reform as the solution to a long list of social and economic problems. The current emphasis on education and training as the key to competitiveness in the new economy thus merits some skepticism. The application of new economy arguments to rural areas may be particularly problematic. We thus begin by reviewing the evidence from the earlier chapters on the economic returns to education and training for rural people and places.

A growing number of empirical studies cited in Chapter 2 conclude that the economic value of a highly trained workforce has increased, at least on some level. For example, shifts in the industrial and occupational composition of employment suggest that the relative demand for well-educated workers has increased. Furthermore, case studies of selected firms from a growing number of industries indicate increased need for cognitive skills within occupations as new technologies and organizational strategies alter job content.[51] Because of widely noted problems with workforce education and skill levels in the United States, a serious imbalance may be evolving between available jobs and available workers.

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[51] While certain "best practice" manufacturers have adopted job enrichment competitive strategies, American industry overall clings to the low-skill workforce practices of the "mass-production system" perfected by, for example, Henry Ford (*17*). The generalizability of the recent case study evidence is assessed in Chapter 2.

Labor market returns to increased years of schooling have recently increased for individuals living in rural areas, but the rise has been smaller than in urban areas (Chapter 3). A likely explanation for this difference is that the increase in the relative demand for highly educated workers has been largest in industries and occupations that are concentrated in urban areas. However, rural individuals earning college degrees often relocate to urban labor markets and realize high returns on their schooling. Thus, the individual returns to increased rural education are probably high.

New economy arguments for changing skill needs appear to be less applicable to rural places. Rural areas with higher education levels have not consistently outperformed other rural areas, according to evidence provided in Chapter 4. The small effect of education levels on local growth suggests that factors other than workforce education have been more important in constraining rural economic development.

Although direct evidence is lacking, worker skill upgrading might make a significant contribution to rural economic development, especially if national trends favor a "high-skill" approach to economic growth. The analyses in Chapters 3 and 4 focus on years of schooling. According to Chapter 2, however, there is no simple relationship between this measure of educational attainment and the skills that are, or could become, of increasing importance to employers. Many of the policies considered in this chapter are intended to change the content of schooling (that is, what and how much is learned in school) or to improve the link between schools, post-school job training, and the local job market. Chapter 4's rather pessimistic findings thus provide a lower-bound assessment of the potential returns to education and training reform in rural places.

Policy Choices: Schools

The skills needed in the new economy tend to be cognitive in nature. Because schools are designed to impart just these sorts of skills, a straightforward case could be made that upgrading worker skills simply requires more schooling for American workers. This answer, however, is incomplete.

Attaining a certain level of education need not imply that a certain level of cognitive skills has been reached. Thus, the role of schools in upgrading worker skills must go beyond simply providing more schooling to more students. An exclusive focus on increased years of schooling for today's students also slights the importance of adult education and on-the-job

training. Schools should cultivate skills and aptitudes that lead to lifelong learning, but much of that learning will take place outside of schools.[52]

Implications for Elementary and Secondary Schools

The basic cognitive skills that schools should cultivate include the academic skills on which schools have traditionally concentrated: basic literacy and numeracy (the ability to comprehend the significance of numbers as well as to manipulate them). Levels of verbal and mathematical skills are much too low, particularly for workbound students. Recent efforts to improve these levels, with their emphasis on rigorous drilling and standardized testing, have improved students' abilities to perform low-level tasks, such as simple computation and word recognition, but not the higher order tasks that are also needed (*32*).[53]

Thus, schools probably should cultivate literacy and numeracy on a substantially higher level than they are currently doing. Exactly how to achieve that goal is a difficult question, but several approaches may have merit.

Performance Standards

The low level of learning in many American schools reflects low levels of effort (*9*, *41*). Although students hoping to attend selective colleges are generally highly motivated, many students do not work hard in school. The absence of a clear link between academic achievement and employment opportunities may explain much of this apathy. In contrast to other leading industrial countries, workbound high school students in the United States receive very little economic return for school performance beyond that associated with attending long enough to receive a diploma (*1*, *9*). One reason is that very few schools provide employers with useful information on student achievement.[54]

Improved measures of verbal and mathematical skills (objective, uniform across schools, set to high standards) could be emphasized and routinely provided to employers. Vocational education programs could similarly develop "competency profiles" that provide students and employers with

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[52] The American Society for Training and Development estimated that U.S. firms spent $30 billion for formal training programs in 1983 and a further $90-$180 billion for informal, on-the-job training (*14*).

[53] Italicized numbers in parentheses identify literature cited in the References at the end of this chapter.

[54] In 1982, Nationwide Insurance requested transcripts for 1,200 job applicants from local high schools, but received just 93 responses. Only 20 of these provided all of the information requested (*8*).

objective measures of the occupational skills that have been demonstrated.[55] This link to the labor market could provide the incentives that students need to achieve higher levels of literacy and numeracy. A second advantage is that absolute standards avoid peer pressure dynamics that discourage hard work when relative (or "curved") grades measure individual achievement.

Schools and teachers could also be held accountable to measures of learning achievement. Possible incentive mechanisms include allocation formulas for State and Federal aid, merit pay, or parental choice of their children's schools or teachers (*15*).[56] The greatest appeal of performance incentives, however, is disappointment with past attempts to upgrade school quality through centralized regulation of the level of funding or the instructional process (*16*, *19*, *57*). Because there is little experience with these new approaches, their application should be carefully monitored.

An essential prerequisite for a results-driven incentive system is the development of appropriate performance measures. Schools and teachers must not be penalized for instructing students with greater barriers to learning or be encouraged to spend all of their time drilling students for tests that emphasize lower-level skills such as rote computations.[57] Furthermore, merit pay programs must not undermine teamwork among faculty members (*32*).

Rigorous Academic Standards

The high school curriculum can be reoriented to increase emphasis on basic academic subjects. The National Commission on Excellence in Education recommended increasing graduation course requirements in English, mathematics, science, computer science, and social studies (*59*). In recent years, many States have moved in this direction, but most still fall short of these recommended standards (table 1). Basic skills testing and minimum graduation standards also have been more widely adopted, but they could be set to higher standards.

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[55] Most vocational education programs devote little attention to job placement despite its importance (*8*, *12*, *57*).

[56] Parental choice of schools or teachers may not be feasible in many rural areas because schools may be too dispersed and too small to allow for meaningful choice. The small size of rural schools may, however, encourage other forms of parental involvement.

[57] Recent experience with performance standards in job training programs illustrate this danger. Excessive emphasis on quantitative performance measures, such as minimizing costs per job placement, have discouraged enrollment of individuals with the greatest need for labor market assistance (*2*, *47*).

Table 1--Average years of coursework required for high school graduation by public school districts and subject area

Item	Subject area				
	Mathe-mathics	Science	English	Foreign languages	Social studies
			Years		
Survey year					
1982	1.6	1.5	3.6	0.0[1]	2.6
1985	1.9	1.8	3.8	.1	2.8
1988	2.3	2.0	3.9	.2	2.9
Recommendations of the National Commission on Excellence in Education	3.0	3.0	4.0	2.0[2]	3.0

[1] Less than 0.05 year.
[2] The Commission's foreign languages recommendation only applied to college-bound students, but other requirements refer to all students.
Source: (*58*).

One difficulty with increasing the rigor of the high school curriculum is that low-achieving students may be discouraged from persisting in their studies. Overall, high school dropout rates continued to fall in the 1980's, particularly for blacks and Hispanics (table 2). Nonetheless, 15-20 percent of all young adults still fail to earn a high school diploma, and this group has increasingly poor employment prospects. Anecdotal evidence suggests that tougher academic standards are often a barrier rather than a healthy spur for "at-risk" youth (*7*).

Compensatory Education

Many disadvantaged students can benefit from a rigorous curriculum if they receive appropriate assistance. Evaluations of compensatory educational programs (such as the Education and Consolidation Act of 1984, chapter 1 programs), preschool programs for disadvantaged children (such as Head Start and the Perry Preschool Program), and support programs for at-risk teenagers (such as the Summer Training and Education Program (STEP) demonstrations), have shown substantial gains in academic achievement, school completion rates, earnings, and reductions in teen pregnancy and crime (*7, 32*).

Table 2--High school completion rates by race/ethnicity

Year	Age 18-19			Age 20-24		
	White	Black	Hispanic	White	Black	Hispanic
			Percent			
1974	76	56	49	86	72	59
1980	76	59	46	85	74	57
1986	77	65	55	85	81	62

Source: (*58*).

Evaluation studies suggest that the more intensive and expensive programs are more effective. Current funding levels are, however, much too low to serve the eligible populations. For example, Head Start serves less than 20 percent of the 2.4 million children meeting its enrollment criteria (*32*). The increasing number of students with high-risk backgrounds (such as racial and ethnic minorities, immigrants, and children in poor or single-parent families) also suggests that higher funding levels may be justified.

Enriched Vocational Education

Even students not at risk of dropping out may be hurt by more rigorous standards unless they are applied flexibly. In many States, students who do poorly in traditional academic courses are now required to take more or to repeat such courses. These students are typically workbound and would benefit from a coherent program of four to six vocational education courses.[58] Completing such a vocational sequence, in addition to meeting expanded basics requirements, often requires more total credits than is typical of college-bound students and may thus be discouraging (*12, 20*).

In other words, the movement for educational excellence may have increased the tendency of high schools to neglect the needs of workbound students. Such a result would be unfortunate, because recent evaluations of American education have generally concluded that the most pressing need is to raise achievement levels for students who do not plan to attend college (*17, 32*).

[58] Several recent studies have found a high labor market payoff for workbound students who take a modest number of vocational courses. The benefits are limited, however, to students completing a sequence of courses appropriate for an occupation that they then pursue (*8, 12, 57*).

Enriched vocational education programs could help workbound students meet more rigorous academic standards while preparing them for good jobs. Many students who perform poorly in traditional academic courses are both more motivated and better able to master verbal and mathematical skills in an applied context that directly relates to their career aspirations (*8*, *57*). Exemplary vocational education programs have been developed that complement basic skills mastery while providing specific vocational training. Many vocational students, however, appear to get the worst of two worlds: they are tracked out of decent academic instruction, but do not attend a coherent sequence of vocational courses that qualify them for good jobs (*24*, *57*).

Nontraditional Curriculum

Some of the skills in increased demand have not traditionally found a home in school curriculums. These include problem-solving, adaptability, and cooperative work. Basic literacy and numeracy provide a foundation without which these other skills are difficult to develop. Developing these more applied skills cannot be reduced to attaining a given level of verbal or mathematical skills.[59] Problem-solving, adapting to new tasks, and working cooperatively on the job challenge workers to go beyond pencil-and-paper mastery of basic academic skills to their application in ways that are creative and flexible. Thus, schools should probably prepare students for workplace situations by cultivating these "new" skills in close conjunction with the old ones.

Exactly how to do this is a difficult question. Curriculums may have to be redesigned to incorporate exercises and teaching approaches that allow students to cultivate these abilities. For example, Slavin sets forward a number of specific ways in which cooperative learning can be successfully incorporated into classroom environments (*48*). In the process, certain pedagogical approaches, such as rote drilling and "teaching to the test," should probably be deemphasized, because they are antithetical to such skills as problem-solving in ambiguous situations and to adaptability.

High school vocational education programs can also reinforce and apply basic skills learning. Curriculums emphasizing these broad skills could also be linked to work experience through "cooperative education" and other arrangements negotiated with the local business community. Research indicates that "hands on" experience is particularly valuable for motivating students and reinforcing work habits and social skills of value in the

[59] Scribner and Stevens report virtually no relation between performance in traditional school math and the ability to apply mathematical reasoning to solve workplace scheduling problems (*46*).

workplace (*8*). Congress' recent inclusion of a subminimum training wage in the 1989 amendments to the Fair Labor Standards Act may provide a good opportunity for high schools to cultivate increased employer involvement in these programs.

Implications for Postsecondary Education

The American system of postsecondary education generally deserves high marks (*17*). A diverse mix of public and private 4-year colleges and universities offer high-quality academic training to large numbers of students. Community and technical colleges also provide vocational training for many occupations and enroll large numbers of nontraditional and disadvantaged students.[60]

Two potential problems merit consideration. First, about 50 percent of all students enrolling in community colleges or technical schools leave without either a degree or certification of vocational qualifications (table 3). More extensive counseling might help students identify and complete course sequences leading to improved employment opportunities (*57*). Another reason for low completion rates may be the financial strain associated with midcareer retraining, particularly when children or other dependents are present.

A second cause for concern is the leveling off of college enrollment and graduation rates since the mid-1970's. Some analysts believe the supply of college-educated workers exceeds the number of jobs requiring higher education (*45*). However, the recent increase in the wage premiums earned by young workers with 4 or more years of college suggests that a shortage of highly educated workers is developing ((*33*) and Chapter 3 of this report).

Financial considerations may increasingly discourage promising students from attending college. Since 1980, the costs of higher education have grown more rapidly than family incomes, and inflation-adjusted financial aid has declined modestly (tables 4 and 5). Although increased labor market returns to college should encourage more students to pursue college degrees, inadequate financial aid may be preventing promising students from continuing their education.

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[60] Because most of the national labor force for the next several decades has already left school, upgrading job skills for the current workforce is an important part of the education challenge. Two-year colleges provide remedial and vocational education to many older students, including experienced workers. Many firms purchase employee training services from 2-year colleges (*13, 21*).

Table 3--Outcomes for 1980 high school graduates who continued to schools other than 4-year colleges or universities as of 1984

Student outcome	Community colleges	Public technical institutes	Proprietary schools
		Percent	
Completes program	19.1	36.1	36.1
Associate degree	17.1	18.1	12.5
Certificate	2.0	18.0	23.6
Leaves without credential	42.0	46.5	42.2
Transfers to other institutions	25.2	8.6	13.2
Still enrolled in first school entered	13.8	9.0	14.0

Source: (*57*).

Special Problems of Rural Areas

The above discussion sketched a national strategy for orienting the educational system to the demands of the new economy. Three underlying conditions seem critical for this overall approach to succeed. First, students, parents, and the community at large must place increased priority on academic achievement. Second, schools need sufficient fiscal resources. Finally, the link between schools and the local labor market needs to be strengthened. Many rural areas face special problems in meeting these conditions, which must be addressed in formulating an educational approach appropriate for these areas.

Rural Education Gap

Rural areas start from a lower educational base than urban areas. Nonmetro dropout rates are higher, but the gap fell from 2.1 percentage points in 1980 to 1.3 percentage points in 1985 (table 6). Regional differences in dropout rates are very large for nonmetro areas, with the rate in the South (20.6 percent) far exceeding that in the Midwest (8.7 percent). The Midwest and West, in fact, have lower nonmetro than metro dropout rates. Much of the educational gap in the South reflects pockets of very low educational attainment in Appalachia, the Mississippi Delta, and southern Texas (*51*).

Table 4--Recent trends in the cost of public higher education

Program	Year				
	1963	1970	1975	1980	1985
All public schools:			*Dollars*		
Tuition and required fees	323	432	583	891	1,106
Room and board	880	1,131	1,582	2,265	2,769
Total cost	1,203	1,563	2,165	3,156	3,875
Share of per capita personal income	29.7	25.7	*Percent* 21.8	24.1	25.0
2-year colleges:			*Dollars*		
Tuition and required fees	178	277	355	528	660
Room and board	773	1,062	1,436	2,006	2,396
Total cost	951	1,339	1,791	2,534	3,056
Share of per capita personal income	23.5	22.0	*Percent* 18.1	19.3	19.7
4-year universities:			*Dollars*		
Tuition and required fees	427	599	840	1,284	1,651
Room and board	1,111	1,462	2,077	3,090	4,263
Total cost	1,538	2,061	2,917	4,374	5,914
Share of per capita personal income	38.0	33.9	*Percent* 29.4	33.3	38.2
Other 4-year schools:			*Dollars*		
Tuition and required fees	306	448	662	1,052	1,248
Room and board	829	1,110	1,536	2,233	2,711
Total costs	1,135	1,558	2,198	3,285	3,959
Share of per capita personal income	28.0	25.7	*Percent* 22.2	25.0	25.6

Source: (56).

It is unclear if nonmetro students generally possess background characteristics that reflect greater barriers to educational achievement than metro students. Children in nonmetro areas are more likely to be members of poor families and the educational attainment of rural parents lags that of metro parents (table 7). Nonmetro children are less likely, however, to live in female-headed families or to be black. Thus, overall differences between

Table 5--Student financial aid by major programs

Program	1963	1970	1975	1980	1985
			Million dollars (1982)		
Federal aid:					
Pell grants	--	--	1,629	2,660	3,298
Work study	--	552	513	734	610
National direct student loan	356	584	800	774	740
Guaranteed student loan	--	2,466	2,204	6,811	8,280
Social Security survivors	--	1,212	1,901	2,099	--
Veterans' aid	211	2,724	7,271	1,911	656
Other grants	27	364	494	625	457
Other loans	--	102	78	68	218
Total	594	8,004	14,890	15,682	14,259
State grants	176	574	853	893	1,209
Institutional grants	940	2,343	2,496	2,383	3,014
Total	1,710	10,921	18,239	18,958	18,482

-- = Program not in operation.
Source: (6).

metro and nonmetro students in their readiness for learning are probably less pronounced than are differences between nonmetro areas.

The rural education gap is most pronounced at higher levels of education (table 8). For example, 27.5 percent of the metro population aged 25-44 had 4 or more years of college, compared with 16.2 percent of the nonmetro group. Moreover, this higher education gap has grown in the last decade.

One reason rural workers have less postsecondary education is that school enrollment rates for young adults are lower (table 9).[61] In 1987, 8 percent of the metro 25-34 year olds were enrolled in schools, compared with 5.3 percent of the nonmetro group. One probable source of this difference is the fact that much of the rural population does not live within

[61] Selective outmigration also contributes to rural workers having less postsecondary education (chapter 2 of this report).

Table 6--Recent trends in high school dropout rates by location

County characteristic	Dropout rate as share of all 18-21 year olds in-- 1980	1985
	Percent	
Total	17.2	14.2
Metro	16.7	13.9
Northeast	13.4	11.9
Midwest	15.1	11.8
South	19.4	16.9
West	18.7	15.4
Nonmetro	18.8	15.2
Northeast	12.3	16.4
Midwest	13.7	8.7
South	24.3	20.6
West	18.4	12.9

Sources: (*54, 55*).

Table 7--Selected characteristics of children by location, 1988

Item	Metro	Nonmetro
	Percent	
Family in poverty:		
Age--		
Less than 6 years	21.8	28.3
6-11 years	20.1	23.5
12-17 years	16.8	19.7
Less than 18 years	19.6	23.8
Mother-only family	23.6	20.0
Parents not high school graduates [1]	20.2	22.9
Black	16.4	12.0

[1] For two-parent families, father did not finish high school.
Source: (*54*).

Table 8--Educational attainment of 25-44 year olds, selected years

Item	1971	1975	1979	1983	1987
Completed high school:					
			Percent		
Metro	73.7	79.6	83.2	85.7	87.1
Nonmetro	65.6	70.7	77.8	80.8	82.7
			Percentage points		
Nonmetro gap	8.1	8.9	5.4	4.9	4.4
Completed 1 or more years of college:					
			Percent		
Metro	31.9	38.9	44.2	47.9	49.1
Nonmetro	21.2	25.9	34.3	35.3	34.2
			Percentage points		
Nonmetro gap	10.7	13.0	9.9	12.6	14.9
Completed 4 or more years of college:					
			Percent		
Metro	17.0	21.4	24.0	26.8	27.5
Nonmetro	10.8	13.8	17.5	18.0	16.2
			Percentage points		
Nonmetro gap	6.2	6.6	6.5	8.8	11.3

Source: (*53*).

commuting distance of a postsecondary school. Metro counties are much more likely than nonmetro counties (particularly nonmetro counties not adjacent to a metro area) to offer higher education opportunities locally (table 10). However, other factors such as occupation and prior level of education also appear to lower adult enrollment rates in nonmetro areas (table 11). Thus, the relative importance of the scarcity of nearby schools in discouraging postsecondary education is difficult to ascertain.

Besides getting less education, rural students also lag their urban counterparts in terms of educational content. In the critical mathematics and science area, rural high school seniors are substantially less likely to have taken either four-six math or four-six science courses (*44*). Furthermore, U.S. Department of Education data show that schools in rural communities scored lower in mathematical achievement scores than schools in any other location except high-poverty central cities (*18*).

Table 9--School enrollment rates for young adults, selected years

Share of 25-34 year olds enrolled	1971	1975	1979	1983	1987
			Percent		
Metro	7.3	9.8	9.2	9.0	8.0
Nonmetro	5.1	5.6	5.5	6.0	5.3

Source: (*54*).

Table 10--Share of counties with one or more colleges and universities, 1986

Type of school	Total	Metro	Nonmetro		
			Total	Adjacent	Nonadjacent
			Percent		
Public:					
University	2.2	7.9	0.6	0.5	0.6
4-year college	13.1	33.7	6.9	6.6	7.1
Any 4-year college or university	15.0	40.0	7.5	7.1	7.7
2-year college	23.5	50.7	15.3	17.2	14.2
Any public college or university	31.4	64.5	21.5	22.3	20.9
Private:					
University	1.0	4.1	0	.1	0
4-year college	17.8	47.2	9.0	13.0	6.4
Any 4-year college or university	17.9	47.5	9.0	13.0	6.4

Source: (*60*).

The rural achievement gap in mathematics and science is probably due, in part, to the fact that rural schools have greater difficulty attracting qualified teachers in these areas (table 12). Thus, rural students are less likely to have the opportunity to pursue a rigorous academic curriculum. For

Table 11--School enrollment rates for young adults aged 25-34 by education, labor force status, and occupation, 1987

Group	Men		Women	
	Metro	Nonmetro	Metro	Nonmetro
	Percent			
Total	7.7	4.6	8.3	6.0
Educational attainment:				
Less than 12 years	1.0	1.2	3.7	1.5
12 years	2.8	2.1	3.6	3.3
13-15 years	14.9	10.2	14.4	11.6
16 years	7.4	9.9	9.3	10.2
17 or more years	18.7	15.4	19.7	17.9
Labor force status:				
Employed full-time	5.2	2.9	7.0	5.7
Employed part-time	16.0	11.5	10.0	7.1
Unemployed	5.8	4.4	8.0	1.4
Not in labor force	27.1	17.1	9.5	6.2
Professional/technical occupation	15.1	12.1	13.9	13.9

Source: (*54*).

example, 18 percent of rural high schools offer calculus, compared with 54 percent of suburban schools (table 13).

By several important measures, rural schools also offer lower quality vocational education (table 14). Small schools, which are disproportionately rural, are less likely to offer cooperative education programs or area vocational centers. They also offer training in fewer areas and less frequently offer sequences of three or more classes in any given area. All of these deficiencies are more severe in schools with a high proportion of disadvantaged students. These are also the schools where students take the greatest number of vocational education courses and, hence, would probably benefit most from high-quality programs.[62]

[62] The special orientation of vocational agriculture programs may offset some of these apparent deficiencies (*44*).

Table 12--High school principals reporting difficulty hiring fully qualified teachers for vacancies, by community type and subject (school year ending 1986)

Subject	Type of community		
	Rural	Urban	Suburban
	Percent		
Physics	77	67	65
Chemistry	69	60	52
Computer science	70	59	48
Mathematics	67	52	40
Foreign language	57	46	49
Biology/life science	50	33	13
Physical science	48	26	24
Earth/space science	49	30	14
Special education	48	29	16
General science	38	16	10
Social studies	7	8	4

Source: (*58*).

Table 13--High schools offering selected science courses, by type of community (school year ending 1986)

Subject	Type of community		
	Rural	Urban	Suburban
	Percent		
Biology	99	97	99
Chemistry	88	90	97
Physics	75	85	90
Calculus	18	39	54

Source: (*58*).

Fiscal Stress

Rural areas generally have lower levels of income and taxable wealth than do urban areas. Moreover, many rural residents already face higher tax burdens than their counterparts in urban areas (*39*). The costs of providing a given level of educational services are also higher in rural areas because

Table 14--Characteristics of high school vocational education, by school size and concentration of disadvantaged students

Item	Disadvantaged		Advantaged	
	Highly	Medium	Medium	Highly
Share of schools offering:		*Percent*		
Area vocational center--				
500 students	39.3	77.0	66.3	59.5
900 students	53.6	73.4	74.4	63.3
1,300 students	68.0	69.9	82.5	67.1
Cooperative education--				
500 students	50.6	66.0	52.7	48.6
900 students	62.4	68.7	57.3	54.8
1,300 students	74.3	71.4	62.5	61.0
Levels of vocational education offered:		*Mean number per school*		
Total credits offered--				
500 students	24.4	27.4	42.8	33.7
900 students	35.4	38.4	48.4	43.1
1,300 students	45.3	49.4	54.0	52.5
Subject areas with at least three courses--				
500 students	2.2	2.3	3.0	2.7
900 students	2.7	2.8	3.3	3.2
1,300 students	3.1	3.4	3.5	3.6
Credits at second level or above--				
500 students	6.8	8.3	10.2	10.6
900 students	9.3	11.9	12.6	13.7
1,300 students	11.8	15.4	15.1	16.8

Source: (57).

low population density limits the economies of scale that bring down costs per pupil in urban areas.[63] Thus, the costs of improving rural schools may be difficult to meet with local tax revenue.[64]

Nonlocal funding already plays an important role in public elementary and secondary education. The U.S. Department of Education estimates that State aid provided 50 percent of total revenues and Federal aid an additional 6 percent in 1987 (table 16). Although total Federal aid has decreased since 1980, increases in State funding were common and were often linked to school reform, as with the Education Reform Act of 1982 in Mississippi (*37*). There is considerable uncertainty, however, how adequately this aid compensates for the low incomes and high costs in many rural school districts.

In 1982, estimated per pupil spending in nonmetro elementary and secondary schools was $2,137, compared with $1,962 in metro schools (table 15). Higher average nonmetro spending coexists, however, with greater county-to-county variation in per pupil spending (*22*). Higher nonmetro variation results, in part, from unusually low spending in a some nonmetro counties. Furthermore, per pupil expenditures rise with county per capita income (table 17). These patterns suggest that the most pressing funding gaps in rural education are concentrated in high-poverty areas.

Spending per student would be more nearly equal if Federal programs were better targeted to high-need districts. The relative poverty of rural areas means that the Education and Consolidation Act of 1984 chapter 1 compensatory educational programs should be an important vehicle for improving rural educational attainment. Evaluations suggest, however, that the funds have not been well targeted on disadvantaged students (*32*). The situation recently may have improved, however, because the 1988 reauthorization amended Chapter 1 to better target aid to schools with the greatest needs.

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[63] One indication that high educational costs and a small or widely dispersed student population go hand-in-hand is that 1982 per pupil spending in nonmetro counties in the lowest enrollment quintile was $2,676 compared with $1,964 in the highest enrollment quintile (table 15). King County, Texas, with an estimated enrollment of 74, had estimated per pupil expenditures of $7,873 (*22*).

[64] High outmigration rates may provide an additional justification for State and Federal funding for rural schools. A substantial proportion of well-educated rural residents move out of their communities after receiving their education. Thus, a rural workforce with higher levels of cognitive skills would make a significant contribution toward a national workforce adequate to the demands of the new economy and international economic competition.

Table 15--County enrollment and current expenditures in public elementary and secondary schools, 1982

Quintile	All counties		Metro counties		Nonmetro counties	
	Mean enrollment	Per pupil spending	Mean enrollment	Per pupil spending	Mean enrollment	Per pupil spending
	Pupils per county	*Dollars*	*Pupils per county*	*Dollars*	*Pupils per county*	*Dollars*
1	1,077	2,575	6,002	1,729	900	2,676
2	2,631	2,064	13,168	1,845	2,078	2,166
3	4,739	1,889	23,537	1,959	3,422	1,974
4	9,217	1,915	42,164	2,072	5,596	1,906
5	57,165	2,038	155,315	2,203	12,065	1,964
All	14,966	2,096	48,037	1,962	4,812	2,137

Source: (22).

Table 16--Federal, State, and local funding for elementary and secondary education, various years

School year	Federal	State	Local
		Percent	
1919-20	0.03	16.5	83.2
1929-30	.04	16.9	82.7
1939-40	1.8	30.3	68.0
1949-50	2.9	39.8	57.3
1959-60	4.4	39.1	56.5
1969-70	8.0	39.9	52.1
1979-80	9.8	46.8	43.4
1986-87	6.4	49.8	43.9

Source: (22).

The Carl D. Perkins Act of 1984 (Public Law 98-524) was intended to better target Federal aid for vocational education to disadvantaged students. The National Assessment of Vocational Education concluded that "the basic goals of increasing the access of special populations to high-quality

Table 17--County per capita income and expenditures in public elementary and secondary schools, 1982

Quintile	All counties		Metro counties		Nonmetro counties	
	Mean per capita income	Per pupil spending	Mean per capita income	Per pupil spending	Mean per capita income	Per pupil spending
			Dollars			
1	6,411	1,785	7,666	1,582	6,234	1,793
2	7,859	1,904	9,183	1,851	7,549	1,905
3	8,898	2,096	10,100	1,980	8,540	2,101
4	9,971	2,228	11,115	2,108	9,529	2,282
5	12,152	2,468	13,349	2,287	11,565	2,606
All	9,058	2,096	10,283	1,962	8,683	2,137

Source: (22).

vocational education and improving the overall quality of programs are sound, but the legislation is a weak instrument for achieving these goals" (57). Although rural students take a larger share of their courses in vocational subjects, just 59.8 percent of rural school districts received Perkins Act funds compared with 96.9 percent of urban districts. Among districts receiving funds, however, grants were somewhat equalizing. Both low- and high-poverty districts received above-average per pupil grants (table 18).

The extent to which Federal and State educational programs improve the access of rural students to high-quality elementary and secondary education merits continued concern. Targeting formulas may need to be altered to better reflect differences in educational needs and per pupil costs. Rural disadvantages should also be considered in setting the school performance standards, emphasized by the current wave of school reform.

Federal support for postsecondary education is also crucial for improving rural educational levels. The low incomes of many rural students and their greater likelihood of not living within commuting distance of a college or university suggest that financial aid is more often needed to guarantee access to higher education. Federal support for vocational education at community colleges could also be used to encourage outreach programs for students in remote areas. Finally, the shortage of qualified mathematics and science teachers in rural areas suggests establishing a grants program for students

Table 18--Distribution of Perkins Act funds for secondary vocational education, 1986-87

Item	Mean Perkins Act funds per pupil[1]
	Dollars
Size of district:	
Small	25.29
Medium	14.27
Large	32.21
Poverty level:	
Low	14.96
Medium	19.50
High	32.21
Average	21.97

[1] Mean levels for districts receiving Perkins Act funds.
Source: (57).

becoming certified in these subjects, provided they teach for a minimum number of years in rural or other underserved areas.

Limited Employment Opportunities and Outmigration

Rural areas face a potential dilemma in upgrading their schools. To make the people in rural places competitive, these people must have the skills to function productively in the new economy. But, new economy jobs are mostly urban. Thus, improving rural education might result in greater underemployment of rural workers or increased outmigration of relatively well-educated youths.

Increased academic achievement will also be difficult to motivate if rural students do not perceive a clear payoff in improved employment prospects (*49*). Rural high school seniors have lower educational aspirations than urban and suburban students (table 19). At least in part, this difference probably reflects local employment opportunities. For example, rural students are also less likely to anticipate professional careers (table 20).

When possible, rural school reform should be combined with comprehensive economic development policies designed to attract good jobs to rural areas. Two basic sources of increased job opportunities for the well educated can

Table 19--Educational aspirations of high school seniors by area, 1980

"How far in school do you think you will get?"	Type of community		
	Rural	Urban	Suburban
	Percent		
Less than high school	0.8	0.7	0.3
High school graduate only	22.8	14.1	13.7
Less than 2 years at business or vocational school	10.2	5.8	6.4
2 years or more at business or vocational school	12.8	11.9	10.3
Less than 2 years college	2.8	3.2	2.8
2 or more years of college with associate degree	12.6	12.3	12.6
Finish college with bachelors degree	22.6	26.1	27.8
Master's degree or equivalent	9.0	13.1	14.2
Ph.D., M.D., or equivalent	6.3	12.9	11.8

Source: (*31*).

be specified: (1) firms already located in rural areas might reorganize or expand in such a way as to increase their need for well-educated workers, and (2) firms that rely heavily on well-educated workers may be founded in or relocated to rural areas.

The first source could be particularly important for rural manufacturing. Rural manufacturing jobs tend to be in "routine" manufacturing industries where the skill levels demanded are generally low and vulnerability to low wage foreign competition is particularly high (*30*). However, some best practice firms in rural areas are now successfully adopting new technologies and work organization, with consequent increases in the demand for workers with good cognitive skills (*25*, *43*). This trend may increase job opportunities for the relatively well educated in rural areas.

The second source of jobs for the well educated is new or relocating firms that rely on skilled labor. The increased need for cognitive skills in the new economy, combined with the modest supply of such skills in the contemporary workforce, may hinder employers in many urban areas in finding adequate supplies of productive workers--especially if international competition spurs employers toward strategies of job enrichment (*23*). The potentially severe problem these employers could face in urban areas can be

Table 20--Career aspirations of high school seniors by area, 1980

"Which category describes the job you expect to have at age 30?"	Type of community	
	Rural	Urban
	Percent	
Clerical	11.6	11.3
Craftsman	9.3	5.9
Farmer	3.5	.5
Housewife	3.4	1.2
Laborer	2.7	.7
Manager-administrator	5.3	7.6
Military	2.6	2.5
Operative	3.9	1.9
Professional (lower)	24.2	29.1
Professional (higher)	9.0	15.2
Proprietor-owner	3.3	2.9
Protective services	1.7	1.7
Sales	1.8	1.8
Schoolteacher	4.2	3.5
Service	4.1	3.3
Technical	8.1	9.7
Not working	1.5	1.3

Source: (*31*).

viewed as an opportunity for rural workers and communities. Taking advantage of such an opportunity, however, depends on rural areas upgrading their school systems and being able to provide enough educated workers.[65] It is unlikely, however, that new economy employers locating or expanding in rural areas will confine their hiring to youths newly leaving school. For years to come, the rural labor force will be dominated by older workers who left school in earlier years. Thus, adult training will also be instrumental in upgrading worker skills in rural labor markets.

[65] Highly skilled managerial and profession-technical workers are often recruited nationally, and thus need not be trained locally. Good elementary and secondary schools, however, help attract these workers to a community.

Policy Choices: Job Training Programs

Competitive success in the new economy is likely to require continuous learning from a wide spectrum of the workforce. This is most evident for displaced workers making midcareer shifts to new industries and occupations. Continued learning is also likely to be required within jobs as, for example, production workers' responsibilities are broadened to include production scheduling, quality control, and other tasks formerly assigned to technical or supervisory personnel (*24*). Adult education and training is, thus, a critical component of the workforce preparation system. Case studies from a number of industries demonstrate the potential role of broad in-firm training in achieving competitive success (*17*). U.S. employers appear to provide relatively little and excessively narrow training, particularly for nonprofessional employees. The relative weakness of employer-provided training suggests that public job training programs could help overcome potential skill shortages that may otherwise limit employment growth in particular regions or industries.

The primary goal of public training programs has been to assist disadvantaged workers. Providing disadvantaged workers with a second chance and promoting economic development need not be synonymous. If a proper balance is struck, however, job training programs that actively complement employers' human resource strategies will better serve the workers most in need of assistance and contribute to overall economic growth.

The economic development component of job training programs is especially important in rural areas. Enhancing rural workers' skills will not improve their employment prospects significantly if the local economy lacks appropriate jobs for these workers. However, skill upgrading may be a precondition for expanding the supply of new economy jobs in many rural areas. Furthermore, rural employers often lack the resources to retrain their workers.[66] Thus, rural job training programs need economic development and rural employers need job training programs to a greater extent than is true in urban areas.

Credibility with Employers

A basic weakness of U.S. job training programs has been their isolation from mainstream workers and employers (*36*). Because unsubsidized employment

[66] Rural workers tend to have low educational attainments, rural employers tend to be small and to use relatively stagnant technologies, and rural labor markets are relatively volatile and prone to excess supply. Because all of these factors reduce employer-provided training, training opportunities are probably more limited for rural than for urban workers (*10, 52*).

in good jobs is the ultimate goal of these programs, credibility with employers is critical to their effectiveness. Many employers came to view participation in CETA programs as a signal of low productivity or poor work attitudes, however.[67] That view is hardly surprising because CETA enrolled almost exclusively very low-skilled individuals with unsatisfactory work histories. Too exclusive a focus on severely disadvantaged workers proved self-defeating because participants were stigmatized.[68]

One of the most important accomplishments of the Job Training Partnership Act (JTPA) is that many programs have increased their credibility with employers (*4*). Private industry councils (PIC's), in which local business leaders play a prominent role, have helped forge closer links between these programs and local employers. The highly decentralized nature of JTPA has also allowed the more innovative PIC's to develop training and placement services that are responsive to local labor market conditions. The participation of displaced mainstream workers in JTPA programs has also undercut the belief that participants are probably unsatisfactory workers.

Who Gets Training?

The most widespread criticism of JTPA programs is that many avoid serving individuals with the greatest barriers to satisfactory employment (*47*). National measures of the extent of "creaming" are not available. However, an audit of 58 Service Delivery Areas (SDA's) by the U.S. Department of Labor's Inspector General's office showed that hard-to-serve populations, such as dropouts and functional illiterates, were systematically screened out of many JTPA programs (*61*). For example, a secretarial training and placement program in a Denver skills center only accepted applicants who possessed a high school diploma and were able to pass two typing tests.[69]

The mix of JTPA program services, which emphasizes job search assistance (JSA) and on-the-job training (OJT), also limits participation to relatively "job-ready" individuals (table 21). Although many disadvantaged workers

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[67] The 1982 Job Training Partnership Act (JTPA) revamped the system of Federal employment and training programs previously administered under the Comprehensive Employment and Training Act (CETA) of 1973.

[68] During 1980-81, the U.S. Department of Labor tested a wage subsidy program in Dayton, Ohio. Disadvantaged workers were provided vouchers entitling employers hiring them to sizable wage subsidies. The stigma on Federal employment programs was then so strong that workers with vouchers had less success finding jobs than did a control group (*11*).

[69] A General Accounting Office survey of 63 SDA's, however, concluded that JTPA participants were generally representative of the eligible population. One exception was high school dropouts, who were underrepresented. Enrollees who were less ready for jobs also received less intensive services than more job-ready enrollees (*63*).

Table 21--Program enrollments under the Job Training Partnership Act of 1982 for program year 1987[1]

Initial program assignment	Title II-A[2]		Title III[3]	
	Number	Share of total	Number	Share of total
	Thousands	*Percent*	*Thousands*	*Percent*
Total	797	100.0	98	100.0
Classroom training[4]	286	35.9	28	28.6
On-the-job training	171	21.5	14	14.3
Job search assistance	154	19.3	42	42.9
Work experience	55	6.9	0	0
Other services[5]	131	16.4	14	14.3

[1] The 1987 program year ran from July 1, 1987 to June 30, 1988.
[2] Disadvantaged worker programs.
[3] Dislocated worker programs.
[4] Occupational training only.
[5] Includes remedial education.
Source: (*4*).

lack basic reading and mathematics skills, very few programs offer remedial education. In 1982, 14 percent of CETA enrollees received remedial education, compared with 7 percent of JTPA enrollees in 1985 (*28*). Work experience programs, which introduce individuals with little or no work experience to the social norms of the workplace, have also been greatly reduced. Finally, the 15-percent limitation on stipends, child-care, and other support for trainees may prevent members of low-income families from participating.

One source of the bias toward creaming is the emphasis JTPA places on numerical performance standards, such as the percentage of workers placed in unsubsidized jobs and costs per placement (*2*). The U.S. Department of Labor is developing performance measures intended to better target JTPA programs, as the legislation specifies, on those "most in need of services." Increased emphasis on serving more disadvantaged workers could also be

encouraged by expanding remedial education and basic skills training and relaxing the 15-percent limit on trainee support.[70]

Increased emphasis on better serving the least employable should be balanced against the need to protect JTPA's credibility with employers. Thus, any shift in targeting should probably be phased in gradually and be limited enough so that JTPA participants will continue to include individuals with a range of educational and work histories. Stigma may also be reduced if job training programs serving the most disadvantaged individuals are not isolated from programs serving more job-ready individuals.

Current funding levels are probably not adequate to continue to provide OJT and JSA for job-ready individuals while providing initially less employable individuals with the remedial education and basic skills training they need before receiving job placement services. One strategy would be to phase in increased spending for remedial education and basic skills training while holding OJT and JSA training at their present levels.

Disadvantaged Workers

Training programs for disadvantaged workers are funded under titles II and IV of the JTPA (table 22). After several decades of intensive study, broad agreement seems to have been achieved concerning the effectiveness of job training programs for disadvantaged workers (*3*, *5*, *47*). Although dramatic improvements in life prospects are rare, several types of programs generate positive net benefits with a large share of the benefits accruing to society at large through increased taxes paid and reduced welfare dependency and crime. This positive assessment is, however, subject to qualification. Individuals with serious labor market problems generally require the more intensive, and more expensive, programs of the sort that JTPA has deemphasized.[71]

Special Rural Concerns

Whether rural areas are adequately served by job training programs for disadvantaged workers is unclear. Most JTPA title II funds are allocated by a formula that includes three equally weighted measures, two indexes of unemployment share and one measure of poverty share. Because rural areas

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[70] Stipends are expensive, however, diverting resources from other services, including training. The widespread use of trainee stipends by CETA programs may also have attracted unmotivated participants, who enrolled for the income rather than for training or job placement.

[71] These findings emerged from the intensive evaluation of CETA programs in the 1970's and early 1980's. JTPA Title II programs have not been subject to comparable evaluation. Thus, how accurately these earlier findings reflect current returns to JTPA programs is not known.

Table 22--Job Training Partnership Act outlays, program year 1987[1]

JTPA Program	Outlays
	Million dollars
Title II-A disadvantaged adult and youth programs	1,900
Title II-B summer disadvantaged youth programs	802
Title III dislocated worker programs	172
Title IV Federally administered programs:	
Job Corps	679
Native American programs	61
Migrant and seasonal farmworker programs	56
Veterans' programs	11

[1] The 1987 program year ran from July 1, 1987 to June 30, 1988.
Source: (*4*).

have had relatively high unemployment and poverty rates, they have been relatively well served by these criteria. In relation to their disadvantaged populations, the more rural SDA's have received more title II-A funds and served more individuals (table 23). For example, totally metro SDA's served 1.9 percent of their disadvantaged population in program year 1987 compared with 2.4 percent in totally nonmetro SDA's.[72]

Several qualifications are worth noting. First, many rural areas are in SDA's that also contain metro areas that may dominate PIC policy setting. Second, operating costs may be higher in nonmetro areas due to higher transportation costs, diseconomies of scale, or an unusually disadvantaged case load.[73] Finally, even the higher nonmetro participation rate seems quite low.

[72] Allocation formulas based on local unemployment rates often disadvantage rural areas (*29, 34, 40*). Unemployment rates from the Current Population Survey understate both actual unemployment and total underemployment to a greater degree in rural than in urban labor markets. Unusually high rural unemployment rates in the early and mid-1980's and the use of thresholds in the JTPA allocation formula (the extent to which unemployment exceeded 6 percent) appear to have offset the usual bias (*35, 38*). The recent decline in nonmetro unemployment rates may, however, result in sharp reductions in the rural share of JTPA funding.

[73] Data on title II-A participants and outcomes for program year 1987 are, however, rather ambiguous in this respect (table 24). Nonmetro SDA's assist a greater proportion of high school dropouts and American Indians, but relatively fewer blacks, Hispanics, and single heads of households. Furthermore, nonmetro programs have had somewhat better success at placing clients and do not report unusually high costs.

Table 23--Geographic distribution of JTPA Title II-A expenditures, program year 1987[1]

	U.S. total	Service delivery area type[2]			
		Metro	Metro dominant	Nonmetro dominant	Non-metro
			Dollars		
Expenditures per labor force member	15	11	15	18	21
Expenditures per disadvantaged person[3]	41	37	43	42	45
			Percent		
Terminees as share of total labor force	.8	.6	.8	1.0	1.1
Terminees as share of disadvantaged persons[3]	2.2	1.9	2.3	2.4	2.4
Share of total terminees	100.0	47.3	22.8	17.1	12.8

[1] The 1987 program year ran from July 1, 1987 to June 30, 1988.

[2] Service delivery area types defined as: metro denotes totally metro; metro dominant denotes mixed, but more that 50 percent metro; nonmetro dominant denotes mixed, but more that 50 percent nonmetro; nonmetro denotes totally nonmetro.

[3] As defined by the JTPA authorizing legislation, the "economically disadvantaged" include six categories of persons defined by receipt of welfare payments, low family income, homelessness, and certain foster child and handicapped individuals. Because eligibility is limited to this group, the data displayed in row 4 can be interpreted as annual participation rates.

Source: (*38*).

The migrant and seasonal farmworker and American Indian programs have a strong rural orientation. The Job Corps also operates numerous centers in rural areas, 30 of which are civilian conservation centers, operated by the U.S. Department of Agriculture and the U.S. Department of the Interior on public lands. These three programs are also noteworthy for continuing to enroll severely disadvantaged clients. Indeed, the operation of these programs has been much less affected by the transition from CETA to JTPA than have title II-A programs. For example, the Job Corps continues to provide lengthy and expensive remedial education and vocational training courses and continues to pay trainee stipends. The 15-percent limit on trainee support has, however, been applied to the farmworker programs despite the income support, transportation, and health care needs of many migrant and seasonal farmworkers.

Table 24--JTPA title II-A program participants and outcomes by location for adult program terminees, program year 1987[1]

Item	Mean for total U.S.	Service delivery area type[2]			
		Metro	Metro dominant	Non-metro dominant	Non-metro
Program terminee characteristic:	*Percent*	*Relative share*[3]			
Male	44.0	0.99	1.02	0.99	1.00
High school dropout	25.1	.96	1.00	1.08	1.04
Black	23.1	1.38	.95	.78	.43
Hispanic	8.5	1.26	.90	.43	.95
American Indian	2.1	.39	.49	1.12	2.63
Single household head	31.3	1.08	.99	.92	.90
Program outcomes:			*Weeks*		
Stay in program	19	17	21	20	21
Share placed			*Percent*		
in employment	73.4	72.8	73.9	73.7	74.0
Program cost--			*Dollars*		
Per placement	2,944	3,124	2,767	2,672	2,947
Per week	131	158	111	110	111
Wage at placement--					
Hourly wage	5.32	5.64	5.14	4.96	5.08
			Percent		
Relative wage[4]	61.0	58.4	60.6	63.1	66.1

[1] The 1987 program year ran from July 1, 1987 to June 30, 1988.

[2] Service delivery area types defined as metro: totally metro; metro dominant denotes mixed, but more that 50 percent metro; nonmetro dominant denotes mixed, but more that 50 percent nonmetro; nonmetro denotes totally nonmetro.

[3] Relative share is the ratio of the percentage share of a terminee group for a service delivery area type (for example, the percentage of men for metro SDA's) to the corresponding percentage share for all service delivery areas. Thus, a value above 1.00 indicates a greater than average concentration on serving this terminee group.

[4] Average hourly wage of terminees when placed as a percentage of the average hourly wage for all workers in the area labor market.

Source: (*38*).

Displaced Workers

In the early 1980's, increased foreign competition and a severe recession displaced large numbers of experienced industrial workers who had little prospect of finding similar jobs. Federal job training programs for the long-term disadvantaged did not offer displaced workers with stable work histories adequate retraining or job placement services. Title III of the 1982

JTPA, which authorized adjustment assistance for "dislocated" workers, was intended to fill this gap.

Most displaced workers are--in terms of their skills and attitudes--job ready, but are often demoralized by their unemployment and unsure of how to search for new employment. Thus, job search assistance (JSA) has proven highly cost-effective for displaced workers (*27*). JSA is also quite inexpensive and can be provided on short notice. Evaluation results for classroom training (CT) and on-the-job training (OJT) have, however, been disappointing. Participants receiving only JSA benefited about as much as those also receiving CT or OJT. Because the additional costs associated with training are high, training probably should be the exception rather than the rule.

Several State displaced worker programs have developed training strategies which, although not carefully evaluated, appear to be effective (*26*). An important characteristic of these programs is the emphasis on avoiding layoffs. For example, "at-risk" workers are retrained for reassignment with their current employers. A second characteristic is the emphasis on developing credibility with employers as suppliers of either trained workers or training assistance for their current workforce.

Although displaced worker programs probably should emphasize JSA, excessive concern to maximize placements or placements per dollar has led some programs to screen out high school dropouts, as well as, older and otherwise less job-ready applicants (*28, 62, 63*). Because about 20 percent of all displaced workers are dropouts, displaced worker programs probably should include a sizable remedial education component. Just 6 percent of all title III enrollees, however, received any remedial education in 1985, and the median duration of these programs was just 2 weeks. The Economic Dislocation and Worker Adjustment Assistance Act (EDWAA) of 1988 directed title III programs to devote increased resources to training activities rather than JSA. Thus, adjustment assistance may have recently increased for displaced workers with more severe barriers to reemployment.

Special Rural Concerns

Nonmetro workers are somewhat more likely to be displaced than are urban workers (*50*). Nonmetro workers represented 21.5 percent of the national workforce in 1985, but 24.9 percent of all displaced workers during 1983-86 (table 25). Rural workers also have greater difficulties in becoming reemployed. Median time without work following displacement is 24 weeks for nonmetro workers compared with 20 weeks for metro workers. Once reemployed, nonmetro workers also have greater earnings losses.

Table 25--Worker displacement by location, 1981-86[1]

Item	Total	Metro	Nonmetro
Incidence of displacement, 1983-86:		*Thousands*	
Total displaced	6,556	4,923	1,633
		Percent	
National share	100.0	75.1	24.9
Share of employment, 1985	100.0	78.9	21.1
Adjustment costs per worker, 1981-86:			
		Weeks	
Time jobless--			
Median	20	20	24
		Percent	
Probability of greater than 26 weeks	40.0	39.8	43.5
Earnings loss[2]--			
Median loss	7.0	6.6	10.4
Probability of greater than 25 percent loss	31.9	30.4	36.1

[1] Workers permanently displaced from full-time jobs.
[2] Reduction in usual weekly earnings for reemployed workers.
Source: (*50*).

The costs of providing effective training and placement services are probably higher in rural areas for two reasons. First, the same services are more expensive because many rural communities are too small for local training programs to achieve economies of scale available to urban programs. Second, the rural displaced as a group are more likely to need relatively expensive retraining and relocation assistance. Most urban labor markets offer a wide range of employment opportunities, but job opportunities in rural areas tend to be both more scarce and less diverse. Thus, relatively inexpensive JSA programs may be better able to match urban workers to jobs that use their current skills. In addition, the rural displaced are less

educated than their urban counterparts, and hence, are more likely to require remedial education.

The share of JTPA displaced worker funds allocated to rural areas is unknown. By law, 75 percent of title III funds are distributed across States by a formula incorporating three measures of the relative severity of unemployment. Thus, the relatively high unemployment rates in rural areas should have tended to shift funds toward more rural States. However, States have had almost total discretion concerning the geographic distribution of their title III funds.[74] Because reporting requirements for title III do not require any geographic breakdown within States, the rural-urban mix of services within States is unknown.

The remaining 25 percent of JTPA title III displaced worker funds are distributed at the discretion of the Secretary of Labor, usually on a project-by-project basis. Some of these projects meet important rural needs. For example, at least 20 States have operated special programs for displaced farmers supported by these discretionary funds. Again, a comprehensive measure of the overall priority assigned to rural concerns is not available.

Rural areas are probably disadvantaged by the tendency of displaced worker programs to deemphasize remedial education and intensive training in favor of JSA (table 21). A related concern is that the tendency to "cream" as well as to give top priority to mass layoffs may impart an urban bias to the project selection and enrollment processes. Similarly, the Worker Adjustment and Retraining Notification Act of 1988 requires 60 days advance notice of permanent layoffs if sufficiently large numbers of workers are involved. Because rural employers tend to be smaller than urban employers, their workers are probably less likely to be protected by this requirement.[75]

Finally, close coordination between displaced worker programs and economic development policies may be especially important in rural labor markets. Local employment opportunities are often limited in rural areas experiencing layoffs. Relocation assistance will sometimes be the appropriate response to surplus labor market conditions. Job preservation or creation strategies, however, are often a preferable alternative. Thus,

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[74] In 1986, 40 States either allocated all funds on a project basis or ran a statewide program through their employment service or community colleges (*28*). However, EDWAA amended title III to require States, beginning July 1989, to pass at least 60 percent of their funds to substate SDA's.

[75] Advance notice is required for: (1) total shutdowns affecting 50 or more workers, (2) partial reductions in force affecting one-third of an establishment's workforce and 50 or more workers, or (3) partial reductions in force affecting 500 or more workers. Firms employing fewer than 100 full-time workers are exempted from these requirements.

worker displacement is a symptom of the general need for economic diversification and worker skill upgrading in rural areas.

Conclusions

The personal and national returns to education and training reform appear high, especially if U.S. firms adopt competitive strategies centered on job enrichment. Thus, residents in rural areas should have access to education and job training that qualifies them for the range of good jobs that may be created by national economic trends. Although an overall blueprint for reform can not be confidently specified, a number of promising policy initiatives have been identified.

Organizational and fiscal needs of rural areas must be recognized. Rural governments often lack the resources to fund school reform and worker skill upgrading. Increased Federal and State aid may thus be required for rural schools and job training programs. Rural employers also often lack the ability to initiate skill-upgrading strategies. Thus, vocational education and job training programs should work closely with local businesses.

If education and training policy is to do more than improve the employment opportunities of outmigrants, it may need to be part of a comprehensive rural development strategy. Rural areas differ greatly, and new economy trends in technology and trade are likely to affect some local economies more quickly or more extensively than others. If the skill-upgrading challenge is met, however, the rise of the new economy could provide growth opportunities for many rural areas.

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