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Kentucky Annual Economic Report 1997

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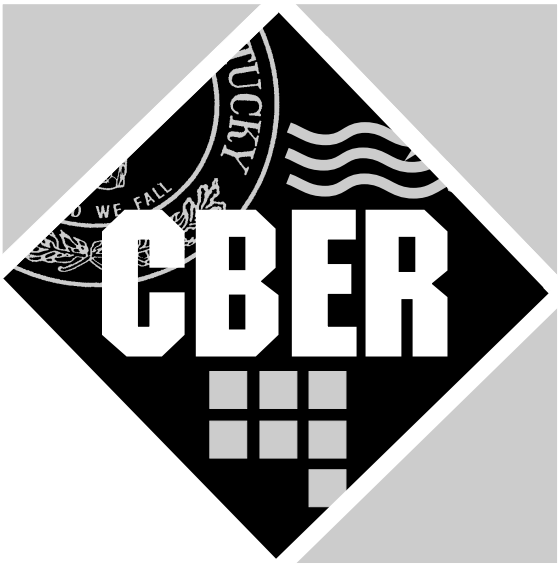

Center for Business and Economic Research
University of Kentucky

UNIVERSITY OF KENTUCKY
CAROL MARTIN GATTON
COLLEGE of BUSINESS and ECONOMICS

Kentucky Annual Economic Report

1997

Center for Business and Economic Research

Department of Economics

Carol Martin Gatton College of Business and Economics

University of Kentucky

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COLLEGE of BUSINESS and ECONOMICS

From the Director. . .

The Center for Business and Economic Research (CBER) is proud to publish the 25th *Kentucky Annual Economic Report*. The Annual Report is one of the important ways in which the Center fulfills its mission to monitor and analyze the Kentucky economy. The 1997 Report contains seven articles that provide economic forecasts and address many of the major economic policy issues facing Kentuckians today.

Again this year we draw mainly upon the expertise of the faculty at the University of Kentucky. All but one article is either authored or coauthored by University of Kentucky economists. We are also pleased to publish an article from the Kentucky Office of Financial Management and Economic Analysis detailing the state budget forecasts. This Annual Report is edited by Steve Allen, who was recently hired as a full-time research associate at the Center.

The first article details the structure of Kentucky's average per capita income compared to the U.S. average. I show that while Kentucky's level falls below the national average, the gap has been narrowing over time. I also detail several ways in which Kentucky might raise its per capita income. Foremost among these is to increase the education level of Kentucky's workforce.

The second article contains employment, income, and population forecasts based upon the University of Kentucky State Econometric Model. This model was constructed and is maintained by Dr. Eric C. Thompson, who was recently named Associate Director of the Center. In this article, Dr. Thompson provides quarterly forecasts for the next three years. He forecasts that gross state product will grow 2.4 percent in 1997 and forecasts that total employment will grow 1.8 percent.

Manoj Shanker, an economist in the Commonwealth of Kentucky Office of Financial Management and Economic Analysis, discusses the forecasting of Kentucky state government revenues. In outlining the forecasting process, he details the various components of the state General Fund and notes the small error between the estimated and actual revenues.

In the fourth article, Dr. J. Robert Gillette provides an overview of the U.S. economy's performance in 1996 and outlines its prospects for 1997. He notes that gross domestic product should average just above two percent growth, while inflation and unemployment continue to remain low.

Dr. William H. Hoyt and Kathleen Toma, a graduate student in economics at the University of Kentucky, discuss the coming difficulties of welfare reform in Kentucky. They point out that with the passage of the federal welfare reform act, Kentucky will assume greater responsibility in administering welfare programs, receiving block grants instead of entitlements and facing new and potentially costly work requirements for recipients.

In the sixth article, Dr. Dan A. Black and Amitabh Chandra, also a graduate student in economics, discuss the often controversial case for tuition increases at public universities in Kentucky. They indicate that increases would give public universities more of a competitive stance when recruiting students and faculty.

Finally, Dr. Michael Webb, chair of the Department of Economics at the University of Kentucky, examines the increasing internationalization of the Kentucky economy. He notes that foreign-affiliated firms provided 61,000 jobs in Kentucky in 1995 and points out that Kentucky direct exports now account for seven percent of state income.

Over the past year we have continued to build our research program at the Center. In 1996, we began an affiliation with Basil-Blackwell Publishers for marketing, production, and distribution of our scholarly journal, *Growth and Change*. We have recently completed research projects for the Commonwealth of Kentucky Governor's Office for Policy and Management, Kentucky Utilities, Inc., the U.S. Agency for Health Care Policy and Research, the Downtown Somerset (Kentucky) Development Corporation, and the Kentucky Department of Employment Services. Some of our current research includes projects for the Kentucky Transportation Cabinet, the Kentucky Department of Employment Services, and the Kentucky Administrative Office of the Courts. We look forward to a busy and exciting 1997.

Mark C. Berger

Center for Business and Economic Research

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Mark Toma
Weiren Wang

The Center for Business and Economic Research (CBER) is the applied economic research branch of the College of Business and Economics at the University of Kentucky. Its purpose is to disseminate economic information and provide economic and policy analysis to assist decision makers in Kentucky's public and private sectors. In addition, the Center performs research projects for federal, state, and local government agencies, as well as for private-sector clients nationwide. The primary motivation behind CBER's research agenda is the belief that systematic and scientific inquiries into economic phenomena yield knowledge which is indispensable to the formulation of informed public policy.

Recent studies completed by CBER focus on the areas of manpower, labor, and human resources; health economics; public finance; and economic growth and development. In addition to the *Kentucky Annual Economic Report*, CBER will be publishing a quarterly newsletter starting in 1997. It also publishes the *Carol Martin Gatton College of Business and Economics Working Papers*, which report the results of current research by college faculty, and *Growth and Change*, a scholarly, refereed journal of urban and regional policy with international distribution.

Authors

Dr. Mark C. Berger

Director of the Center for Business and Economic Research since 1994, Dr. Mark C. Berger is a Professor of Economics and Ashland Oil Research Fellow at the University of Kentucky. He received a Ph.D. from The Ohio State University in 1981, at which time he joined the faculty of the University of Kentucky. His research interests include on-the-job training, the structure of wages, health insurance reform, welfare reform, and other public policy issues. His papers have appeared in journals such as the *American Economic Review*, the *Journal of Political Economy*, and the *Review of Economics and Statistics*. During spring 1996, he was a visiting professor at the Economics University of Vienna, Austria.

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Dr. Dan A. Black

Dr. Dan A. Black is Professor of Economics and Ashland Oil Research Fellow at the University of Kentucky. He received his Ph.D. from Purdue University in 1983, at which time he joined the University of Kentucky. His research interests include labor economics and public policy. His papers have appeared in academic journals such as the *American Economic Review*, the *Review of Economics and Statistics*, and the *Journal of Labor Economics*. He is co-author with Dr. Mark Berger of a forthcoming book on on-the-job training from the Upjohn Institute and is currently evaluating the impact of college quality on earnings with Dr. Jeff Smith of the University of Western Ontario and Dr. Kermit Daniel of the University of Pennsylvania's Wharton School. During the 1996-97 academic year, Dr. Black is a Visting Professor of Public Policy at the Heinz School of Public Policy at Carnegie Mellon University.

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Amitabh Chandra

Amitabh Chandra is a Research Associate at CBER and a student in the Ph.D. program in economics at the University of Kentucky. His research interests include the economics of higher education, poverty policy, and the history of economic thought.

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Dr. J. Robert Gillette

Dr. J. Robert Gillette is an Associate Professor of Economics at the University of Kentucky. He received his Ph.D. from Texas A&M University in 1986 and joined the faculty of the University of Kentucky in 1994. Before coming to Kentucky, he taught at Texas A&M University and Washington State University, and worked in private consulting. Dr. Gillette has authored or co-authored economic studies for various public agencies, including the Internal Revenue Service and the State of California, and for numerous private organizations.

Authors

Dr. William H. Hoyt

Dr. William H. Hoyt is an Associate Professor of Economics at the University of Kentucky. In the fall of 1994, he rejoined the faculty of the University of Kentucky after two years at Georgetown University. He received his Ph.D. from the University of Wisconsin in 1986 before coming to the University of Kentucky. His areas of interest include tax policy and public finance. His research has been published in the *American Economic Review*, the *Journal of Urban Economics*, and the *Journal of Public Economics*. His study of the Kentucky tax system was the lead article in the 1995 Kentucky Annual Economic Report.

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Manoj Shanker

Manoj Shanker is an economist with the Commonwealth of Kentucky Office of Financial Management and Economic Analysis. He received a bachelor's degree in chemical engineering from the Indian Institute of Technology and a masters degree in economics from Oklahoma State University. He is also a member of the National Association of Business Economists. His principal work is in the development of econometric models.

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Dr. Eric C. Thompson

Dr. Eric C. Thompson is the Associate Director of CBER and an Assistant Professor in the Department of Economics at the University of Kentucky. He received his Ph.D. in agricultural economics from the University of Wisconsin-Madison in 1992. Dr. Thompson was an Assistant Professor at the Center for Economic Research at West Virginia University and in the Community Economic Development Division of the West Virginia University Extension Service before coming to Kentucky in 1995. Dr. Thompson's research fields include local and state economic development, regional economics, and economic forecasting. He has published several research reports and has a paper forthcoming at the *Review of Regional Studies*.

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Kathleen Toma

Kathleen Toma is a student in the Ph.D. program in economics at the University of Kentucky. She received a bachelor's degree in economics and East Asian languages and literatures from Indiana University. Prior to entering the graduate program, she worked in the private sector for five years. Her research interests include international economics and public economics. She is currently conducting research on welfare programs.

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Dr. Michael Webb

Dr. Michael Webb is Chair of the Department of Economics and Professor of Economics at the University of Kentucky. He received his Ph.D. in economics from the University of Illinois in 1980. Dr. Webb has previously served as an Associate Dean of the Carol Martin Gatton College of Business and Economics. His research interests include trade policy and economic development.

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Kentucky's Per Capita Income: Catching Up to the Rest of the Country

Mark C. Berger

A goal among many leaders in Kentucky is to see the state's per capita income equal or exceed the national per capita income average. Although Kentucky has narrowed the income gap recently, its per capita income still stands at only 81 percent of the national average. Matching this national level would require significant changes in Kentucky. The state would need large increases in the number of high school and college graduates in the state, and/or in the percentage of private sector employment per capita. Based on previous rates of increase, it will still be many years before Kentucky's per capita income is equal to the national average.

INTRODUCTION

A frequently used indicator of a state's economic health is per capita income. Historically, Kentucky's per capita income has been below that of the U.S. average, although that gap has narrowed in recent years. In 1995, per capita income in the U.S. stood at $23,208 in 1995 while in Kentucky the level was $18,849.[1] Many believe that an important goal for Kentucky is to narrow the gap between its income and that of the rest of the country. Kentucky Governor Paul Patton, in a recent speech to the Hopkinsville Chamber of Commerce, said that his goal was to see per capita income in Kentucky above the national average.[2] Although this may be a lofty goal, there is cause for optimism given the recent history of income levels in Kentucky. Indeed, while per capita income in Kentucky stood at only 78.3 percent of the national average in 1985, by 1995 it had increased steadily to 81.2 percent of the national average.

In this article, I examine long-term trends in Kentucky's per capita income relative to the national average. In the process, I address several questions: 1) Has the recent increase in Kentucky's per capita income relative to the U.S. average been part of a long-term increase or has it been confined to more recent years? 2) Has Kentucky's experience mirrored that of other states, or has it been unique? 3) What determines differences in per capita income at the state level? 4) Can these determinants explain why Kentucky's per capita income is below the national average? 5) What can explain the increase in Kentucky's per capita income relative to the national average in recent years? 6) How different would Kentucky have to be today to be at the national average of per capita income? 7) How long will it take for Kentucky to reach the national average per capita income?

PER CAPITA INCOME AS A MEASURE OF WELL-BEING OR STANDARD OF LIVING

Per capita income is often used by policymakers and the public as an overall index of well-being or standard of living in an economy. Thus, before proceeding with the analysis, it is important to examine what per capita income measures and to look at its strengths and weaknesses as an indicator of economic well-being.

Personal income data are collected by the U.S. Department of Commerce's Bureau of Economic Analysis as part of the National Income and Product Accounts. These data comprise wage and salary disbursements, other labor income, proprietor's income, rental income of persons, personal dividend income, personal interest income, and transfer payments to persons (e.g., Social Security, Aid to Families with Dependent Children, etc.). The majority of personal income comprises wage and salary disbursements, followed by transfer payments to persons and personal interest income. Table 1 shows the 1995 breakdown of personal income into its components for the U.S. and Kentucky.

Thus, personal income is just the total amount of income earned or disbursed to individuals in the economy in one form or another in a given year. Individuals then use this personal income to purchase goods and services, pay taxes, or place in savings or investments. It is thus a broad-based measure of economic well-being for the

TABLE 1

Personal Income and Its Components, U.S. and Kentucky, 1995

	Kentucky[1]		U.S.[2]	
	Amount	Percent	Amount	Percent
Wage and salary disbursements	40,644,369	86%	3,423,330	85%
Other labor income	5,476,497	12	423,799	11
Farm proprietors' income	5,282,519	11	19,529	0
Nonfarm proprietors' income	623,446	1	449,257	11
Less: contributions for social insurance	-3,650,670	-8	-294,013	-7
Less: adjustment for residence	-250,831	-1	-873	-0.02
Net earnings by place of residence	47,501,884	65	4,021,029	66
Dividends, interest, rent	10,879,281	15	1,054,107	17
Transfer payments	14,380,955	20	1,022,841	17
Total personal income	72,762,120	100	6,097,977	100
Population (000s)	3,860		262,755	
Per capita income (dollars)	$18,849		$23,208	

[1] In thousands of dollars unless otherwise noted.
[2] In millions of dollars unless otherwise noted.
Source: U.S. Department of Commerce, Bureau of Economic Analysis, unpublished data.

economy. *Per capita* personal income is simply the total personal income divided by the total population, which gives a per person measure of the income earned or disbursed to individuals in the economy. As a result, per capita income adjusts for population differences over time or across states.

The chief limitation of personal income as a measure of well-being is that it does not measure activities or things that people value that are not traded in the marketplace. For example, environmental quality or other amenities are not reflected in personal income, nor is the value of leisure time or the value of services provided inside the household. Nevertheless, personal income covers a broad base of economic measures better than any other indicator. For instance, another indicator such as the unemployment rate only gives the percentage of persons without work, not the well-being of those with work. Similarly, the employment rate tells the percentage of persons that are working but not the earnings of those workers. On the other hand, average wages would provide the earnings of workers but not the income non-workers have at their disposal. Consequently, personal income is the best measure of economic well-being that is readily available.

Per Capita Income in Kentucky Relative to the U.S.

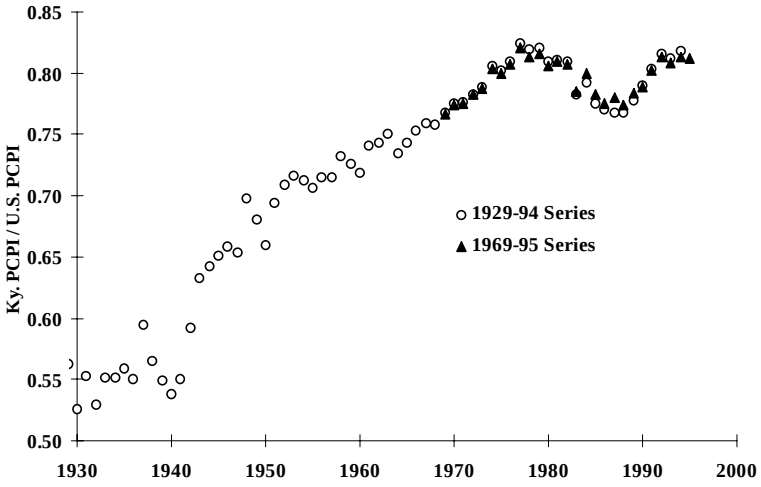
Figure 1 shows the ratio of per capita income in Kentucky to the U.S. average from 1929 to 1995, the entire time period for which per capita income data are available from the National Income and Product Accounts. Two series are shown in Figure 1: the first spans the period from 1929–94, and the second shows the new series recently published by the Bureau of Economic Analysis that covers the period from 1969–95 but is not comparable to the earlier series.[3]

Figure 1 tells an interesting story. Per capita income in Kentucky relative to the U.S. average rose steadily until about 1979 or 1980, exhibiting the long-run convergence familiar to regional and growth economists. For instance, Barro and Sala-i-Martin argue that marginal returns to capital may be higher in states with low income *levels*, and thus growth may be higher, promoting convergence.[4] Convergence may also occur if there is mobility of businesses and workers across states. Businesses will tend to migrate where land and labor costs are lower, expanding economic activity and raising per capita income. In contrast, workers will tend to migrate where wages are higher, increasing the supply of workers in certain areas and exerting downward pressure on income. The net effect of such mobility would be an equalizing of incomes across states and higher rates of growth in per capita income observed in low income states.[5]

In the long run, with such mobility of businesses and workers, incomes would be completely equalized across states except for differences reflecting location-specific factors. Blomquist, Berger, and Hoehn examine such differences due to location-specific amenities such as climate, air and water quality, and other natural conditions.[6] For example, if people find Kentucky to be a pleasant place to live because of its climate or natural features such as rivers or mountains, then per capita incomes may remain below the national average; in other words, Kentucky residents are willing to accept a lower income to live in a desirable location. Per capita incomes in undesirable locations would lie above the national average to compensate individuals for living in unpleasant conditions. Nonetheless, excepting location-

FIGURE 1

Kentucky Personal Per Capita Income (PCPI) Relative to U.S. Average, 1929–95



Source: U.S. Department of Commerce, Bureau of Economic Analysis, unpublished data.

specific amenities, both growth theories and regional models of economic behavior predict an eventual convergence of per capita income for Kentucky and the U.S.

Contrary to the long-run pattern of convergence, however, Kentucky's relative per capita income fell rather sharply in the early and middle 1980s. This fact suggests that the recession and economic restructuring of that period affected income in Kentucky more than in the rest of the country.[7] Since about 1985, though, Kentucky's per capita income has been rising relative to the national average, so that the state's relative income now stands approximately at its 1979–80 level. Viewed in this light, the recent increase in Kentucky's income has represented a catching up to a level relative to the national average that had been reached previously.

What will the future hold and how quickly can we expect Kentucky's per capita income to converge to the national average? We can get some clues about the process of convergence by looking at the experiences of other states. I turn to this analysis in the next section.

Kentucky's Experience Compared to Other States

Has this convergence to the national per capita income average been unique to Kentucky, or has it occurred in other states? Table 2 shows that convergence has been proceeding on a nationwide basis regardless if considering the entire period of available data (1929–94) or the last 10 years. This table shows the average change in the ratio of state to U.S. per capita income, both for those states that began each time period above the national average and those that began below the national average. As would be expected from convergence, the average change for those states above the average is negative and positive for those below the average. States like Kentucky that are below the national average are catching up over time and those above the national average are falling toward it. Figure 2 focuses on the experience of Kentucky and surrounding states over the last 10 years. It shows that the pattern of convergence to the national average has also occurred in states neighboring Kentucky.

As Kentucky's relative income has risen, has its per capita income ranking among the states changed? Figure 2 shows that there has been no change in rankings over the last 10 years among surrounding states. Table 3 shows the top 10 and bottom 10 states in per capita income rankings in 1985 and 1995, expressed in terms of income relative to the U.S. average. Table 3 shows that even though convergence to the national average has been occurring, the state rankings change slowly. Kentucky was ranked 44th in per capita income in 1985, and after 10 years of convergence, it had only moved up to 43rd by 1995.

What Determines a State's Per Capita Income?

On the most basic level, factors that affect per capita income are those which raise or lower the amount of income a person receives in a state. One such set include factors which raise

TABLE 2

Convergence of States' Per Capita Income to U.S. Average, 1929–94 and 1985–95

	Time Period	Number of States	Average Change in Relative Income
States above U.S. average, 1929	1929–94	14	-0.1780
States below U.S. average, 1929	1929–94	34	0.1825
States above U.S. average, 1985	1985–95	17	0.0004
States below U.S. average, 1985	1985–95	33	0.0092

Source: U.S. Department of Commerce, Bureau of Economic Analysis, unpublished data.

FIGURE 2

Per Capita Personal Income (PCPI) in Kentucky and Surrounding States Relative to U.S. Average, 1985–95

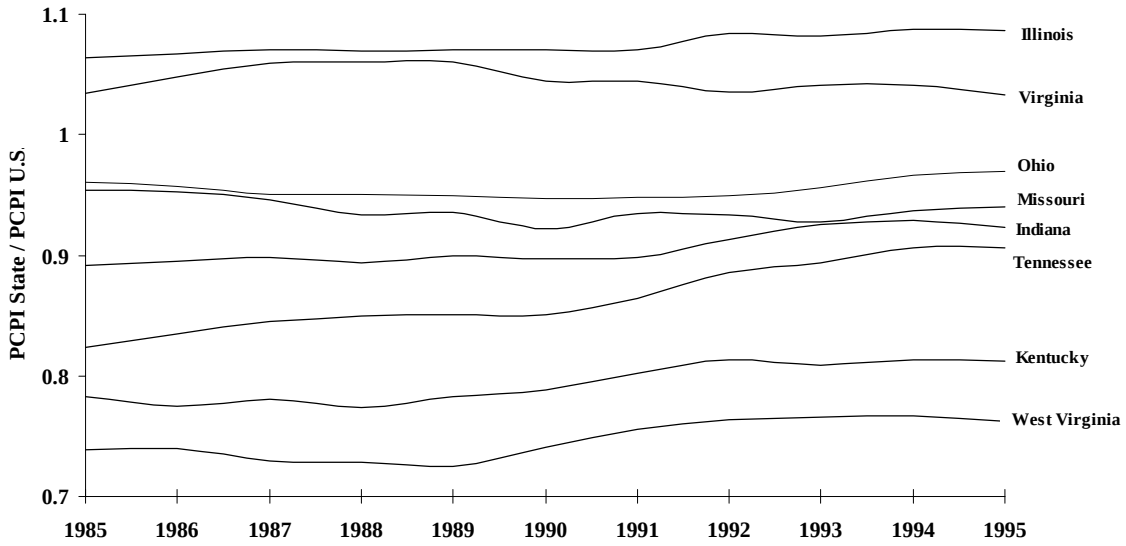


TABLE 3

Top 10 and Bottom 10 States Ranked by Personal Per Capita Income (PCI) Relative to U.S. Average, 1985 and 1995

	1985		1995	
	State	**Relative PCI**	**State**	**Relative PCI**
1	Alaska	1.31	Connecticut	1.37
2	Connecticut	1.28	New Jersey	1.29
3	New Jersey	1.24	Massachusetts	1.21
4	Massachusetts	1.17	New York	1.19
5	New York	1.15	Maryland	1.13
6	California	1.15	Delaware	1.13
7	Maryland	1.14	New Hampshire	1.10
8	New Hampshire	1.10	Illinois	1.09
9	Delaware	1.07	Hawaii	1.06
10	Illinois	1.06	Nevada	1.05
41	South Dakota	0.80	Idaho	0.81
42	Montana	0.79	Kentucky	0.81
43	Idaho	0.79	North Dakota	0.80
44	Kentucky	0.78	Oklahoma	0.80
45	South Carolina	0.78	Montana	0.79
46	Alabama	0.77	Utah	0.79
47	Utah	0.76	New Mexico	0.78
48	Arkansas	0.76	Arkansas	0.78
49	West Virginia	0.74	West Virginia	0.76
50	Mississippi	0.66	Mississippi	0.72

Source: U.S. Department of Commerce, Bureau of Economic Analysis, unpublished data

or lower the productivity of the labor force. Most obvious among these is the level of education. Workers in states with higher levels of education among their residents will earn more in the labor market and thus increase those states' per capita income. Not only productivity, but employment of workers in general will be a very important factor affecting per capita income across states. States with a higher percentage of their population working will have more people earning wages and salaries and thus are likely to have a higher per capita income. In addition, whether the state is primarily urban or rural will have an impact on the model. Rural states will have a disproportionate number of individuals working in agriculture, where wages and incomes will tend to be lower. Thus, the very nature of the jobs in rural states will tend to hold down per capita incomes.

I have constructed an econometric model of per capita income that explains variation in income across states in 1995. After experimenting with several different combinations of variables which account for the factors discussed in the previous paragraph, I have specified five variables that do a good job in explaining differences in per capita income across states.[8] Table 4 shows these variables and the results of the estimated econometric model. This table also shows the average values of the variables across all the states and the Kentucky values of the variables which will help explain why Kentucky's income is below the national average.

From these econometric estimates, the following conclusions can be drawn about the determinants of per capita income across states: States with higher education

TABLE 4

Econometric Estimates Explaining Per Capita Income by State, 1995 [a]

Variable	Estimated effect [b]	Kentucky value	Average of states
% of population over 25 & high school graduate	0.0096 *	31.7	30.9
% of population over 25 & college graduate	0.0208 *	13.6	20.0
Private sector employment per capita	0.7679 *	0.4361	0.4860
Public sector employment per capita	-0.4528	0.0832	0.0965
% of population living in rural areas	-0.0039 *	48.1	31.1
Intercept	9.083 *	—	—
Log of per capita personal income	—	9.844	10.00

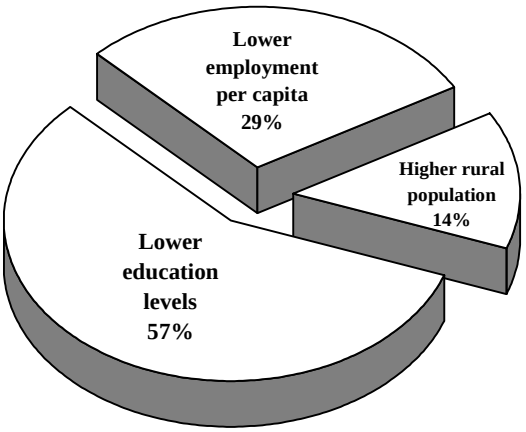
[a] The dependent variable is the natural log of per capita personal income. Fifty-one observations (including the District of Columbia) were used in the analysis. The R^2 for the estimated model is 0.7615.

[b] A * denotes statistical significance at the 5 percent level in a two-tailed test.

Source: U.S. Department of Commerce, Bureau of Economic Analysis, unpublished data.

FIGURE 3

Explaining the Difference Between Kentucky and U.S. Per Capita Income, 1995



Source: Calculated from results shown in Table 4.

levels, as measured by the percentages of the population over age 25 that are high school and college graduates, have higher per capita incomes. States with higher private sector employment per capita also have higher income per capita. Interestingly, states with higher government employment per capita, holding other variables constant, have lower per capita income. This finding suggests that improvements in per capita income are more likely to be obtained if job growth comes from the private rather than the public sector. Finally, as expected, states with higher rural populations have lower per capita incomes.

The results of the econometric model can be used to explain why Kentucky's per capita income level is below that of the average across all states. This is done by calculating the differences in the predicted per capita incomes arising from differences in education levels, employment per capita, and the percentage of population that is rural between Kentucky and the U.S. Figure 3 shows this calculation. We see that 57 percent of the difference between Kentucky's predicted per capita income and the predicted average of the states' per capita incomes is due to education differences — primarily Kentucky's low percentage of college graduates among the population age 25 and over. That Kentucky is a much more rural state than average accounts for 29 percent of the difference, and the remaining 14 percent comes from the fact that Kentucky's employment per capita is lower than the average of the rest of the states.

Why is Kentucky's Per Capita Income Below the National Average?

Thus, the lion's share of the difference arises from the lower education levels in Kentucky compared to the average of other states. If education levels were higher, Kentucky's per capita income would be closer to the national average. In fact, the model suggests that if Kentucky's education levels were equal to the national average, 57 percent of the gap between Kentucky's per capita income and the national average per capita income could be closed.

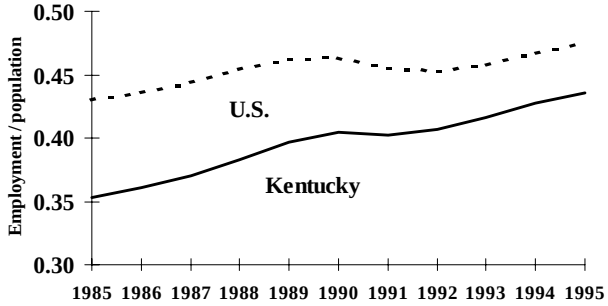
Kentucky's Per Capita Income from 1985 to 1995

In considering why Kentucky's per capita income has risen relative to the rest of the country from 1985 to 1995, we need to look for trends in Kentucky that are different from the rest of the country. Education levels have been improving over time both in Kentucky and in the rest of the country, so education cannot explain the rising per capita income in Kentucky. Similarly, there has been a small decline in the percentage of the population living in rural areas in both Kentucky and the rest of the country. That leaves employment/population changes.

While the recession of the early 1980s was

FIGURE 4

Private Sector Employment Per Capita in Kentucky and U.S., 1985–95



Source: U.U.S. Department of Commerce, Bureau of Economic Analysis, unpublished data.

particularly hard on Kentucky, the opposite was true for the recession of the early 1990s. Kentucky barely felt that recession, and since then, job growth has been stronger in Kentucky than in many other places. At the same time, population growth in Kentucky has not been as strong as in the rest of the country. These two factors combined imply that employment per capita has been rising faster in Kentucky than in the rest of the country. Figure 4 shows the changes in private employment per capita in Kentucky and for the U.S. From this figure it is apparent that private employment per capita has been increasing faster in Kentucky than in the rest of the country, and this difference may be partially responsible for the relative gain in Kentucky per capita income from 1985–95. This employment growth has in part contributed to the resumption in the convergence of Kentucky's per capita income to the U.S. average so that it is now back to the level it was before the recession of the late 1970s and early 1980s.

MAKING THEM EQUAL

We can use the results of our econometric model to construct scenarios under which Kentucky's per capita income would be equal to the U.S. per capita income. We must ask how different Kentucky's characteristics must be for the state's per capita income to be equal or greater than the U.S. average. In Table 5, I consider three different scenarios that might accomplish this goal. The first scenario increases Kentucky's education levels until the predicted per capita income from the model matches the national average. Under this scenario, Kentucky would have the same number of jobs, but its workers would be more educated and hence more productive, all of which would raise incomes. The second scenario increases private sector employment per capita, increasing the number of jobs while holding education levels constant. More jobs might exist because there are more employers in the state, or labor force participation rates, which are lower in Kentucky than in most other states, might rise. In the third scenario both education levels and private sector employment per capita are raised. All three scenarios hold constant the percentage of the population living in rural areas and the number of government jobs per capita.

. . . to have a per capita income level equal to the national average at present, Kentucky would need a far different economy and a much more educated workforce.

Scenario 1 means Kentucky would have a 50 percent higher percentage of the population age 25 and over with a bachelor's degree or higher and a 20 percent higher percentage of high school graduates. Kentucky would then lie almost exactly at the average of the other states for the percentage of college graduates (20.4 percent vs. 20.3 percent) and well above the average of the other states for the percentage of the population that are high school graduates that did not attend college (38.0 percent vs. 30.9 percent). In fact, such a 20 percent increase in the percentage of the population that are high school graduates only would place Kentucky ahead of all other states, including Pennsylvania, where 38.7 percent of the population age 25 and over are high school graduates.

TABLE 5

Changes in Kentucky's Education Levels and Employment Required for Per Capital Personal Income to be Equal to or Greater than U.S. Average, 1995

Characteristic	Scenario 1	Scenario 2	Scenario 3
% of population 25 and over & high school graduate	+ 20%	—	+ 10%
% of population 25 and over & college graduate	+ 50%	—	+ 25%
Private sector employment per capita	—	+ 60%	+ 30%

Source: Calculated from results shown in Table 4.

Scenario 2 would correspond to a 60 percent increase in the number of private sector jobs per capita. This would put Kentucky far above the average of the other states. In fact, only the District of Columbia would have a higher number of private sector jobs per capita and many of its jobs are held by commuters who do not live in the District.

Scenario 3 corresponds to increases in education levels and private sector employment per capita that are half the sizes of those in Scenarios 1 and 2. Such a combination of characteristics would give Kentucky a percentage of high school graduates similar to Nebraska and Vermont, a percentage of college graduates the same as Wisconsin and Idaho, and a private sector employment per capita similar to Nevada and Colorado. In general, the scenarios show that, to have a per capita income level equal to the national average at present, Kentucky would need a far different economy and a much more educated workforce.

How Long Will it Take?

Following the scenarios presented above, Kentucky would require a long time to catch up to the average U.S. per capita income. It might take a generation to raise education levels as much as needed, and, if education levels were rising at the same rate in the rest of the country as well, per capita income in Kentucky would not rise at all relative to the national average. On the other hand, the process of regional convergence, where capital and labor flow to areas with the highest return, should naturally raise per capita income in Kentucky relative to the rest of the country, as it has done in the past.

How soon should we reasonably expect this convergence? Looking at the long-term trends in Kentucky's per capita income relative to the U.S. average, we can see that it took over 30 years to increase Kentucky's relative per capita income from approximately 60 percent to 80 percent of the national average. To obtain more precise estimates of the rate of convergence, I have estimated regression models of Kentucky's relative per capita income over various time periods and reported the results in Table 6. As can be seen the estimates range from a predicted increase of 0.0045 per year (0.45 percent) over the entire 1929–94 time period of the old series to 0.0060 (0.60 percent) per year estimated from 1929–79. These estimates can be used to predict how long it will take Kentucky to move from its current level of 81.2 percent of U.S. per capita income to 100 percent of the U.S. level. Using the highest estimated rate of convergence (0.60 percent), Kentucky will catch up to the national average in 31 years and will reach 90 percent of the national average in 15 years.

Using any of the three estimates, it is clear that the convergence of Kentucky's per capita income to the national average is a long-run process and difficult to accomplish overnight. Even if Kentucky were to increase the highest estimated long-run rate of convergence by 50 percent, it would still take 21 years for the state to reach the national average level of per capita income.

Conclusion

Will Kentucky in fact reach this national average? Probably, given the progression toward convergence that has been and is still occurring in the U.S. Of course, if Kentucky is a desirable place to live and work, it may never completely reach the national average because residents will accept lower incomes to live here. Based on past trends of convergence, it will take many years for Kentucky's per capita income to reach the national average. The process could be accelerated, but it would be difficult. It would require that education levels or jobs grow faster than the national average, which may be difficult for Kentucky to sustain.

TABLE 6

Estimated Rates of Convergence and Number of Years until Kentucky Per Capita Income Equals U.S. Average Per Capita Income

Time period of estimation	Estimated annual convergence rate	Number of years until equality reached	Number of years until 90% of U.S. average reached
1929–94	0.45%	42	20
1929–79	0.60%	31	15
1986–95	0.51%	37	17

Source: Calculated using U.S. Department of Commerce, Bureau of Economic Analysis unpublished data.

FOOTNOTES

[1] U.S. Department of Commerce, Bureau of Economic Analysis, "Total Personal Income and Earnings by Industry (SA05) 1969-1995," unpublished data files, September 1996.

[2] Governor Paul Patton's speech to the Hopkinsville Chamber of Commerce, July 23, 1996. Source: Office of the Governor Press Office, September 3, 1996.

[3] U.S. Department of Commerce, Bureau of Economic Analysis, "Total and Per Capita Personal Income by State and Region," *Survey of Current Business* 76 (May 1996): 94-101.

[4] Robert J. Barro and Xavier Sala-i-Martin, "Convergence," *Journal of Political Economy* 100 (April 1992): 223-251.

[5] These and other reasons for convergence are discussed in Edward Nissan and George Carter, "Income Inequality Across Regions Over Time," *Growth and Change* 24 (Summer 1993): 303-320, and Rajiv Mallick, "Convergence of State Per Capita Incomes: An Examination of Its Sources," *Growth and Change* 24 (Summer 1993): 321-340.

[6] Glenn C. Blomquist, Mark C. Berger, and John P. Hoehn, "New Estimates of Quality of Life in Urban Areas," *American Economic Review* 78 (March 1988): 89-107.

[7] James S. Fackler, "Economic Overview: National and State Economic Activity," *Kentucky Annual Economic Report*, University of Kentucky Center for Business and Economic Research (1995): 43-48.

[8] I also tried to add other variables to the model, but with the five variables already included, these variables were not statistically significant. Most notable among these were variables measuring the age distribution of the population, such as the percentage of the population under age 18 and the percentage over age 65.

Quarterly Forecasts for the Kentucky Economy, 1997 - 1999

Eric C. Thompson

The Kentucky economy should see moderate growth in 1997. Gross state product is forecast to grow 2.4 percent, and total employment and personal income are expected to grow by 1.8 percent and 2.2 percent, respectively. The services and retail trade should experience the largest growth among all industries, and the manufacturing sector is forecast to be a source of major improvement in the Kentucky economy. The most rapid occupation growth is forecast for service occupations, with marketing and sales occupations also showing strong growth. Professional specialty occupations that require a high level of education are also expected to grow substantially over the next three years. Finally, over the next three years, population in Kentucky is forecast to grow by 0.8 percent annually with the largest increases in older age groups.

INTRODUCTION

This article describes a forecast for the Kentucky economy produced using the University of Kentucky State Econometric Model. The model, developed in 1995, is used to make quarterly forecasts of the state economy three years into the future. The forecasts are updated each quarter and have significant sector and demographic detail. Forecasts are made for many mining, construction, manufacturing, retail, and service industries and government at a detailed level. Forecasts also are presented for occupational groups. Population forecasts are made for five-year age groups for both men and women. Forecast results are presented below for 20 manufacturing industries, two mining industries, three service industries, and three levels of government. Quarterly forecasts are presented below for 1997, and annual forecasts are presented for 1997, 1998, and 1999.

As in the previous year, the Kentucky economy is forecast to experience moderate growth in 1997 through 1999. While the Kentucky economy is forecast to grow faster than the national economy throughout the period, the state is not expected to match the very rapid growth rates which it experienced in the early 1990s.

Growth in the Kentucky economy is also expected to be broad-based. All major industry groups except mining are expected to add employment from 1997 to 1999. Twelve of 20 manufacturing industries are expected to add employment, compared to only 8 of 20 nationally. All nine occupational groups are forecast to add jobs over the next three years.

Faster job growth is forecast to lead to wage and salary income growth of 1.9 percent per year and a total income growth rate of 2.3 percent annually. Growth in wages, salaries, benefits, and proprietors' income is forecast to account for 61.7 percent of all income growth. Growth in transfer income from sources such as Social Security and Medicare is forecast to account for only 27.8 percent of total income growth. Strong employment and income growth is forecast to encourage net migration to Kentucky and yield an expected increase in the state's population of 0.8 percent per year.

THE KENTUCKY FORECAST

The rate of growth in the Kentucky economy is forecast to exceed the national growth rate (see the Appendix for a description of the national forecast). Kentucky's growth is expected to exceed national growth by about one-half of one percent whether the measure is value-added output, employment, or per capita income. Faster growth in Kentucky is forecast because the state is expected to have faster growth in a broad group of manufacturing, construction, and retail industries. This faster growth is occurring even though Kentucky does not have an large concentration of rapidly growing national industries, such as those in computers and semi-conductors.

These faster growth rates forecast for Kentucky can have enormous consequences. To give one example, Kentucky's total employment growth rate is forecast to exceed the national rate by 0.5 percent annually on average. This percentage difference translates into 26,500 new jobs for Kentucky from 1997 to 1999.

Recent Developments

During 1996, the Kentucky economy grew modestly while the national economy boomed. Job growth accelerated in the national economy to 2.9 percent while in Kentucky, 1996 growth dropped slightly from 1995 levels: the growth rate for employment dropped to 1.6 percent, while the growth rates for real value-added output and income both dropped to 2.2 percent. Even these moderate growth rates, however, reflected substantial progress for the Kentucky economy, as in Kentucky's adding roughly 26,000 jobs in 1996. These figures are based on employment data from the first nine months of 1996 and estimated values for the last three months.

The weaker performance in Kentucky in 1996 in part reflected a poor year for manufacturing employment. While the industry grew consistently in the state throughout the early 1990s, manufacturing employment in Kentucky declined by 1.3 percent during 1996. Substantial job loss in the apparel industry was the major reason for the overall decline in manufacturing employment.

The performance of the coal mining industry, however, was more encouraging. Coal mining employment remained steady in Kentucky in 1996. This is the first time in many years that the industry avoided significant job loss.

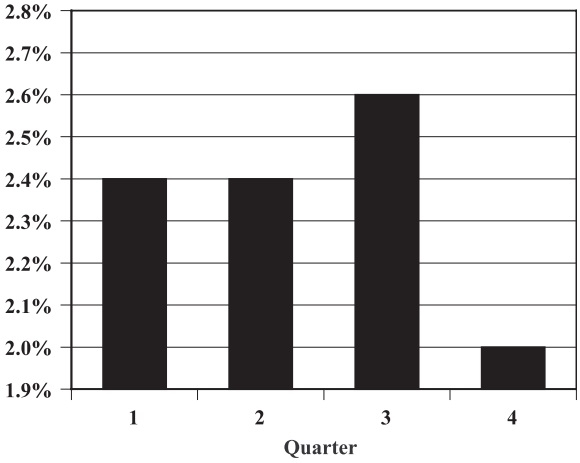
Other major industry groups posted employment gains in 1996 with the service and retail trade sectors accounting for the most job growth. The service industry grew at 3.5 percent and added 14,000 jobs in 1996. Business and health services led the way in service industry growth. The retail trade industry grew at a rapid 2.1 percent growth rate and added 6,600 jobs.

The forecast for 1997 predicts a faster rate of growth for Kentucky than the United States. This is true for a range of measures, from real value-added output, real personal income, total employment, and manufacturing employment.

Most job and income growth also led to modest population growth. Population in Kentucky is estimated to have grown by 0.7 percent in Kentucky during 1996.[1] Reflecting moderate population and income growth, real per capita income in Kentucky grew by 1.6 percent.

FIGURE 1

1997 Kentucky Gross State Product Growth



The Next Year

The forecast for 1997 predicts a faster rate of growth for Kentucky than the United States. This is true for a range of measures, from real value-added output, real personal income, total employment, and manufacturing employment. While Kentucky did not share in the rapid economic growth of the last year, the rate of growth in the Kentucky economy is forecast to grow while declining modestly across the nation (see Appendix for a description of the national economic forecast).

Real value-added output, or real gross state product, is forecast to grow at a moderate 2.4 percent rate in 1997, up slightly from 2.2 percent growth in 1996. Growth is forecast to be steady and above 2.0 percent throughout 1997. As Figure 1 shows, the slowest growth is forecast for the fourth quarter. Gross state product is forecast to grow at 2.4 percent in each of the first two quarters before rising to 2.6 percent in the third quarter and dipping to 2.0 percent in the fourth quarter. All in all, 1997 will be a year for steady, moderate growth in Kentucky.

Such steady growth is also evident in employment forecasts. Total employment growth is forecast to reach 2.0 percent in the first quarter of 1997, 1.8 percent in the second and third quarters, and 1.7 percent in the fourth quarter. While it is somewhat more volatile, growth in real total personal income also is forecast to be steady. Total personal income growth is forecast to reach 2.8 percent in the first quarter, 2.3 percent in the second quarter, 2.2 percent in the third quarter, and 1.7 percent in the fourth quarter. With steady employment and income growth, population growth is also expected to remain moderate in Kentucky in 1997, with an increase of 30,500 during the year, representing a 0.8 percent growth rate.

Just as in previous years, the largest growth among industries in 1997 is forecast for services and retail trade. Service industry employment is forecast to grow by 2.8 percent in 1997, adding a total of 11,500 jobs. Business services, growing at 5.4 percent, and health services, growing at 2.8 percent, are forecast to add the most new services jobs. Retail trade employment is forecast to grow at 1.9 percent in 1997, adding 6,400 new jobs.

The manufacturing industry is expected to be a source of major improvement in the Kentucky economy in 1997. After declining in 1996, manufacturing employment is forecast to rise by 0.5 percent in Kentucky in 1997. This translates into 1,600 new manufacturing jobs. Printing, wood products, paper products, and fabricated metals are forecast to be the strongest manufacturing industries in 1997.

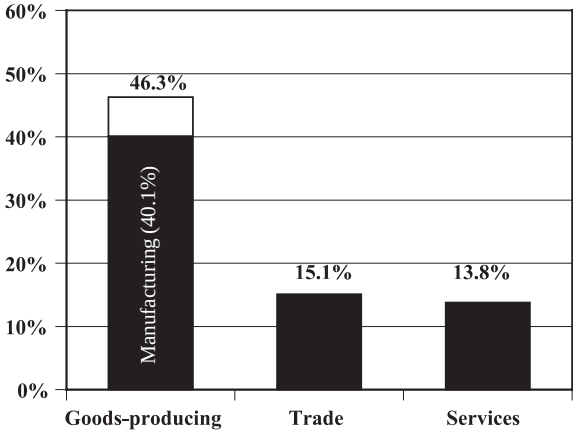
Continuing a trend from 1996, the coal mining industry is forecast to perform fairly well in Kentucky in 1997. Employment is expected to remain unchanged during the year, expanding slightly in the beginning of the year before falling again in the second half of 1997. Unfortunately, that decline is forecast to continue through 1998 and 1999.

THE THREE YEAR FORECAST

Growth in the Kentucky economy is forecast to accelerate in 1998 and 1999. Increased growth in those two years is forecast to lead to strong growth overall for the three-year period. Real gross state product is forecast to grow nearly 3.1 percent on average for the three years. Total employment is forecast to average 2.0 percent per year, and real total personal income is forecast to grow by 2.3 percent on average. Each of these growth rates exceeds national forecasts by roughly one-half of one percent. Population growth in Kentucky is expected to lag national growth by 0.1 percent. The following three sections discuss the growth of industries, income, and population in more detail.

FIGURE 2

Share of 1997 to 1999 Gross State Product Growth in Selected Industry Groups



Gross State Product and Employment

Gross state product (GSP), the measure of value-added output, is a comprehensive measure of economic activity which includes capital consumption, profits, business tax payments as well as employment and earnings. As a result, analysis of gross state product can sometimes lead to a different perspective than analysis of a less comprehensive measure, such as employment growth. In particular, while more rapid job growth in the services industry is indicative of the emerging service economy, analysis of gross state product data reiterates the crucial role which manufacturing and other goods-producing industries play in the overall economy.

Manufacturing and other goods-producing industries (such as agriculture, mining, and construction) continue to account for a substantial share of gross state product. Manufacturing accounted for 26.8 percent of real gross state product in 1996, while goods-producing industries as a whole accounted for 37.2 percent. The remaining 62.8 percent of real gross state product was divided among other industries, with retail and wholesale trade accounting for 14.6 percent, services 13.5 percent, finance, insurance and real estate 12.9 percent, government 11.9 percent, and transportation, communications, and public utilities 10.0 percent.

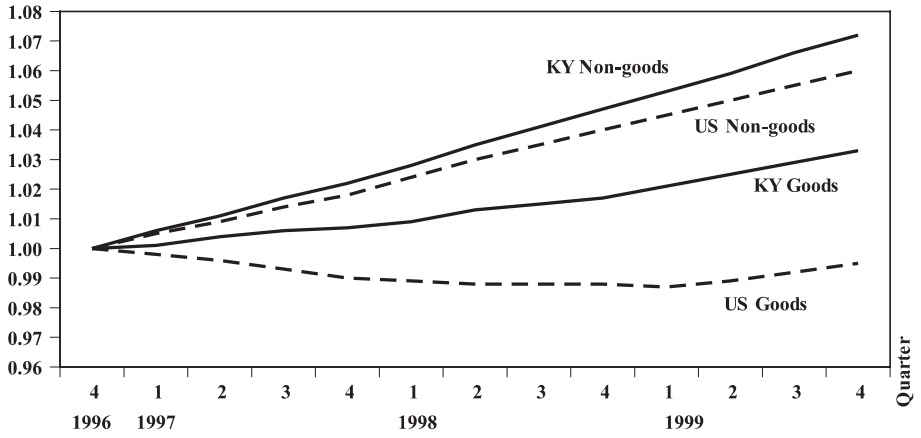
Manufacturing and other goods-producing industries are forecast to account for an even larger share of job growth, portending an even more important role in the economy in the future. As Figure 2 shows, manufacturing is forecast to account for 40.1 percent of growth in real gross state product from 1997 through 1999. All goods-producing industries are forecast to account for 46.3 percent of real gross state product growth, nearly half of the total. Growth in manufacturing, mining, agriculture, and construction will be a crucial engine for growth in the Kentucky economy in years to come.

Figure 2 also shows the relative significance of trade and services for growth in real gross state product. These industries are forecast to play a significant but secondary role in GSP growth. Retail and wholesale trade are forecast to account for 15.1 percent of real gross state product growth from 1997 through 1999, while services are forecast to account for 13.8 percent of growth.

Strong growth in real gross state product is consistent with growing employment. An increase in real GSP, however, does not guarantee that employment also will increase. Productivity, or real GSP per worker,

FIGURE 3

Indices of Employment Forecasts for Goods- and Non-goods-Producing Industries



can grow rapidly enough in some industries so that total employment will decline even as gross state product grows. This trend is occurring nationally in many manufacturing, mining, and construction industries. Figure 3 shows indices for employment in 1997 through 1999 compared to employment in the fourth quarter of 1996. As depicted, goods-producing employment is forecast to decline in the U. S. from the fourth quarter of 1996 through the fourth quarter of 1999.

Growth in real GSP in goods-producing industries, however, is leading to an increase in employment in Kentucky. As shown in Figure 3, employment in goods-producing industries is forecast to increase steadily throughout the three-year period. Goods-producing industries are forecast to grow by 1.1 percent per year on average.

Non-goods-producing industries also are forecast to grow more quickly in Kentucky than nationally. Figure 3 shows growth indices for non-goods-producing industries like services, retail trade, wholesale trade, and government in Kentucky and the U.S. Non-goods-producing industries in Kentucky consistently outperform the national averages. The growth rate in Kentucky is forecast to be 2.4 percent compared to a 2.0 percent for the U.S.

Income

Income growth in Kentucky is forecast to exceed national growth in each of the next three years. Figure 4 shows indices of real total personal income in Kentucky and the U.S. Real income refers to income adjusted for inflation. Growth in real total income in Kentucky is forecast on average to be 0.4 percent greater each year than national income growth. As with employment and gross state product, the growth rate of total real personal income is forecast to accelerate over the three-year period. Growth in 1997

FIGURE 4

Indices of Real Personal Income Forecasts for Kentucky and the United States

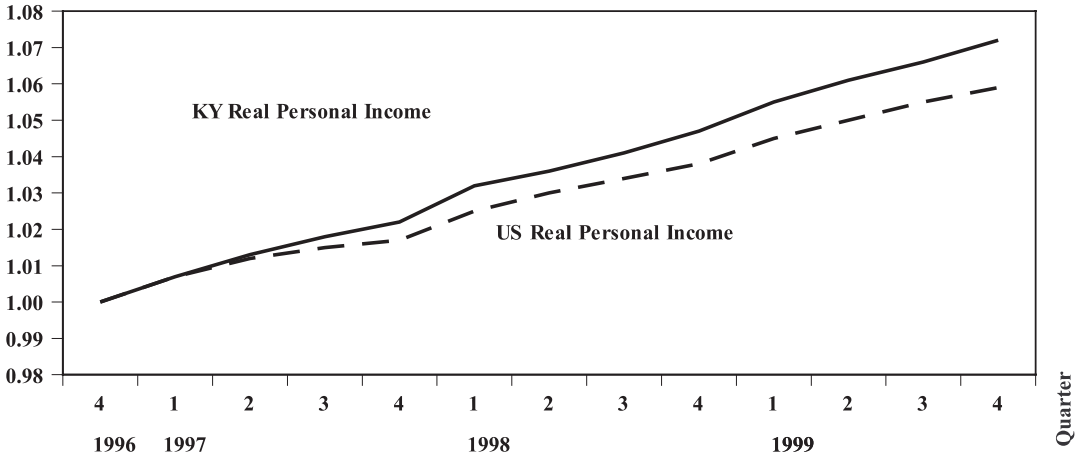


TABLE 1

Real Gross State Product (GSP) by Major Industry Group, Seasonally Adjusted

Industry	1996 GSP ($mil) 4th Q	1997 quarterly growth (at an annual rate) (%) 1st Q	2nd Q	3rd Q	4th Q	Annual growth (%) 1997	1998	1999	Annual averages Growth ($mil)	Growth rate (%)
Total	69,416.8	2.4	2.4	2.6	2.0	2.4	3.3	3.6	2,200.2	3.1
Agriculture	1,638.7	-9.7	-10.3	11.3	-15.4	-6.5	6.4	5.0	24.4	1.6
Mining	2,611.7	5.1	7.2	3.0	3.4	4.7	2.0	2.1	78.4	2.9
Construction	3,022.5	1.3	0.7	0.6	0.0	0.6	1.2	1.5	34.7	1.1
Manufacturing	18,549.9	1.9	3.2	2.1	2.7	2.5	5.1	6.1	881.8	4.6
TCPU	6,888.1	2.9	2.9	3.0	2.9	2.9	3.0	3.1	213.3	3.0
Trade	10,222.9	3.5	2.5	3.1	2.9	3.0	3.3	3.2	332.3	3.2
FIRE	8,995.0	1.7	1.7	1.7	1.6	1.7	1.8	1.8	161.5	1.8
Services	9,415.0	3.3	3.1	3.1	2.9	3.1	3.1	3.1	302.7	3.1
Government	8,073.1	3.7	1.9	2.2	1.9	2.4	1.9	1.9	170.9	2.1

Note: TCPU = Transportation, Communications, and Public Utilities
FIRE = Finance, Insurance, and Real Estate

is forecast at 2.2 percent, but is forecast at 2.4% in 1998 and 1999.

Faster total income growth in Kentucky is not the result of faster population growth in the state. In fact, population in Kentucky is forecast to grow slightly slower than nationally over the three-year period. Instead, faster income growth in Kentucky is the result of faster income growth per person. Growth in real per capita, or per person, income in Kentucky is forecast to average 1.5 percent in Kentucky compared to an average growth of 1.0 percent nationally. Kentucky's more rapid expansion is forecast to result in faster-rising average incomes for residents.

Population

Population growth in Kentucky has been steady throughout the 1990s.[2] Rising in-migration, reduced out-migration, or both, have lead to a strong, positive net migration, which is the number of persons migrating to Kentucky minus the number migrating out of the state. With more persons moving to the state than leaving it, population growth has exhibited the kind of steady growth seen elsewhere in the nation (net migration also is positive for the nation as a whole). From 1997 to 1999, Kentucky's population is forecast to grow by 0.8 percent annually compared to 0.9 percent for the nation. This figure translates into an average increase of 31,200 residents each year. Of that total, 23,300 are due to net migration.

This strong growth, however, is not forecast in all population groups. As nationally, Kentucky's forecast shows an aging population. The number of persons age 30–39 in Kentucky is forecast to decline slightly over the next three years, and growth is very modest in other younger age groups. At the same time, some older age groups should grow rapidly. In particular, population is forecast to grow quickly among the older portions of the labor force. The population of persons age 50–59 is expected to grow by 3.6 percent per year from 1997 through 1999. Population is also forecast to grow quickly among the oldest portion of the population. The number of persons over age 85 should grow by 5.4 percent per year over the next three years.

FORECAST DETAIL

The strong growth forecast for the Kentucky economy is not the result of a consistent growth rate among all industries, sources of income, or population age groups. Many industries are growing much more rapidly than total employment, while some manufacturing and mining industries are not growing at all. The following sections examine growth in industries, occupations, sources of income, and population.

Employment

The strong employment picture in Kentucky is the result of broad-based growth. As nationally, the majority of job growth is forecast in retail trade and services. But, in Kentucky, nearly all industries are forecast to add employment over the next three years with only a few industries forecast to shed employment. These exceptions are coal mining, selected manufacturing industries, and federal government employment. Even coal mining employment, however, is forecast to hold steady in 1997, before falling in 1998 and 1999.

Manufacturing employment is forecast to grow at an average annual rate of 1.0 percent in Kentucky from 1997 through 1999. This growth rate compares very favorably with the forecast of a *decline* of 0.5 percent in manufacturing employment nationally. Manufacturing employment is forecast to increase by 0.5 percent in 1997, 1.3 percent in 1998, and 1.4 percent in 1999. These growth rates translate into an average increase of 3,300

TABLE 2

Growth and Growth Rates for Nonfarm Employment by Industry, Seasonally Adjusted

	1996 employment (thou) 4th Q	1997 quarterly growth (at an annual rate) (%) 1stQ	2nd Q	3rd Q	4th Q	Annual growth (%) 1997	1998	1999	Growth Ky.	Growth rates (%) Ky.	U.S.
Total nonfarm	1,680.97	1.97	1.81	1.84	1.71	1.83	2.10	2.20	35.09	2.05	1.54
Goods-producing	409.42	0.43	1.22	0.71	0.52	0.72	1.01	1.51	4.47	1.08	-0.18
Mining	24.30	1.84	2.57	-1.45	-1.48	0.35	-2.46	-2.21	-0.35	-1.44	-1.65
Coal mining	20.43	2.48	3.36	-1.35	-1.50	0.73	-2.87	-2.69	-0.33	-1.61	NA
Construction	74.96	1.08	3.24	0.44	2.02	1.69	1.12	3.23	1.54	2.02	1.12
Manufacturing	310.17	0.17	0.62	0.94	0.32	0.51	1.25	1.37	3.28	1.05	-0.53
Food products	22.73	-3.06	-0.64	0.84	0.00	-0.73	-0.59	1.32	-0.00	-0.00	0.16
Tobacco	4.34	1.37	-2.44	-3.46	-4.82	-2.36	-4.55	-5.02	-0.17	-3.98	-1.69
Textiles	8.91	-0.47	3.16	5.46	4.83	3.22	2.82	1.98	0.24	2.67	1.39
Apparel	26.65	0.58	2.51	1.76	1.53	1.59	0.61	0.94	0.28	1.04	0.21
Wood	14.24	8.61	5.11	2.68	1.95	4.55	2.56	2.01	0.45	3.04	0.30
Furniture	5.06	-3.66	-2.45	-1.09	0.95	-1.58	5.03	8.62	0.21	4.02	-0.20
Paper products	10.99	6.90	6.26	6.05	4.84	6.01	4.64	4.38	0.58	5.01	0.58
Printing and publishing	22.03	-0.06	1.27	2.52	1.90	1.40	2.05	2.21	0.42	1.89	0.48
Chemicals	14.47	0.14	1.48	2.35	1.51	1.37	0.51	-0.52	0.07	0.45	0.07
Petroleum and coal refining	3.50	5.38	3.56	2.18	1.45	3.14	0.47	-0.42	0.04	1.06	-0.96
Rubber and plastic products	19.72	7.84	6.52	2.08	1.37	4.42	2.65	2.60	0.66	3.22	0.51
Leather products	1.25	-6.36	0.81	-1.78	-4.92	-3.10	-4.16	-4.79	-0.05	-4.02	-8.83
Stone, clay, and glass products	11.40	-1.33	1.52	1.48	-1.33	0.08	-0.65	-0.88	-0.06	-0.48	-1.07
Primary metals	17.24	-0.00	-0.75	-0.31	-0.52	-0.40	1.31	1.01	0.11	0.64	-0.38
Fabricated metals	22.48	2.52	2.44	2.17	2.00	2.28	1.97	1.72	0.46	1.99	0.25
Non-electric machinery	37.00	-4.21	-4.52	-1.12	-0.45	-2.59	0.33	1.20	-0.13	-0.35	-1.55
Electric machinery	25.90	-2.31	-2.63	-2.86	-2.88	-2.67	-2.30	-1.46	-0.54	-2.14	-1.62
Transportation equipment	33.18	-3.12	-2.89	2.46	1.35	-0.58	4.34	3.19	0.78	2.32	-1.42
Instruments and related products	4.06	-0.75	1.27	-0.46	-1.75	-0.43	-2.65	-0.74	-0.05	-1.27	-2.82
Miscellaneous manufacturing	5.02	11.44	15.10	-12.08	-19.62	-2.42	2.59	-0.58	-0.00	-0.14	-1.92
Non-goods-producing	1,271.54	2.47	2.00	2.21	2.09	2.19	2.44	2.42	30.62	2.35	1.96
TCPU	93.13	1.37	1.24	1.48	1.36	1.36	1.53	1.58	1.41	1.49	0.93
Trade	407.73	2.29	1.81	2.04	1.72	1.96	2.39	2.19	9.08	2.18	1.48
Wholesale trade	81.15	2.54	1.61	2.25	1.71	2.03	2.42	2.19	1.84	2.21	1.67
Retail trade	326.58	2.22	1.86	1.99	1.72	1.95	2.38	2.19	7.24	2.17	1.42
FIRE	66.45	0.21	-0.22	0.74	0.40	0.28	0.81	1.11	0.49	0.73	0.92
Services	411.17	2.61	2.76	2.80	2.99	2.79	3.30	3.33	13.32	3.14	3.08
Business services	75.96	5.29	5.47	5.28	5.66	5.43	5.88	5.47	4.49	5.59	NA
Health services	146.16	3.06	2.80	2.72	2.77	2.84	3.05	3.18	4.55	3.02	2.94
Government	293.06	3.41	1.95	2.17	1.95	2.37	1.96	2.01	6.32	2.11	1.35
Federal	39.75	-1.19	-2.10	-1.85	-1.21	-1.59	-1.23	-0.45	-0.43	-1.09	-1.55
State and local	253.31	4.14	2.58	2.80	2.44	2.99	2.44	2.37	6.75	2.60	1.81
State	87.93	3.59	1.89	1.33	1.37	2.04	0.95	0.90	1.15	1.30	NA
Local	165.38	4.44	2.95	3.58	3.00	3.49	3.22	3.12	5.60	3.28	NA

Note: TCPU = Transportation, Communications, and Public Utilities
FIRE = Finance, Insurance, and Real Estate

jobs for each year from 1997 to 1999.

The broad-based growth evident throughout Kentucky's economy is also forecast for the manufacturing industry. This broad-based growth is seen in Table 2. Twelve of the 20 manufacturing industries in Kentucky are forecast to add jobs from 1997 though 1999. This compares with only eight manufacturing industries which are expected to grow nationally. The fastest rates of growth are forecast for plastics, wood products, transportation equipment, and fabricated metals. The fastest rates of decline are forecast for tobacco products, leather products, and electric machinery.

The increase in manufacturing is also forecast for the construction industry, which is forecast to grow by 2.0 percent per year compared to 1.1 percent per year annually. Growth is forecast to be fastest in 1999. After holding steady in 1997, coal mining is forecast to remain one declining part of the Kentucky economy in 1998 and 1999, although this rate of decline is expected to be minimal. After declining by 1,400 jobs per year in the early 1990s, coal mining employment is forecast to decline by only 500 jobs per year in 1998 and 1999.

Twelve of the 20 manufacturing industries in Kentucky are forecast to add jobs from 1997 through 1999. . . . The fastest rates of growth are forecast for plastics, wood products, transportation equipment, and fabricated metals.

The faster growth forecast for Kentucky in goods-producing industries such as manufacturing and construction also is forecast for many non-goods-producing industries such as retail and services. This result is not surprising given the 0.5 percent faster rate of income growth expected for Kentucky than nationally. Since demand for industries such as retail and services is largely driven by local demand and incomes, faster growing incomes in Kentucky should lead all services and trade industries to grow significantly faster in Kentucky than nationally. This faster rate of growth is clearly seen in retail employment and government employment and to a lesser extent in services employment. Retail trade employment is forecast to grow by 2.2 percent in Kentucky compared to 1.5 percent nationally over the next three years. Similarly, wholesale trade employment is forecast to grow by 2.2 percent in Kentucky compared to 1.6 percent nationally. In part reflecting continued efforts at improving education in Kentucky, state and local government in Kentucky is forecast to grow by 2.6 percent per year compared to 1.8 percent nationally. Moreover, as part of continued efforts to cut the federal budget deficit, federal government employment is forecast to decline in both Kentucky and the nation.

Despite the much more rapid growth in trade and government, some non-goods-producing industries only are forecast to grow slightly more quickly in Kentucky than nationally. In particular, health services and other types of services are forecast to only grow about 0.1 percent faster in Kentucky than nationally from 1997 through 1999. Finance, insurance, and real estate are forecast to grow 0.1 percent slower in Kentucky than nationally during the period.

The rate of services growth, however, still is forecast to exceed the rate of growth in retail employment in Kentucky. The services industry still contains some of the fastest growing portions of the economy, such as business services and professional services. A trend among many businesses towards outsourcing services rather than keeping in-house staff continues to fuel rapid growth in business and professional services. Table 2 indicates that business services are forecast to grow by 5.6 percent per year on average in 1997 through 1999. It is also worth noting that the rate of health care employment growth has moderated both in Kentucky and nationally. With efforts to reduce the rate of growth in health care costs, health care employment in Kentucky is forecast to grow at 3.0 percent annually — still a fast rate of growth but below the average growth rate for services.

In summary, most trade and service industries are forecast to grow faster in Kentucky than nationally. This is consistent with the faster rates of income growth in the state. The state also is forecast to benefit from a faster growing manufacturing sector relative to the U.S., although the number of new jobs in manufacturing is expected to be substantially less than the number in services or retail trade.

Occupations

This pattern of industry growth also is evident in the pattern of occupational growth. As Table 3 indicates, the most rapid job growth is forecast to occur in services, and to a lesser extent, marketing and sales occupations. Workers in services occupations include health care assistants, food preparers, cleaners, and household workers. Marketing and sales occupations are composed primarily of cashiers and other retail sales workers. Nearly 8,000 services jobs are forecast to be gained over each of the next three years, while 4,700 marketing and sales jobs are forecast to be gained. These numbers

TABLE 3

Growth and Growth Rates for Employment by Occupation, Seasonally Adjusted, 1996–99

	1996 4th Q	1999 4th Q	Annual growth	Annual growth (%)
Total	1,681,004	1,786,268	35,088	2.0%
Executives, administrators, and managers	168,523	180,243	3,907	2.3
Professional specialty	203,703	223,231	6,509	3.1
Technicians and related support	59,510	63,570	1,353	2.2
Marking and sales	177,982	192,057	4,692	2.6
Administrative support, including clerical	318,947	329,578	3,544	1.1
Service	267,294	290,668	7,791	2.8
Agriculture, forestry, fishing, and related	17,020	17,911	297	1.7
Precision production, craft, and repair	202,077	211,061	2,995	1.5
Operators, fabricators, and laborers	265,948	277,949	4,000	1.5

translate into a 2.8 percent annual growth rate for service occupation jobs and a 2.6 percent annual growth rate for marketing and sales jobs. Both growth rates are well above the forecast overall growth rate of 2.0 percent for all occupations. Slower growth is forecast for those occupations which account for a substantial share of manufacturing employment, such as precision, production, craft, and repair workers, and operators, fabricators, and laborers. The growth rate for both of these groups is forecast to be 1.5 percent. A substantial share of the job growth in these occupations is forecast to occur for workers performing tasks in non-manufacturing industries such as construction and transportation, communications, and public utilities.

Another pattern is the growth for occupations requiring a high level of education. Among all occupational groups, workers in professional specialty occupations have the highest level of education. This occupational group also has the highest growth rate and is forecast to experience the second largest job increase in the next three years. The number of workers in professional specialty occupations is forecast to grow by 3.1 percent annually, resulting in a net increase of 6,500 workers each year. The professional specialty occupational group includes teachers, scientists, engineers, doctors, and artists, among others. Executives, administrators, and managers as well as technicians are another group of workers which have a higher level of education on average.

The annual rate of job growth in these two occupational groups is forecast to be 2.2 percent, above the average of 2.0 percent for all occupations. The rapid growth rate for these education-oriented occupations is forecast to occur throughout the economy, rather than being tied to a particular industry.

Despite these differences among particular occupations, it is worth noting that the outlook for job growth is at least fair for all of these nine aggregate occupation categories. Jobs in each of the nine occupations is forecast to grow over the next three years, and the growth rate is forecast to exceed at least 1.0 percent per year in all occupational groups. These numbers point to expanding opportunities for most Kentucky workers. While the number of jobs may be declining in some more specific occupations, these aggregate numbers indicate that there at least should be jobs available in related occupations.

Income

Real total personal income is forecast to grow more rapidly in Kentucky than nationally. Table 4 shows the sources of income growth and indicates that this faster overall growth results from faster growth in earnings from work, such as wages

TABLE 4

Growth Rates for Real Personal Income by Source, Seasonally Adjusted

	1996 income ($mil) 4th Q	1997 quarterly growth (at an annual rate) (%)				Annual growth rate (%)			Annual averages Growth ($mil)	Growth rate (%)	
		1st Q	2nd Q	3rd Q	4th Q	1997	1998	1999	Ky.	Ky.	U.S.
Total personal income	48,829.4	2.8	2.3	2.2	1.7	2.2	2.4	2.4	1,166.1	2.3	1.9
Wage and salary income	27,058.8	1.7	1.8	1.9	0.8	1.6	2.2	2.0	528.7	1.9	1.4
Other labor income (benefits)	3,454.2	3.8	4.3	3.0	2.1	3.3	4.1	4.6	144.3	4.0	3.1
Proprietor's income	3,582.9	2.1	1.4	1.2	0.7	1.3	1.0	0.7	37.0	1.0	-0.4
Residential adjustment	-151.4	9.6	13.1	10.9	10.2	10.9	11.2	11.1	-18.7	11.1	NA
Contributions to social insurance	2,202.5	3.4	2.8	2.4	1.3	2.5	2.5	2.1	53.7	2.4	1.9
Transfer income	9,576.8	6.9	3.0	2.3	3.6	3.9	2.9	3.0	324.2	3.3	3.1
Dividends, interest, rent	6,753.4	2.1	3.5	3.8	3.1	3.1	2.8	3.0	207.2	3.0	2.9
Per capita income	12,542.1	2.1	1.5	1.3	0.8	1.4	1.6	1.5	0.2	1.5	1.0

and salaries, benefits (other labor income), and proprietors' income.

Real wage and salary earnings is forecast to grow by 1.9 percent per year in Kentucky compared with 1.4 percent nationally. This 1.9 percent rate of growth translates into nearly $539 million of real income growth per year from 1997 to 1999. Benefits income (other labor income) is forecast to grow by 4.0 percent per year in Kentucky compared to 3.1 percent nationally. This 4.0 percent increase is forecast to yield over $144 million in new income each year. Proprietors' income, forecast to decline nationally, is forecast to grow by 1.0 percent per year in Kentucky from 1997 to 1999, adding $37 million per year to state income. Together, these three sources of working income are forecast to account for $720 million of $1,166 million of income growth per year in Kentucky. Earnings from work will be the key source for income growth in Kentucky, accounting for 61.7 percent of income growth in the state.

Income from transfer payments and dividend, interest, and rent income will be the other main sources of income growth for the state. Growth in these sources of income is forecast to mirror national growth. This is not surprising since growth in transfer income and dividend, interest, and rent income tends to follow growth in population, and population growth in Kentucky is forecast roughly to equal population growth nationally. Growth in transfer income is forecast to grow by 3.3 percent per year in Kentucky compared to 3.1 percent per year nationally, while growth in dividend, interest, and rent income in Kentucky is forecast to grow by 3.0 percent compared to 2.9 percent nationally.

Growth in transfer income is forecast to account for $324 million per year from 1997 through 1999, and growth in dividend, interest, and rent income is forecast to grow by $207 million per year. It is worth noting that transfer income is forecast to account for 27.8 percent of total income growth. Despite legitimate concerns about the rapid growth of transfer income, it is important to stress that earnings from work is forecast to account for a much larger share of income growth in Kentucky than transfer payment income.

Another interesting pattern is the decline of Kentucky's residential adjustment, which is the difference between what Kentuckians earn working in other states minus what residents of other states earn working in Kentucky. The decline in residential adjustment indicates that one result of Kentucky's forecast employment growth is expected to be an increase in workers from nearby states finding work in Kentucky, a decrease in the number of Kentuckians working in nearby states, or both.

Risks to the Forecast

The forecast presented for the Kentucky economy is based in part on the baseline September forecast for the U.S. economy produced by DRI/McGraw Hill. This baseline national forecast represents a moderate, most likely scenario for the economy over the next three years. Use of this moderate national forecast implies that the Kentucky forecast is also a moderate forecast, one scenario among a group of possible scenarios for the state's economy. The national economy has other potential outcomes, which in turn could be played out in the Kentucky economy. The three alternative national scenarios are examined below.

In the first alternative scenario, there may be a recession on the horizon for 1998. With the economy currently at below the full employment rate, inflation pressures in the economy may build over 1997. In turn, rising inflation could cause the Federal Reserve to raise interest rates substantially. In this scenario, rising interest rates would lead to a recession in 1998. DRI has assigned a probability of 20 percent to this scenario.

In the second alternative scenario, a recession occurs in 1997. This would occur due to a collapse in consumer confidence because of some unexpected event, such as an international incident. DRI has assigned a probability of only 10 percent to this scenario.

In the third alternative scenario, national growth could continue at its more rapid pace of the last year. In this scenario, the capacity of the economy grows more quickly than expected due to quickly rising productivity and faster than expected growth in the size of the labor force. Greater national capacity means that faster growth can be achieved without sparking a rise in inflation and without prompting the Federal Reserve to lower the rate of growth in the economy. DRI has also assigned a probability of only 10 percent to this scenario.

Conclusion

The Kentucky economy is forecast to experience moderate growth during 1997, 1998, and 1999. Growth is expected to accelerate throughout the period, with the most rapid growth occurring in 1999. Growth is also forecast to be broad-based: most industries are forecast to add employment, with the exception of coal mining, several manufacturing industries, and the federal government. All major occupational groups are forecast to add employment. Moreover, real income and population are each forecast to grow at a moderate rate. Moderate growth also is forecast to help Kentucky maintain already low statewide unemployment rates.

The services and retail trade industries are forecast to add the most new jobs during the next three years. Together, these two industries are forecast to add 20,500

of the 35,100 net new jobs expected in the Kentucky economy each year. The manufacturing industry as a whole is forecast to add 3,300 new jobs per year from 1997 to 1999. Yet, despite this relatively low share of employment growth, manufacturing remains a key to growth in the state economy as the manufacturing sector is forecast to account for 40.1 percent of growth in real gross state product in Kentucky. It is also worth noting that, despite the growing importance of transfer payments to the Kentucky economy, the wage, salary, and benefits returns from working are forecast to be the primary source of income growth in Kentucky during the next three years.

Growth in the Kentucky economy is forecast to exceed growth in the national economy for most employment and income measures. Manufacturing employment is forecast to grow in Kentucky from 1997 to 1999, while it declines nationally. Growth rates in Kentucky for retail trade, wholesale trade, government, and to a lesser extent, services employment, are forecast to exceed growth rates for the U.S. Similarly, growth rates for wages and salaries, benefits, and proprietor's income in Kentucky are forecast to exceed those for the U.S. Population growth in Kentucky, however, is forecast roughly to equal national growth rates.

FOOTNOTES

[1] Personal income data for Kentucky are not yet available for the last three quarters of 1996. Population data are yet not available for the entire year. Thus, income and population values needed to be forecast for these 1996 quarters are based on the Kentucky employment data which are available and national values for income growth. Kentucky employment growth and unemployment data are key inputs into forecasts of the migration component of population and the wage and salary benefits, and proprietor's income components of personal income.

[2] Moderate series birth and survival rates were taken from Michael Price, Thomas Sawyer, and Martye Scobee, *How Many Kentuckians: Population Forecast 1995-2020*, Population Research, Kentucky State Data Center, University of Louisville, 1993.

[3] National industrial production and productivity by industry are variables in manufacturing and mining, gross state product, and employment equations. National consumer spending and industry employment variables are important inputs for retail and service equations. National data on income growth by source are key variables in income growth equations.

APPENDIX: NATIONAL FORECAST

The forecast for Kentucky is based on a baseline national forecast from the DRI/McGraw-Hill publication *Review of the U.S. Economy* for September 1996. National variables forecast by DRI/McGraw-Hill are key variables in nearly every part of the University of Kentucky State Econometric Model.[3]

The baseline national forecast from DRI/McGraw-Hill depicts an economy in 1997, 1998, and 1999 that slows relative to the rapid growth of early 1996, but which continues to experience moderate growth. The national economy is forecast to experience slow growth in the first two quarters of 1997 with growth accelerating to a more moderate pace in the second half of 1997 and into 1998 and 1999. Real Gross Domestic Product (GDP) growth is forecast to see a 1.6 percent annual growth rate in the first two quarters of 1997 and a 2.2 percent growth rate for the entire year. Real GDP is forecast to grow by 2.3 percent in 1998 and 2.2 percent in 1999. On an annual basis, growth rates are very similar for 1997, 1998, and 1999. This similarity is also seen for employment and unemployment: employment is forecast to grow by 1.7 percent nationally in 1997, 1.5 percent in 1998, and 1.6 percent in 1999 while the unemployment rate is forecast to average 5.4 percent in 1997, 5.5 percent in 1998, and 5.6 percent in 1999.

The moderation in the U.S. economy in 1997 through 1999 is expected to result from a slowdown in demand by consumers and the federal government. The Federal Reserve, in an effort to fight inflation, is expected to raise interest rates by three-quarters of a point by mid-1997. This policy is expected to weaken consumer spending, a main spur of economic growth. Continued efforts to curb the budget deficit are expected to lead to a continued reduction in federal government discretionary spending in 1997 through 1999. Discretionary spending, which is spending excepting entitlement program spending (such as Social Security and Medicare) and debt interest payment, is forecast to decline in real terms by 2.3 percent in fiscal 1997, 2.5 percent in 1998, and 3.0 percent in 1999. As a result, the annual budget deficit is forecast to stabilize at its current level of just above $100 billion from 1997 through 1999. A widening trade gap in 1997 is forecast to be an additional drain on the economy in that year. It is worth noting, however, that exports are expected to grow in 1997 but not as quickly as imports.

Rising industrial production is forecast to aid the national economy in 1999. After growing 3.2 percent in 1996, industrial production growth is forecast to grow at 3.4 percent in 1997 and 3.0 percent in 1998 before accelerating to 4.5 percent in 1999. As a result, 1999 is also forecast to be a strong year for growth in manufacturing output and employment nationally.

Kentucky General Fund Revenue Estimates and Accuracy

Manoj Shanker

Providing accurate revenue forecasts is an important part of the budget process for the Commonwealth of Kentucky. Kentucky's process of estimating state revenues comprises models which take into account the economic environment, including national conditions, in which revenues will be collected. These models then provide forecasts for all the major sources of general revenue, including individual income tax, sales and use tax, corporate income tax, coal severance tax, property tax, and several other revenue sources. Since the late 1970s, accurate revenue forecasts have become increasingly important as state law now requires state funds to be budgeted before they are spent. For fiscal year 1996, the absolute percentage error between the estimated and actual revenues was 1.27 percent.

INTRODUCTION

The Office of Financial Management and Economic Analysis (OFMEA) is responsible for analyzing the economy of the Commonwealth of Kentucky and the United States, and estimating revenues upon which the Commonwealth's budget is based. The goal of the revenue estimating and economic analysis function is to provide timely, accurate General Fund and Road Fund estimates, by detailed account, as the primary input to the budget process. In this article I have described the modeling and estimation process for forecasting the General Fund revenue and for evaluating the accuracy of the forecast.

The key to an accurate revenue estimate is the availability of good data, an understanding of the tax code, and the ability to forecast the economic conditions in which the revenue collections will occur. Both the revenue estimates and the underlying economic forecast are prepared through the combined efforts of the revenue estimating staff of OFMEA and the Consensus Forecasting Group, comprising experts drawn from universities and the Legislative Research Commission. As a result of Kentucky's biennial budget process, both the economic and revenue estimates are prepared for a three-year forecast horizon. The revenue estimation procedure is mapped in Figure 1.

FORECASTING THE KENTUCKY ECONOMY

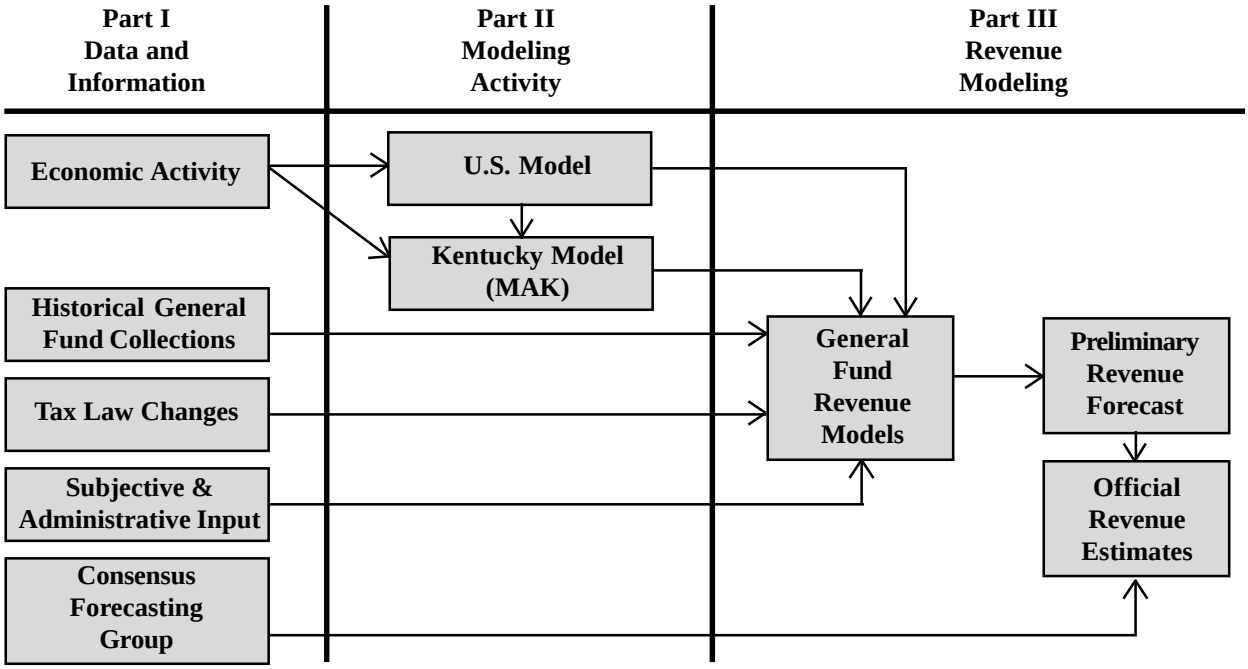
At the heart of the revenue estimation process is a dynamic response econometric model that forecasts the economic environment in which revenue collection will occur. OFMEA has developed a quarterly Macroeconomic Model of Kentucky (MAK) which provides an analytical base for assessing the future economic course of the Commonwealth. The 35-equation econometric model is designed to produce forecasts for personal income and its components, and employment, by industrial sector. It also estimates the effect of changes in the national economic outlook on the Kentucky economy. This latter feature enables us to prepare several possible scenarios for the state economy and then examine the revenue stream resulting from each of these alternatives.

Most national econometric models are modifications of a Keynesian general equilibrium system with commodity markets, labor markets, financial markets, and government operations. Unfortunately, this procedure cannot be translated to a state model for several reasons. First, there is the lack of state-specific data for imports, exports, investment, and financial markets. In addition, topics of particular interest to states, such as net migration and "export" to the rest of the nation, are different from those that are of interest to the national economy. Because of these limitations, MAK has a modified export-based structure and is a top-down model, where national events drive the state equations.

The MAK model has a sectoral design. This means that a broad economic concept — for example, personal income — is configured as a block of equations with the components of personal income defined as separate equations within the block. The equations are of several types: simultaneous, recursive, and identities. The simultaneity occurs both within a particular sector and between sectors. The major blocks are personal income,

FIGURE 1

General Fund Revenue Forecasting Process in Kentucky



employment, and government finance. (Originally there were blocks of equation for both output and population. These equations suffered in performance, however, and reduced the overall accuracy of the model since the data required for these areas of the state economy are fraught with errors.)

Revenue Estimating Models

After the economic environment facing Kentucky and the U.S. has been established by MAK, the next stage is the formulation of the General Fund estimate. The estimates for the General Fund are developed through a group of econometric and time-series models. Each revenue source has its own method of estimation. The formal revenue estimation models were developed to provide consistency, replicability, and simplicity to the forecasting process. The output from these models is enhanced by incorporating subjective input and changes in administering and collecting taxes.

General Fund collections for fiscal year 1996 (FY96, July 1, 1995 to June 30, 1996) were $5.3 billion. The sources of revenue and their contribution to the total are shown in Figure 2.

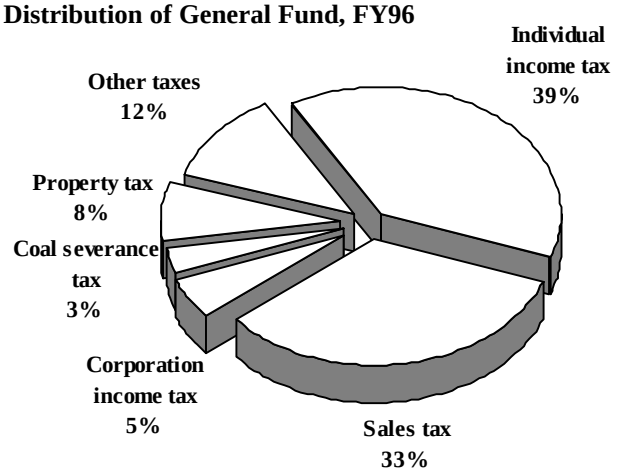
In FY96 individual income tax collections totaled $2.1 billion. This is by far the largest tax and is tied closely to the employment structure and wages in the state. The forecast for income taxes is centered around an accurate estimation of payroll withholding, which constitutes about 90 percent of individual income tax revenues. Until 1993 an aggregate figure for individual income tax was estimated exclusively by a Bayesian Vector Autoregressive (BVAR) model. This model departs from the strict time series Box-Jenkins approach in that exogenous parameters can be factored into the forecast. The exogenous parameters, namely, nonagricultural employment, personal income, and inflation, are derived from the MAK forecast of the state economy.

Individual Income Tax

In late 1992, following the tax law changes in 1990 and the national recession, we found that the BVAR model was not providing a credible forecast for individual income tax. The performance was further hampered by the delayed issuance of tax refunds and other administrative details. We decided to prepare two alternative models for individual income taxes. For a forecast horizon of one to four quarters we developed a Box-Jenkins model. For extended forecasts we modeled tax liability by decomposing it into six components, namely, withholding, declaration payments, tax paid with returns, additional tax billed, refunds due, and credit carried forward. The seven-equation tax liability model

FIGURE 2

Distribution of General Fund, FY96



relies on calendar-year data and therefore circumvents the problems associated with the timing of refunds. The shortcoming of this model is that data are available with a lag of one year. The exogenous data on the economy is derived from the MAK model.

Earlier in 1996 we supplemented the tax liability model by expanding the MAK model with an equation for withholding. This allows us to forecast with more current data and strengthens the link between withholdings and our economic assumptions. The mean absolute percentage error (MAPE) of this model is 2.3 percent.

Sales and Use Tax

In fiscal year 1996 collections from the sales and use tax were $1.8 billion. Like the individual income tax, the sales tax is tied closely to wages and salaries, specifically, disposable income. Growth in consumption in some instances exceeds income during periods of high consumer confidence and when interest rates are relatively low. Some of these factors are explicitly factored into the forecasting models, and others are used implicitly through changes suggested by the Consensus Forecasting Group.

A Bayesian Vector Autoregressive (BVAR) is normally used for forecasting sales tax. The principal advantage of this estimating method is that exogenous economic events are also incorporated in the modeling equation. The sales tax equation is estimated using forecasted values of Kentucky personal income, Kentucky nonagricultural employment, and the U.S. Consumer Price Index (CPI).

Sales tax receipts as reported by the Kentucky Revenue Cabinet are not necessarily for the month in which the sales occurred. Since the tax receipts data for a particular month reflects deposits for the previous month, and not economic "activity," we adjust the sales tax data by assigning it to its proper month in forecasting sales tax. The data are essentially assigned to the month in which the actual transactions took place. During periods of prosperity, especially during the 1990s, the BVAR model has on occasion underforecast sales taxes. This may be due to the inability of the model to incorporate increased consumer confidence (which increases consumers' willingness to spend). It is in instances like this that the Consensus Forecast Group becomes invaluable.

In 1978 the General Assembly modified state law to require the funds to be budgeted before they could be spent. This removed the incentive for systematic underestimation, and accuracy became increasingly important.

Other Taxes

To forecast all other taxes — which amounted to $1.5 billion in FY96 — we use a variety of mathematical models and administrative input. The corporation income tax is estimated by linking it to U.S. corporate tax liability and the past history of the tax. Receipts from this tax were $284.7 million in FY96. The coal severance tax is estimated by forecasting Kentucky coal production and prices. Receipts from the coal severance tax were $166.1 million in FY96. The forecast for the property tax is based on historical tax assessments, the Kentucky economic outlook, statutory changes, and administrative factors that affect the timing of the receipts. Total property tax receipts were $409.2 million in FY96. Over one hundred accounts constitute the rest of the General Fund. In most cases estimates are derived from the historical growth patterns of the tax. Revenue from all other sources, including the state lottery, amounted to $618.4 million in FY96.

MEASURING ACCURACY IN REVENUE FORECASTS

Until the late 1970s the balance of power in the Commonwealth was tilted in favor of the executive branch. Revenue forecasts were typically underestimated, as the Governor had considerable discretion in spending

TABLE 1

General Fund: Estimated and Actual Amounts

Fiscal year	Estimated ($mil)	Actual ($mil)	Absolute % Error
FY89	$3,276.9	$3,289.9	0.40%
FY90	3,557.9	3,561.0	0.09
FY91	4,370.1	4,311.7	1.35
FY92	4,529.0	4,360.8	3.86
FY93	4,593.1	4,511.7	1.80
FY94	4,608.5	4,647.1	0.83
FY95	5,070.1	5,154.1	1.63
FY96	5,269.0	5,336.9	1.27

surplus revenue. In 1978 the General Assembly modified state law to require the funds to be budgeted before they could be spent. This removed the incentive for systematic underestimation, and accuracy became increasingly important. It has been observed that the "social and political costs of deficits are typically greater than that of surpluses" and mean forecasts are adjusted downward to accommodate risk preferences.[1] When revenues are systematically overestimated, cuts must be imposed on previously funded projects. In case of an underestimation, funding for certain programs are not made available because of an expected tight budget situation. Since revenue estimates set the upper bound for budgeting, it is important to have an accurate point estimate.

Forecast errors do occur, however, and can be attributed to three broad sources. These include uncertainty resulting from the economic cycle, data errors from revisions and benchmark changes, and finally, misspecification of the estimation model. Although it is tempting to compute the error resulting from economic uncertainty, the methodology used to estimate this error is itself flawed. The input used to produce national forecasts is also subject to periodic historical benchmarking. In fact, as of November 7, 1996, the U.S. and Kentucky personal income data series before 1990 are incompatible with those after 1990. Furthermore, even the state nonagricultural employment data is benchmarked every year, and the revision can be as much as 0.5 percent.

It is likewise tempting to decompose forecast errors and ascribe much of the error to national benchmarking, and the national outlook provided by a private forecasting firm, in our case, DRI/McGraw-Hill. This strategy has limited theoretical foundation, however, and puts one in a methodological mire. I have addressed the question of forecast accuracy in a more fundamental way, that is, by examining the mean absolute percentage error (MAPE) of the General Fund.

This puts us on a "high road" in the sense that instead of explaining away errors, I have accepted them for what they are. What made this high ground easier to adopt was the fact that the MAPE of the General Fund forecast proved to be 1.40 percent, and the root mean square (RMS) percentage error was 1.77 percent. (MAPE and RMS errors are used to evaluate the overall accuracy of a simulation model. To avoid false accuracy from positive and negative deviations canceling each other out, either the absolute value of the deviation is considered — MAPE — or the deviation is squared and then the square root considered as in the RMS error. The latter is more useful since it penalizes large individual errors more heavily.) Table 1 shows the estimated and actual General Fund revenue values for FY89–FY96.

The errors in the forecast are quite modest in statistical terms. It is difficult to put the forecast error in perspective by comparing it to similar errors in other states. Cross-state comparisons are not done very often, and current data are unavailable. In a 1989 study, however, the mean absolute percentage error for all states was 2.73 percent.[2]

A Word About the Estimation Time Period

In estimating the accuracy of the forecast I made some critical assumptions. Chief among them was the time period over which the analysis was made. The eight-year period from FY89 to FY96 was the most logical choice. OFMEA developed the MAK model in early 1989, and many of the other models were adopted shortly thereafter. This allows us to examine the accuracy of the models and the forecasting procedures currently in use.

Footnotes

[1] G. Cassidy, M.S. Kamlet, and D.S. Nagin, 1989, "An Empirical Examination of Bias in Revenue Forecasts by State Governments," *International Journal of Forecasting*, 5, pp. 321-31.

[2] Stuart I.. Bretschneider, Wilpen Gorr, Gloria Grizzle, and Earle Klay, 1989, "Political and Organizational Influence on the Accuracy of Forecasting State Government Revenues," *International Journal of Forecasting*, 5, pp. 307-319.

U.S. Economy Performs Relatively Well in 1996

J. Robert Gillette

During 1996, the U.S. economy saw moderately high growth with low inflation and historically low unemployment. Gross domestic product is forecast to have grown 2.8 percent for 1996. The economy created approximately 2.5 million additional jobs in 1996, a 2.1 percent increase from 1995 levels. Inflation again remained low, around 3.0 percent, and the Federal Reserve was reluctant to change interest rates throughout the year on signs of a slowing economy. The forecast for 1997 also calls for moderate growth with low unemployment and low inflation. Gross domestic product should average just above 2 percent growth. Unemployment rates should stay in the mid-5 percent range, and inflation will again remain low, hovering around 3.0 percent.

Introduction

In 1996 the United States economy achieved moderately high growth with high levels of resource utilization and low inflation. The unemployment rate dipped to levels not seen since 1973, and the economy moved well into its sixth year of economic expansion since the last recession in early 1991. In fact, over the entire period from 1983 to 1996, the U.S. economy has recorded only two quarters of declines in total output.

Before explaining the performance of the U.S. economy has been in 1996, and its potential for 1997, I first summarize the 1995 economy. The relatively high growth of 1996 came on the heels of the 1995 "soft landing."

1995 Economy Experienced "Soft Landing"

With the economy in 1994 on the verge of overheating, the Federal Reserve launched a preemptive strike against inflation with eight interest rate hikes from February 1994 to February 1995. The Federal Reserve accomplished the delicate balance of slowing the economy without also causing a recession, as the 1995 economy experienced a "soft landing" with moderate to low growth and low inflation.

Real gross domestic product (GDP), the value of all final goods and services produced in the U.S. adjusted for inflation, grew 1.3 percent. As Figure 1 shows, real GDP barely grew at all during the first two quarters, with annual growth rates of only 0.4 percent and 0.7 percent, but grew rapidly in the third quarter at 3.8 percent. The economy slowed in the fourth quarter with an anemic 0.3 percent growth, and produced some fear about a possible recession in 1996.

The unemployment rate, as Figure 2 shows, equaled 5.6 percent for six months in 1995 and ranged only from a low of 5.4 percent to a high of 5.7 percent. The economy generated a healthy increase in jobs (as measured by the increase in nonfarm payroll employment) of 2.2 million, for an average of 185,250 additional jobs per month.

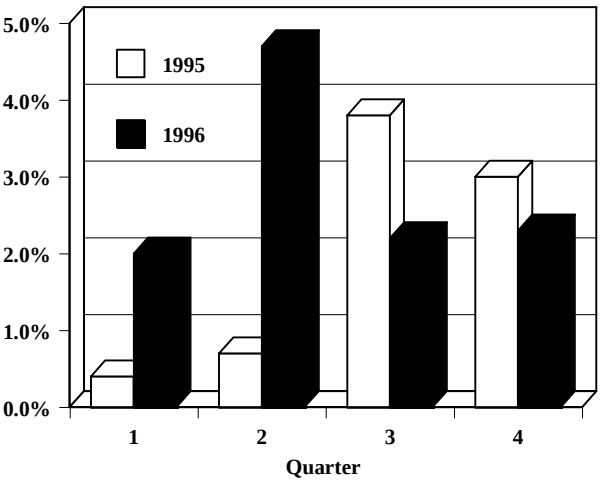
Inflation from December 1994 to December 1995, as measured by the rise in the Consumer Price Index (CPI), remained low at 2.7 percent. The core inflation rate, which excludes volatile food and energy prices, was a bit higher at 3.0 percent.

1996 Economy Performs Relatively Well

The economy in 1996 achieved moderately high growth, low inflation, and historically low unemployment. As Figure 1 shows, real GDP grew substantially faster in 1996 than in 1995. During the first quarter of 1996, the economy grew at a 2.0 percent annual rate, eliminating any fears of a recession following the stagnant 1995 fourth quarter performance. The economy soared in the second quarter at a 4.7 percent rate, causing substantial concerns over overheating and rising inflation. In the third quarter the economy settled back to a more sustainable growth of 2.3 percent. The forecast for the fourth quarter has the economy growing from around 2.2 to 2.4 percent, and if the economy realizes this growth, it will have grown a respectable

FIGURE 1

Real Gross Domestic Product Growth



2.8 percent for 1996.

Unemployment rates dropped to their lowest levels in 23 years. As Figure 2 shows, unemployment equaled 5.8 percent in January, dipped to 5.1 percent in August, and rose slightly to 5.2 percent in October. Through October, the unemployment rate had averaged 5.4 percent for the year. These are historically low rates, and to see how low one needs to consider the fact that the Bureau of Labor Statistics in 1994 revised the way it calculates unemployment, implementing several significant improvements in the data collection procedures. These revised procedures, however, raise unemployment rates about 0.5 percent over rates calculated using the old procedures. As a result, to compare unemployment rates of 1996 with periods before 1994, one needs to subtract about 0.5 percentage points from the 1996 rates. (For example, the 5.4 percent average for 1996 becomes 4.9 percent.) Making this adjustment, unemployment rates in 1996 dropped to their lowest levels since 1973.

Employment and Industry

The U.S. economy continues to be an incredible job-creating machine. Since 1974 the economy has generated an average of over 1.8 million jobs per year.

The U.S. economy continues to be an incredible job-creating machine. Since 1974 the economy has generated an average of over 1.8 million jobs per year. In 1996 the economy did even better in creating jobs. Nonfarm payroll employment increased through October by 2.1 million, for an average of 209,100 additional jobs per month. At this rate the economy will create over 2.5 million additional jobs in 1996, a 2.1 percent increase in total employment from 1995 levels.

Industrial production — the output of factories, mines, and utilities — picked up in 1996. As Figure 3 shows, the monthly index of industrial production remained basically flat in 1995 (increasing only 1.1 percent) but increased at a healthy 4.7 percent annual rate through the first nine months of 1996. The index of industrial production began in January at 122.5 percent of its 1987 (baseline) average and rose to 127.1 percent

FIGURE 2

United States Unemployment Rate

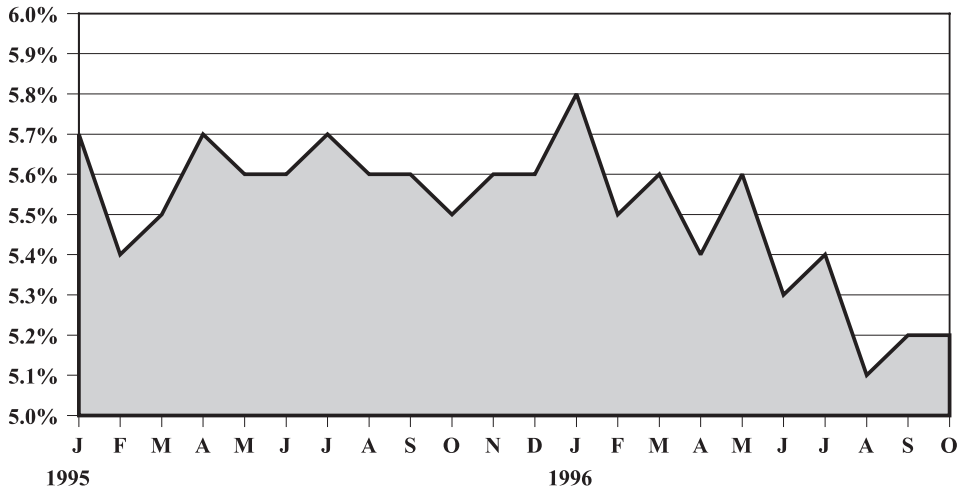
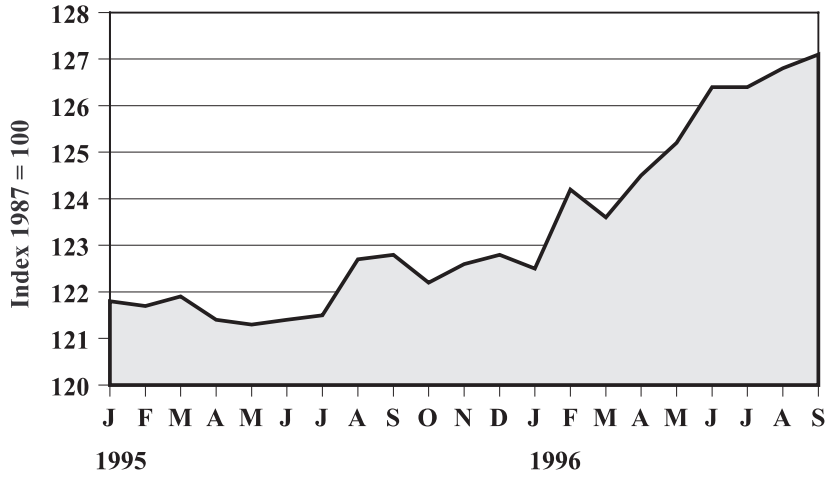


FIGURE 3

United States Industrial Production



by September.

Inflation continued to remain low in 1996 for the fifth year in a row, hovering around 3.0 percent. From January through September, inflation (as measured by the CPI) equaled 3.2 percent. The core rate of inflation, however, which excludes food and energy prices, equaled only 2.6 percent. Both food and energy prices increased considerably in 1996, pushing up the overall inflation rate.

Prices and Inflation

Largely due to the record high grain prices during the summer, food prices increased 4.4 percent through September. The drought in the southern Plains early in the year decimated wheat fields, and the heavy spring rains in the Midwest delayed corn planting, all of which sent wheat and corn prices soaring. Weather conditions have since improved, and grain prices have dropped substantially since August.

Crude oil prices hit six-year highs and caused energy prices to increase by 6.5 percent through September. West Texas intermediate crude started the year at $19.50 per barrel, reached $25.93 in mid-October, and settled back in mid-November to around $23.50, which still represents about a 25 percent increase over 1995 prices. Oil prices fluctuated over the year as the prospects for the United Nations' permission for Iraq to start exporting petroleum on a limited basis (700,000 barrels per day) fluctuated with the actions of Saddam Hussein. Iraq, one of the biggest oil producers in the world, has been barred from selling oil since its 1990 invasion of Kuwait and had not received UN permission to export by mid-November.

Bad weather and increases in oil prices both represent what economists call adverse supply shocks. Other things constant, these two factors cause a drag on the economy's growth rate and an increase in inflation, as evidenced by the 1996 core inflation rate (which excludes food and energy prices) of 2.6 percent considerably below the overall 1996 inflation rate of 3.2 percent. With weather conditions improving, grain prices falling substantially, and crude oil prices stabilizing in the $23 range, the gap between the core and overall inflation rate should begin to narrow.

Interest Rates

The Federal Reserve in 1996 was as noticeable for what it did not do as for what it did do. Early in the year, worried about the slowdown in the economy at the end of 1995, the Fed backed up its interest rate cut in December 1995 with another cut in late January 1996. Specifically, the Fed cut its target for the federal funds rate (the rate banks charge other banks for overnight loans) by a quarter percentage point on each occasion, lowering the rate to 5.25 percent. With the economy picking up in the latter half of the first quarter, the Fed then held rates steady through the rest of the year as of mid-November. The September meeting of the Fed's policy-making arm, the Federal Open Market Committee (FOMC), provided some drama as most analysts predicted FOMC would raise interest rates to slow the economy after the booming 4.7 percent growth rate of the second quarter. Instead, the Fed held rates steady, and, subsequently, when the third quarter numbers indicated a slowing economy growing at the more sustainable 2.2 percent, the Fed policymakers looked like prophets. At its next policymaking meeting on December 17, look for the Fed to continue to hold interest rates steady.

Interest rates went on a bit of a roller coaster ride during 1996 as the expectations of inflation increased and then decreased over the year. The bellwether 30-year Treasury bond rate started the year around 6.0 percent but increased steadily to 7.12 percent in May as inflation fears kicked up with the rise in grain prices, the increase in crude oil prices, and the rapidly improving economy. The long bond's yield then hovered around 7.0 percent (peaking at 7.19 percent in July) through September as inflation fears continued. But, in October with grain prices subsiding and the economy clearly slowing, the 30-year rate dropped, reaching 6.66 percent

by the month's end. The November election results gave rates another boost down as the market anticipated continued control of government spending and budget deficits, and the long bond's rate dipped to 6.48 percent in mid-November.

Currency

The dollar attracted some attention as it hit a 42-month high against the Japanese yen in late October at 114.36 yen per dollar. After declining a couple of yen in early November, the dollar had still gained over 10 yen for the year for a 10 percent increase. Against other currencies, the dollar also gained but by less. Against the German mark, the dollar gained 5 percent, and against the Federal Reserve Board's index of ten major currencies (the currencies of the G-10 countries), the dollar gained 2.7 percent.

1997 Forecast: Not Quite as Good as 1996

For 1997, the economy should experience moderate growth with low unemployment and low inflation. The forecasts for real GDP center just above 2 percent growth. In July, the Federal Reserve in its 1996 semiannual report to Congress predicted real GDP growth for 1997 of 1.75 to 2.25 percent. DRI/McGraw-Hill forecasts growth to be 2.1 percent, with a range of up to 2.5 percent in what it calls its "generous" forecast and down to 1.4 percent for its "stern" forecast. In sum, for 1997 look for real GDP growth of 2.1 to 2.2 percent, with growth of less than 2 percent being a disappointment and growth in the mid-2 percent range being a pleasant surprise.

Unemployment rates will continue to be low in 1997, likely in the mid-5 percent range. The Federal Reserve predicts the unemployment rate will average between 5.5 and 5.75 percent. DRI/McGraw-Hill forecasts an average for 1997 of 5.5 percent, with its generous forecast predicting 5.3 percent and its stern forecast an average of 5.7 percent.

Inflation will continue to remain low in 1997, hovering around 3 percent. The Federal Reserve forecasts an inflation rate for 1997 of 2.75 to 3.0 percent. DRI/McGraw-Hill forecasts a 2.7 percent inflation rate, with its generous and stern forecasts ranging from 2.8 percent to 2.5 percent.

Welfare Reform in Kentucky: Has "Welfare as We Know It" Changed?

William H. Hoyt and *Kathleen Toma*

The recently passed welfare reform act will place greater responsibility for welfare programs on states, changing funding from entitlements to block grants, imposing strict limits on receiving welfare benefits, and creating work requirements. Many recipients will likely have difficulty in the transition from welfare to work. Many of them have never held a job, and low education levels among recipients will also be a barrier to work. Furthermore, some regions in the state will not be able to absorb these former recipients into the labor market. The large urban areas of the state will have the best employment opportunities, and migration out of rural areas may occur as former recipients there may not find work. The work participation requirements will also place a burden on the state. Perhaps the greatest difficulty will be finding and paying for child care for recipients who must work.

INTRODUCTION

On August 22, 1996, President Bill Clinton signed into law the Personal Responsibility and Work Opportunity Reconciliation Act of 1996 (hereafter, Reconciliation Act), otherwise known as the welfare reform bill. This legislation promises to fundamentally change the nature of the American welfare system. Perhaps the greatest change will be the shift from entitlement to block grant funding. States will play a far greater role in the administration of welfare services, and several former assistance programs — Aid to Families with Dependent Children (AFDC), Emergency Assistance (EA), and Job Opportunities and Basic Skills (JOBS) — will be replaced with a single block grant program, Temporary Assistance to Needy Families (TANF). Under TANF each state will have significant authority in setting its own rules on how to use federal (and state) funds. While block grant funding will provide more flexibility for states to design welfare programs, it will also eliminate the traditional relationship where federal contributions to state welfare programs depended on the number of state residents on welfare. With welfare reform, increases and decreases in a state's welfare rolls will have no impact on the federal aid the state receives.

Not all federal guidelines and restrictions on the use of AFDC funds (now TANF) have been eliminated. In fact, two major new restrictions can be expected to change the financial responsibilities of states. Broadly, they concern the length of time recipients can receive TANF benefits and the number (percentage) of recipients who must be participating in some form of employment or training program. Recipient families will face a lifetime limit of five years on TANF, and all adult recipients who can work must obtain employment or engage in approved training programs after two years.

The Reconciliation Act has created myriad issues that will affect how states provide welfare assistance. In addition to summarizing the legislation, our attention will focus on the impacts of what we believe are three important changes created by the Act: 1) the change from entitlement to block grant funding, 2) the two-year limit on continuous TANF assistance, and 3) the work requirements placed on the states to receive TANF funding. In particular, we will examine the following:

- Financial impact of welfare reform on Kentucky. How will welfare reform affect both the federal funds received by Kentucky and the taxes Kentucky residents might pay?

- Characteristics of welfare recipients, with emphasis on prior employment experience and education of recipients who have spent more than two years on AFDC. As we show, the education and experience of AFDC recipients varies dramatically across the state, suggesting that success in reducing welfare rolls also may vary significantly across Kentucky.

- Impact of welfare reform in different regions, especially as it concerns employment conditions. Specifically, we examine how well a region can absorb the increase in its labor force due to more recipients being forced off welfare and into work. Again, we find dramatic differences across regions: In Eastern Kentucky, former AFDC recipients comprise a significant fraction of the

current labor force, while in urban regions, AFDC recipients forced to enter the labor market comprise only a small fraction of the labor force.

- Impact of the TANF work requirements. We discuss the experiences of JOBS programs in a number of states and look at how these experiences might influence the structure of a JOBS program in Kentucky.

Financial Impact of Welfare Reform

Using block grants instead of entitlements may be the most dramatic change of welfare reform. As an entitlement, federal funds received by a state were based on the number of individuals eligible for AFDC and the amount of funding provided by the state itself. For example, Kentucky faced a 70/30 funding match, meaning that 70 percent of funding came from the federal government and 30 percent came from Kentucky. In other words, for every $1.00 that Kentucky contributed, it received an additional $2.33 in federal funds. This 70/30 match was among the most generous in the nation; many states with higher per capita incomes and more spending per recipient faced a 50/50 match, meaning that for every $1.00 the state contributed it received an additional $1.00 from the federal government. Since federal funds also depended on the size of the AFDC rolls, a 20 percent increase in the rolls because of an economic downturn would likewise increase federal funds by 20 percent. Under this entitlement scheme, federal spending on AFDC increased from $23.5 billion in 1980 to $138.7 billion in 1992 while state spending increased from $21.5 billion to $65.3 billion during the same period. Adjusted for inflation, these figures represent increases of 347 percent in real federal spending and 178 percent in real state spending.[1]

The New Funding Formula

Funding under TANF comes in block grants that, with a few exceptions, sever the link between federal funding and the number of recipients as well as the link between federal and state funding.[2] Now, if a state's welfare rolls increase, the state will not receive additional funds, or, if a state increases its funding, it will not receive any additional funds to match its contribution. This block grant is based on federal funding the state would have received in fiscal year 1997 based on the entitlement formula.

The link between the amount of the block grant and the previous federal funding received by a state may place Kentucky at a disadvantage relative to other states, particularly when compared to its funding under the entitlement structure. Kentucky has traditionally been a state with a low average payment per AFDC recipient family, spending $211 per month for the typical family in 1993 while the national average was $381, with ten states spending over $500. Because of its small contributions to AFDC in the past, Kentucky will receive a smaller TANF block grant than states who contributed more to AFDC and therefore received more matching federal funds. Thus, Kentucky will receive 70 percent, or $148, of its $211 per family allocation, while Minnesota, for example, with a payment of $501 and a 50/50 match, will receive $250 per family.

TANF guidelines do require a minimum amount of state spending and under certain conditions, the amount of federal funding a state receives can increase. TANF insures a state contribution through its Maintenance of Effort (MOE) clause, which says that a state must contribute at least 80 percent of its 1994 state expenditures to "qualified state expenditures," which include cash assistance, child care assistance, educational activities related to employment, administrative expenditures (no more than 15 percent), and other spending consistent with the goals of the TANF block grant. For Kentucky this means that the state must contribute $70 million. If the state meets its work participation requirements, however, it need only contribute 75 percent of its 1994 state expenditures. For Kentucky this figure would be $66 million.

Finally, to receive full federal funding through TANF, Kentucky must meet its work requirements and place restrictions on the duration of benefits for recipients. States may receive bonus payments for exceptional performance in placing recipients in work activities and by reducing out-of-wedlock births and teen pregnancies. These bonuses can increase federal funding by up to five percent.

The financial impact of TANF on Kentucky is very difficult to forecast. Uncertainties about how states will respond to TANF work requirements make predictions even more difficult. One possible means of estimating the cost of the work requirements is to consider the cost of the penalties that will be incurred by the state if it fails to meet the work activities requirement.

Kentucky Funding and Payments with TANF

Under TANF Kentucky will receive $181.3 million from the federal government in fiscal year 1997. The 1997 fiscal year budget for Kentucky assumed $171.5 million from the federal government for programs that TANF replaces (AFDC, EA, JOBS). Thus, the state begins the fiscal year with an increase in federal funds of almost $10 million. This $181.3 million, however, cannot increase during the fiscal year, so how Kentucky fares under the new funding plan depends on what the

TABLE 1

Difference in Federal Funding under TANF and Previous AFDC Programs

A. Projected differences between TANF and AFDC if work requirements are met ($millions)

Projected spending growth with AFDC	1997	1998	1999	2000	2001	2002
2.5%	9.8	5.5	1.1	-3.4	-8.0	-12.7
3.0%	9.8	4.7	-0.6	-6.1	-11.7	-17.5
5.0%	9.8	1.2	-7.8	-17.2	-27.2	-37.6
7.5%	9.8	-3.1	-16.9	-31.8	-47.7	-64.9

B. Projected differences between TANF and AFDC if work requirements are not met ($millions)

Projected spending growth with AFDC	1997	1998	1999	2000	2001	2002
2.5%	9.8	-3.6	-11.6	-19.7	-27.9	-36.3
3.0%	9.8	-4.4	-13.3	-22.4	-31.6	-41.1
5.0%	9.8	-7.8	-20.5	-33.5	-47.1	-61.2
7.5%	9.8	-12.1	-29.6	-48.1	-67.6	-88.5

expected increase in funding under the traditional entitlement approach might have been. Of course, funding under the entitlement program was uncertain because it depended on both economic conditions and the state's contributions. From 1970 to 1993, the average yearly increase in AFDC expenditures in Kentucky was 7.6 percent. The rate of increase, however, varied dramatically from year to year and also represented several major changes in AFDC, which makes spending increases of 7.6 percent unlikely without program revisions.

Table 1a projects the differences in funding under TANF and if funding under the previous entitlement programs increased at several alternative rates. The lowest rates are intended to show increases in federal funding that only reflect the current (low) rate of inflation. As Table 1 indicates, if the rate of increase under the entitlement plan were 2.5 percent, federal funding would be greater under TANF from 1997–1999. At a 5.0 percent rate of growth, federal funding is greater under TANF only for 1997 and 1998 and by 2002, there is a difference of $37.6 million, almost 20 percent of federal funding under TANF. Thus, even under relatively conservative scenarios, in the near future Kentucky will be receiving fewer federal funds with TANF relative to the traditional entitlement programs.

To indicate the impact the work requirements under TANF might have on the cost of implementing welfare reform in a state, we incorporate the impact on failing to meet the work requirements into our comparison of the federal funds received under TANF and AFDC. A state can face a five percent reduction in funds the first year it fails to meet the work requirement. Each year after that the penalty increases by two percent to a maximum of twenty-one percent. Then, if Kentucky did not meet its work requirement in 1997, federal funding in 1998 would drop to $172.2 million. If it again failed to meet work requirements in 1998, 1999 funding would be 93 percent of $181.3 million, or $168.6 million. Additional penalties would provide funding of $164.0 million in 2000, $161.4 million in 2001, and $157.7 million in 2002.

Funding and Work Requirements

In Table 1b we incorporate these penalties into the difference between funding under TANF and under the entitlement structure. The differences between the two programs listed in Table 1b should be interpreted as bounds on the difference in the two programs when the costs of work requirements are considered. Presumably, if meeting the work experience goals would cost more than the penalty, states would simply accept the penalty. By comparing Table 1a and Table 1b we can see the impact of not meeting the work requirements. If Kentucky were not to meet the work requirements in each of the first six years of TANF, its payment would be reduced by 11 percent, or $23.6 million.

Funding and Tax Reduction

Of course, if Kentucky's federal funds are to be reduced as a result of welfare reform, we can expect the federal funding of other states to be reduced as well, presumably leading to lower taxes paid by Kentucky residents. The Congressional Budget Office (CBO) projects reductions in federal spending from welfare reform of $3.0 billion in 1997, $8.3 billion in 1998, $9.4 billion in 1999, $10.3 billion in 2000, $10.7 billion in 2001, and $12.7 billion in 2002.[3] The majority of these reductions are not due to lower expected payments under TANF as compared to AFDC but instead are due to reductions in Food Stamps and Supplemental Security Income (SSI) payments as a result of the legislation. The CBO projects spending for cash assistance would be ten percent lower in 2002 than under the previous entitlement programs. This would result in a savings of $1.64 billion.

How might this reduction in spending affect Kentucky residents? That depends on how, and if, this tax savings (or budget deficit reduction) is allocated. If this savings were applied to reducing every individual's

income taxes by the same percentage, then the amount saved by Kentucky taxpayers is simply based on the fraction of taxes paid by Kentucky residents. In 1992, 1.07 percent of individual income taxes in the country were paid by Kentucky residents, which would translate to a savings of $17.5 million from switching from entitlement to block grant funding.[4] In the absence of any penalty and at a three percent rate of increase in entitlement spending in Kentucky, this would result in no change in net federal funds to or from Kentucky. If Kentucky is penalized, the state would see a reduction in net federal funds as a result of this legislation. Based on projected population in Kentucky in 2000 and this proportionate reduction in taxes, welfare reform would reduce taxes of Kentucky residents by $25.67 per capita.[5]

While TANF work restrictions may increase states' costs, the two- and five-year time limits should reduce these costs. Based on information about all Kentucky AFDC recipients in July 1993, Table 2 gives a breakdown of spell lengths for AFDC recipients. In 1993, 57 percent of the recipients had been on AFDC less than two years, while 85 percent had been on less than five years. Approximately 48 percent of recipients from 1990 to 1993 in Kentucky were on AFDC less than two years.

Impact of Spell Limits on Case Load and Expenditures

Based on these breakdowns, the two-year limit on welfare stays would lead to a savings of approximately 45 percent in current spending. This savings, of course, is overly optimistic since many recipients who reach the two-year limit will not find private employment with sufficient income to remove them from the rolls; hence, they will still receive benefits. Limiting the maximum spell length to five years or less would save approximately 20 percent. CBO estimates for all states a reduction of 30 to 40 percent in cash assistance rolls as a result of the five-year limit.[6] Thus, we should expect at the least a savings of 20 percent because of the lifetime limit and at the most a savings of 45 percent because of the two-year limit without work activities, although the actual savings will likely fall around the low end of the CBO estimate, or approximately 30 percent.

Characteristics of AFDC Recipients in Kentucky

To understand the impact of time limits and work requirements, we now examine some characteristics of AFDC recipients from June 1991 to June 1993, beginning with how these characteristics vary with length of stay. Table 3 provides education, work experience, and family structure breakdowns based on spell length for the entire state. The percentage of recipients having out-of-wedlock births tends to increase as the length of stay increases.

Overview of the Commonwealth

The percentage of recipients having little or no work experience does likewise, perhaps reflective of their having out-of-wedlock children, particularly when the recipients are young. Thirty-nine percent of recipients who have stays of less than two years have never or only occasionally worked, while 50 percent of recipients with stays exceeding two years have never or only occasionally worked. While education levels differ little among recipients with stays exceeding four years, there is a noticeable difference in the percentage of recipients with less than eight years of education between recipients having spells of two years or less (13 percent) and recipients who have spell lengths exceeding two years

TABLE 2

Number of Cases by Spell Length and the Impact of Spell Limits on Case Load and Expenditures, July 1995

	Length of stay (in years)										
	Less than 2	2 - 3	3 - 4	4 - 5	5 - 6	6 - 7	7 - 8	8 - 9	9-10	More than 10	Entire sample
Number of cases	38,647	10,340	5,761	3,414	2,211	1,535	1,262	1,055	816	3,072	68,113
Average grant	$211	223	212	219	222	223	225	223	225	222	$215
Total payments ($1,000)	$8,137	2,305	1,222	749	491	342	284	235	183	681	$14,629
Percentage of total cases in category	57%	15	8	5	3	2	2	2	1	5	100%
Percentage of total expenditures in category	56%	16	8	5	3	2	2	2	1	5	100%
Percentage of total expenditures in category and longer spell categories		45%	29	20	15	12	9	8	6	5	N/A

TABLE 3

Characteristics of AFDC Recipients by Length of Stay

	Length of stay (in years)											
	Less than 2	More than 2	2 - 3	3 - 4	4 - 5	5 - 6	6 - 7	7 - 8	8 - 9	9 - 10	More than 10	Entire sample
% of sample	65%	36	13	7	3	2	2	2	1	1	4	100%
Grant	$186	200	198	193	198	199	204	204	215	204	222	$191
Age	29	33	31	31	32	34	34	35	37	37	38	31
Male	10%	8	10	7	8	10	8	10	6	1	6	10%
Nonwhite	17%	18	16	19	22	15	16	19	22	19	23	17%
Education, years	10.8	10.4	10.7	10.7	10.3	10.1	10.1	10.0	10.3	10.0	10.2	10.7
Education, less than 8 years	13%	20	16	16	22	25	22	31	25	29	23	15%
Education, 12 or more years	51%	44	49	48	41	40	32	38	47	38	40	49%
Employed	20%	18	19	20	24	15	14	16	18	13	16	19%
Never worked	19%	36	28	34	32	42	40	45	46	55	54	25%
Never or occasionally worked	39%	50	41	46	46	56	55	61	58	65	74	43%
Wages	$110	93	93	112	130	83	73	95	68	76	57	$104
Family size	2.9	3.0	3.1	3.1	3.0	3.0	2.8	3.1	3.0	2.8	3.1	3.0
Number of children	1.5	1.7	1.7	1.8	1.7	1.7	1.7	1.9	1.9	1.6	1.9	1.6
Children under 2	28%	12	16	11	10	10	9	5	10	8	9	23%
Children under 6	10%	9	13	9	8	6	4	3	3	3	4	9%
Children over 16	9%	13	11	11	12	13	19	15	16	15	21	11%
Out-of-wedlock birth	40%	47	38	47	50	51	49	55	49	58	64	43%

(20 percent). Not surprisingly, the longer the stay on AFDC, the older the recipient and the less likely he or she has young children.

In a number of respects, there is little difference among AFDC recipients based on how long they stay on the program. But with respect to the education and previous work experience — two characteristics that will likely influence their employment chances — those recipients staying longer than two years are at a definite disadvantage.

Table 4 shows the characteristics of recipients who have been on AFDC for more than two years in July 1993 according to the Area Development District (ADD) in which they reside. The most notable comparisons are, again, education and work experience. The areas which can expect the greatest difficulty in obtaining employment for long-term recipients are in south and southeastern Kentucky, where as little as 33 percent of the long-term recipients in Cumberland Valley and Lake Cumberland ADDs have at least a high school degree, and 34 percent in Kentucky River ADD have eight years of education or less. Most long-term recipients demonstrate little experience in the labor market, with most ADDs ranging from a minimum of 40 percent who have had little or no work experience (Northern Kentucky and Bluegrass are exceptions at 37 percent) to a maximum of 73 percent for Kentucky River. In addition, all ADDs in eastern and southeastern Kentucky show well over the state average of 50 percent.

Differences in Recipients across Kentucky

These low education and work experience levels in southeastern Kentucky (Big Sandy, KY River, Cumberland Valley, and Lake Cumberland ADDs) hold for men and women, with a more pronounced effect for men. Overall, women on AFDC longer than five years have an average of ten years of education, while men have an average of only eight years. But as already stated, there tends to be a concentration of male recipients in these four ADDs in south and southeastern Kentucky as is little to no work experience among recipients. These ADDs can expect to have the most difficulty in transforming welfare recipients to members of the labor force.

The Reconciliation Act requires Kentucky to reduce its welfare rolls and move its recipients into jobs. To understand better how Kentucky can accomplish this, we more closely examine what characteristics of AFDC recipients affect their length of stay. We are particularly interested in those characteristics that the state may be able to influence, namely, education and work experience.

Impact of Education and Family Structure on Spell Length

To examine the length of stay of AFDC recipients, we examine recipients' hazard rates, the probability a recipient will leave the program in the next month given the number of months he or she has already been on the program. For example, a hazard rate of 4.5 percent for the seventh month of assistance means 4.5 percent of recipients who have been in the program six months leave the program in the seventh month.

TABLE 4

Characteristics of AFDC Recipients by Area Development District

Area Development District	% of Population	% of Employment	% of Retail and Service	Unemployment Rate
Purchase	5%	1.2%	2.9%	7.6%
Pennyrile	5	2.2	7.4	9.5
Green River	5	3.2	7.9	8.0
Barren River	5	0.3	0.8	7.0
Lincoln Trail	4	4.0	12.7	8.8
KIPDA	5	0.2	0.5	6.0
Northern KY	4	0.4	0.9	4.9
Buffalo Trace	6	5.2	17.0	7.4
Gateway	8	17.4	45.3	10.5
FIVCO	8	4.7	11.3	11.2
Big Sandy	11	3.0	6.9	13.3
KY River	14	3.0	7.1	14.3
Cumberland Valley	13	1.8	4.3	13.5
Lake Cumberland	9	1.5	4.6	9.9
Bluegrass	5	0.2	0.5	6.5

Figure 1 shows four recipients who are representative of the general AFDC population. These four representative recipients were chosen to highlight the impact on the length of AFDC stays of specific recipient and household characteristics: level of education, marital status, and the combination of having a young child and never being married.

Figure 1 also shows the fraction of each of the four representative recipients for each month that will leave AFDC in or before that month. These values show the impact family structure and education have on how long a recipient may stay on AFDC if no limits were imposed. For example, we observe that 38 percent of recipients represented by recipient (3) will leave AFDC in less than a year while 26 percent of recipients represented by (4) leave in less than a year. The difference of four years of education accounts for a difference of five percent between the probability of leaving AFDC for recipient (1) and recipient (2). These differences become more dramatic over time: 53 percent of the recipients represented by (3) leave in less than two years while only 37 percent of the recipients represented by (4) leave in less than two years. After two years, 48 percent of recipients represented by (1) leave while only 41 percent of recipients represented by (2) leave. These representative recipients suggest that: 1) an increase in education has a significant impact on reducing the length of AFDC stays and 2) marital status affects AFDC stays, with the impact of a recipient's never being married greatly increasing the length of stay.

Impact of Welfare Limits on Regional Labor Markets

Table 4, as discussed in the preceding section, shows significant differences in the work experience and education of long-term AFDC recipients among ADDs in Kentucky. These differences in experience and education are likely to lead to differences in the success of recipients in finding employment when forced to leave the welfare rolls.

In addition to work experience and education, however, we must also consider labor market conditions in recipients' regions when predicting their ability to find employment. Table 4 provides for the 15 ADDs the

FIGURE 1

Fraction of Recipients Leaving by Months on Program, Different Recipient Characteristics

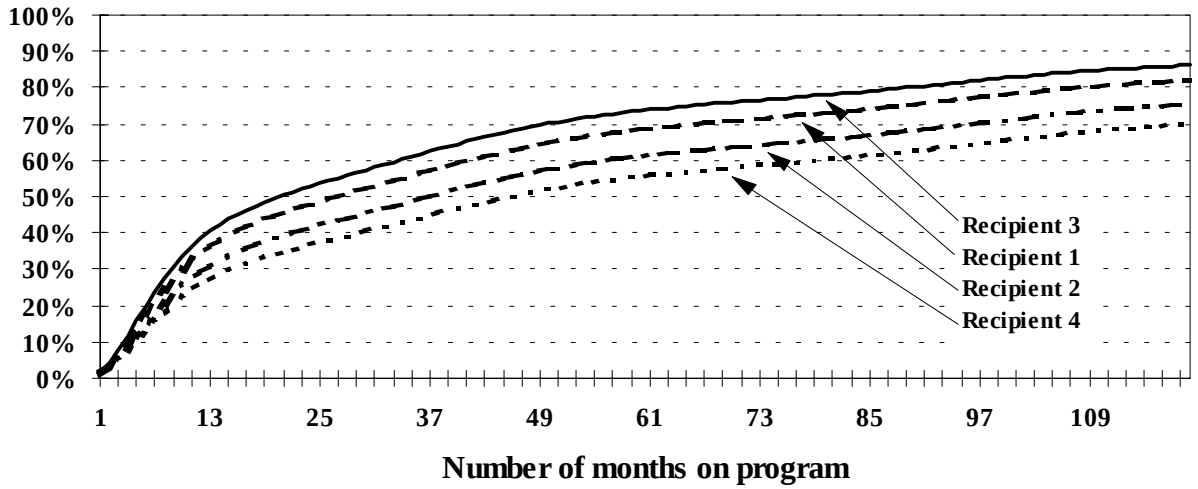
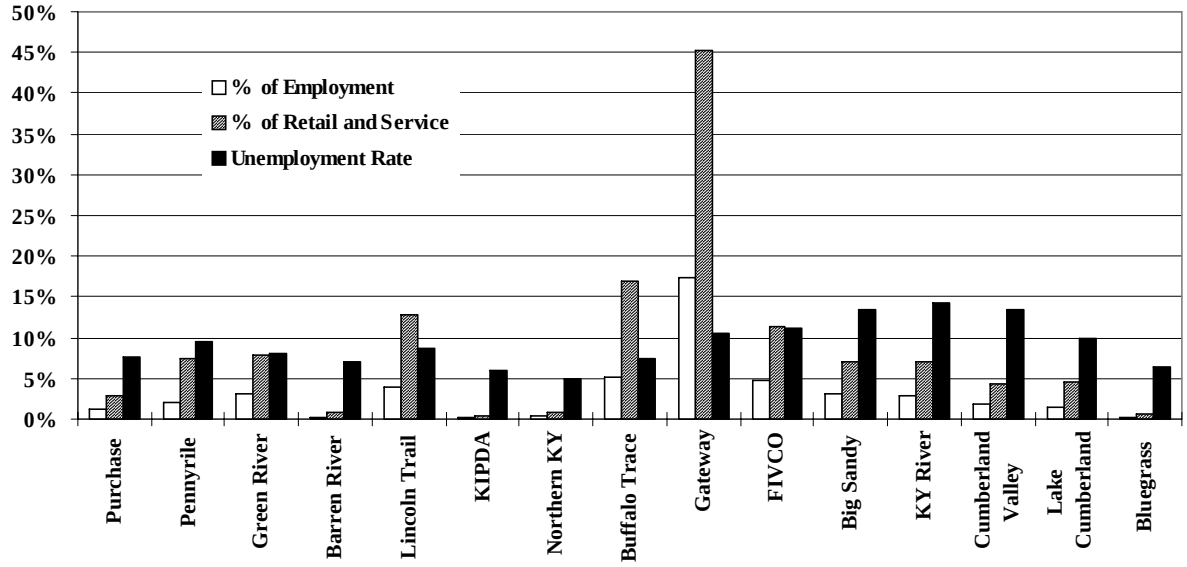


FIGURE 2

Characteristics of AFDC Recipient Area Development District, and ADD Unemployment Rate



unemployment rate, the percent of total employment represented by AFDC recipients, and the percent employment of the retail and service industries these recipients will comprise when forced into the labor market. (Presumably, many former recipients will find employment in the retail and service industries.) Table 4 shows wide variation among ADDs in the share of the labor force former AFDC recipients would comprise. For large urban areas, former recipients would comprise a small share of the entire labor force as well as retail and service employment. For several largely rural ADDs, however, former recipients would comprise over 10 percent of all retail and service employment. Hence, the major urban areas in Kentucky likely will be far more able to employ former recipients than will rural areas, especially those in Eastern Kentucky. Figure 2 provides a graphical summary of these same characteristics.

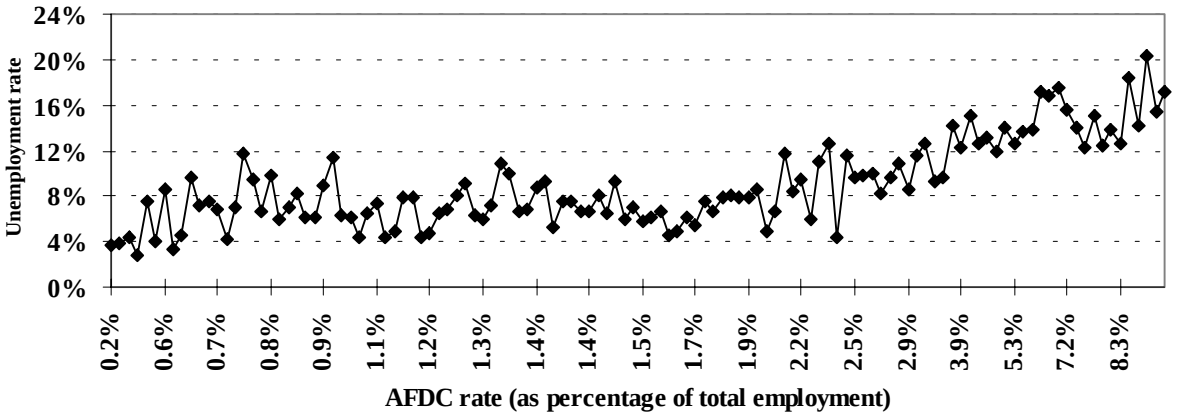
Compounding difficulties in recipients' transition to work will be the high unemployment rates in ADDs where these recipients would comprise a large share of the labor force.

Compounding difficulties in recipients' transition to work will be the high unemployment rates in ADDs where these recipients would comprise a large share of the labor force. Predictably, urban ADDs have much lower unemployment rates (KIPDA, 6.0 percent; Northern Kentucky, 4.9 percent; Bluegrass, 6.5 percent) than the rural ADDs (10 to 14 percent for the ADDs in south and southeastern Kentucky.) Figures 3a and 3b show this relationship between unemployment and former recipients' percentage of the labor supply. There is a definite positive relationship between the two factors, implying that counties with more former recipients seeking work also have higher unemployment rates. This mix of a large number of recipients forced off AFDC, high unemployment, and few jobs, particularly in the service and retail sectors, is not simply a problem for former recipients — competition for jobs could reduce employment for the unemployed and decrease wages (or wage growth) for those residents with jobs.

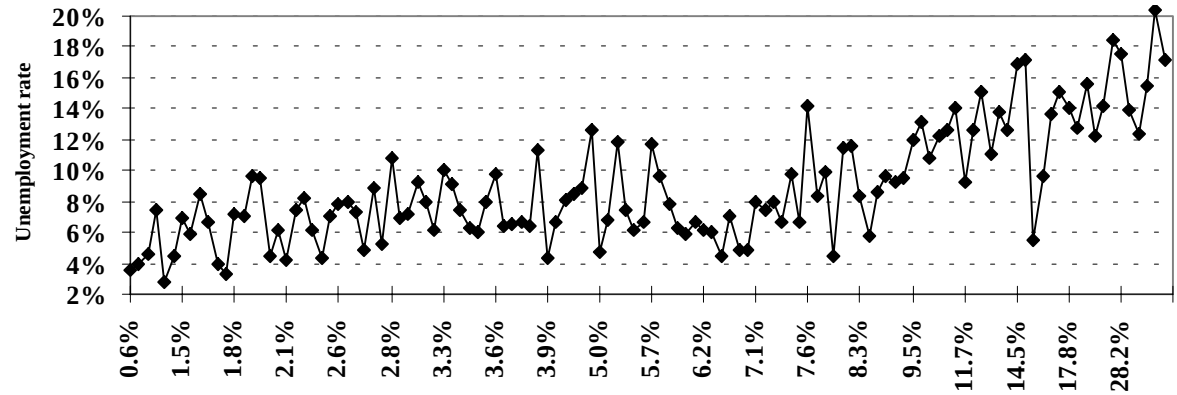
The above conditions may make the adoption of a relocation assistance program a good if not necessary policy, whereby the state provides financial assistance to recipients who wish to move to obtain employment in other areas.[7] These employment figures also reinforce many predictions about welfare reform — that it will cause migration from the impoverished Applachian regions of Kentucky to the urban regions with their lower unemployment rates and greater employment opportunities.[8] Without such migration, it is difficult to believe employment and wages could respond enough in Appalachian Kentucky to absorb the increases in the labor force that welfare reform will generate.

FIGURE 3

A. AFDC Recipients as Percentage of Total Employment versus Unemployment Rate



B. AFDC Recipients as Percentage of Retail and Service Employment versus Unemployment Rate



Work Requirements, Participation Rates, and Work Activities

Work requirements for recipients and minimum work participation rates are a radical departure from AFDC. All adults in families receiving assistance must participate in work activities after two years. Furthermore, any recipients receiving assistance for more than two months must participate in community services if they are not engaged in accepted work activities, which include unsubsidized employment, subsidized private or public employment, on-the-job training, vocational training (not more than 12 months), GED program for adults or high school for teenage recipients, and child care provider for individuals participating in community services. Work activities that are not acceptable include adult basic education and literacy classes and work experience (unless private sector work is limited).

In addition to these activities, recipients have a minimum work hours per week equal to 20 hours for 1997–1998, 25 hours in 1999, and 30 hours for 2000 and beyond. Two-parent families are required to participate a minimum of 35 hours a week. With federal approval, the state can exempt some recipients from this requirement, but these individuals still are included when calculating recipient participation rates for the state.

Moreover, states must now have a much higher percentage of their recipients in employment or training programs to avoid financial penalties. Under the 1988 welfare reforms, states were required to have 10 percent of their recipients in training or employment programs. In fiscal year 1997, the new legislation states that 25 percent of all recipients must be employed or take part in training programs. This figure increases by five percent each year until 2002, when it will remain at 50 percent. Furthermore, the new legislation requires 75

percent of all recipient families with two adults in 1997 and 90 percent in 2002 to have at least one adult working or in a training program.

Costs of Welfare to Work

These mandatory work participation rates will likely prove the greatest challenge for Kentucky and prove to be extremely expensive. The largest expense will go to child care services for recipients' children, while job search, training, and transportation subsidies will be quite expensive as well. For example, for a female recipient to find employment at 30 to 40 hours a week, the state may have to care for her two children under age six at a cost of $100 a week. The monthly cost of child care, therefore, is $400, substantially more than the average $225 Kentucky was paying in AFDC benefits for a one-adult, two-child household. Of course, if the recipient is receiving vocational training, participating in community service, or working in subsidized public or private employment, Kentucky will have to pay these subsidy costs as well. In fact, the Congressional Budget Office, using states' performance in the Job Opportunities and Basic Skills (JOBS) program, assumed that states would not meet the required participation rates and face a penalty of up to five percent but probably on the order of 0.5 percent.

These mandatory work participation rates will likely prove the greatest challenge for Kentucky and prove to be extremely expensive.

One unintended consequence of welfare reform concerns the classification of former recipients who have found private employment. If a state is very successful in finding private, unsubsidized employment for many recipients, it may be more likely to fail to meet its participation rates for job assistance and training programs. Because these persons no longer count as "recipients," the state will not receive any credit for them when trying to meet its participation rates. Thus, the state's welfare rolls will be left with only the truly unemployable, and the state will have no chance of meeting the participation rate goals.

Since work activities include training, some education, and job search assistance, it is worth examining the past experiences with these types of programs. One of the more interesting aspects of the Reconciliation Act is that community work experience, one of the major work activities used in the JOBS program, is only acceptable in special circumstances. Traditionally, training and job search programs have been viewed as having little effect in increasing earnings or reducing welfare rolls.

Work Activities

Evidence from programs in the 1980s and early 1990s, however, seems to indicate a positive impact on earnings and a reduction in welfare rolls from these employment programs.[9] Two relevant employment programs occurred in West Virginia and Arkansas, where many of the AFDC participants live in rural areas, much like in Kentucky. In Arkansas, two groups, one which participated in a job search program and work experience and one which did not, were compared. At the end of three years only 32.8 percent of the recipients who participated in the employment programs were still on AFDC compared to 40.1 percent of the recipients who did not participate, and 34 percent more of the participants in the employment program were employed at the end of three years. In contrast, in West Virginia, the employment program consisted of only work experience with no job search assistance. There, the program had almost no impact on welfare rolls or payments.[10] These results show that work experience programs are not acceptable unless there is very limited private employment in an area. Unfortunately, the Reconciliation Act only allows four weeks of job assistance, a type of program that seems to have had success in the past.

While there is evidence that employment assistance programs can have positive impacts, these results are based on much smaller numbers of recipients. Large-scale programs are less likely to show success since more recipients will have limited education and work experience. Furthermore, while these programs have demonstrated success in finding employment for AFDC recipients, their cost-effectiveness is less clear. They may prove relatively effective on a long-term basis but quite expensive in the short term.

Conclusions

Welfare reform has increased Kentucky's options for providing assistance to low-income families with dependent children. This increased flexibility will not come without a cost, however. Kentucky can expect increases in payments from the federal government under the block grant structure only in the most severe economic downturns. Kentucky residents will have to pay for increases in rolls due to mild recessions.

The work requirements and lifetime limit on benefits will profoundly affect cash assistance. In Kentucky, this impact will be greatest in the Appalachian region, where the combination of limited education and work experience among recipients, a large fraction of the population receiving AFDC benefits, few jobs, and high unemployment make future employment prospects bleak. As a result of this legislation, Kentucky should be prepared for and perhaps encourage migration from these areas to urban areas, where unemployment rates are lower and job opportunities greater. Finally, if Kentucky is to "end welfare as we know it," it must be prepared to pay for it. The shift from entitlements to block grants shifts greater responsibility to the states. Past experiences indicate that for some recipients appropriate employment programs can succeed in reducing welfare rolls and costs. But instituting these programs will be expensive, and their benefits will likely not be seen until much further in the future.

FOOTNOTES

[1] Figures are based on *Statistical Abstract of the United States, 1995*, Table No. 585, p. 375. Figures for state spending include state general public aid and thus are somewhat higher than a state's share of AFDC funding.

[2] While federal funds are no longer directly related to AFDC rolls, states can receive contingency funding which is triggered either by changes in the state's unemployment rate or its number of food stamp recipients.

[3] From Congressional Budget Office report on H.R. 3734, August 9, 1996, Table 1, p. 28.

[4] Calculated using *Statistical Abstract of the United States, 1995*, Table 537, p. 347.

[5] Calculated using population projection Series A from *Statistical Abstract of the United States, 1995*, Table 35, p. 34.

[6] From CBO report on H.R. 3734, August 9, 1996, Table 1, p. 4.

[7] See Chad Carlton, "New limits on welfare take effect," *Lexington Herald-Leader*, October 2, 1996, p. A1.

[8] See Bob Geiger and Karen Samples, "Welfare reform may spur mountain people to move," *Lexington Herald-Leader*, August 18, 1996, p. A1.

[9] See Judith Gueron, "Work and Welfare: Lessons on Employment Programs," *Journal of Economic Perspectives*, 4(1), 1990, pp. 79-98; Robert Moffit, "Incentive Effects of the U.S. Welfare System: A Review," 30(1), 1992, pp. 1-61; General Accounting Office, "Welfare to Work: Most AFDC Programs are not Emphasizing Job Placement," 1995, GAO/HEHS-95-113.

[10] See Gueron (1990).

More Efficient Financing of Higher Education: The Case for Tuition Increases

Dan A. Black and *Amitabh Chandra*

A case for the elimination of tuition subsidies at public universities in Kentucky can be made after studying their impact on equity, efficiency, competition, and the level of educational quality. We describe the rationale for determining tuition schedules in Kentucky and demonstrate various inefficient consequences of the current system. Insofar as higher education in the state should be subsidized because certain students are financially constrained, it makes little sense to provide that subsidy to all students regardless of income levels. Eliminating the "need-blind" component of this subsidy would be the first requirement of any response to the current problem of funding. It would also free up millions of dollars of revenues that could be returned to taxpayers or used for expenditures in other areas of need.

"We must tell these officials that it's not OK to raise our tuition, especially not without consulting us…So get out there today at 11:30 and show that you don't want to pay more for your education…What we do today affects what will happen tomorrow. (Don't forget that one day you may have to pay for your son's or daughter's college education.) You can influence your own future, stand up for your rights and even have a good excuse to skip class."

November 2, 1994, editorial in the Kentucky Kernel, the University of Kentucky student newspaper, encouraging students to protest a $40 tuition increase.

INTRODUCTION

Opponents of tuition increases at public colleges and universities have become increasingly active and vocal. For example, at the University of Kentucky in 1994, over five hundred students walked out of classes and disrupted traffic to protest a proposed 3.7 percent increase in tuition, representing a $40 increase.[1] As the above *Kentucky Kernel* quotation illustrates, some students at public institutions argue that tuition subsidies should be considered as *rights*, with little regard for the motivations behind the increase. Yet the tuition that students pay in Kentucky's public institutions is several thousand dollars below that of their counterparts in Kentucky's private schools. It also draws attention to the efficiency with which students and their supporters are able to garner support for their cause. In such an environment, to suggest the case to the contrary is often viewed as heresy.

Higher education receives two types of appropriations: student aid and tuition subsidies. The first, student aid, is direct assistance to students and includes programs such as Pell grants, Perkins and Stafford loans, and work-study arrangements.[2] All of these programs explicitly incorporate a student's "need" in determining the size of the award. As a result, there is significant evidence that they benefit lower-income families, with poorer families being the most likely to receive such aid and obtain the most generous offers.[3] The federal government provides over three-fourths of all student aid, which is available to students at both public and private institutions.

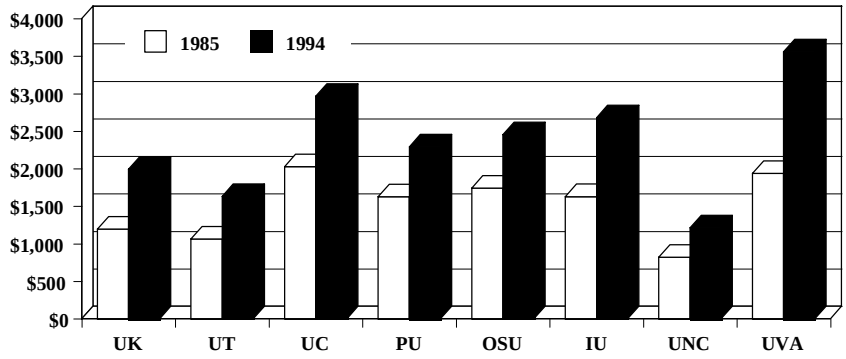
The second form of assistance, which is the focus of the current discussion, is a tuition subsidy. Such assistance reflects the fact that the price that public universities charge their students does not cover the full costs of providing that education. Moreover, unlike student aid, tuition subsidies are "offered" to students regardless of their financial need. Students from both wealthy and poor families qualify for the subsidy simply by virtue of their enrollment at a public university. The fact that students, regardless of their incomes, do not bear the full costs of attending college raises a number of peculiarities in the market for higher education. In this paper we discuss these issues from an economic perspective and develop the case for tuition increases as the appropriate policy response to address these inefficiencies.

Our research has far-reaching implications: In 1992, public universities in the U.S. received over $35 billion in state and local appropriations, generated over $14 billion in tuition revenues, and enrolled approximately

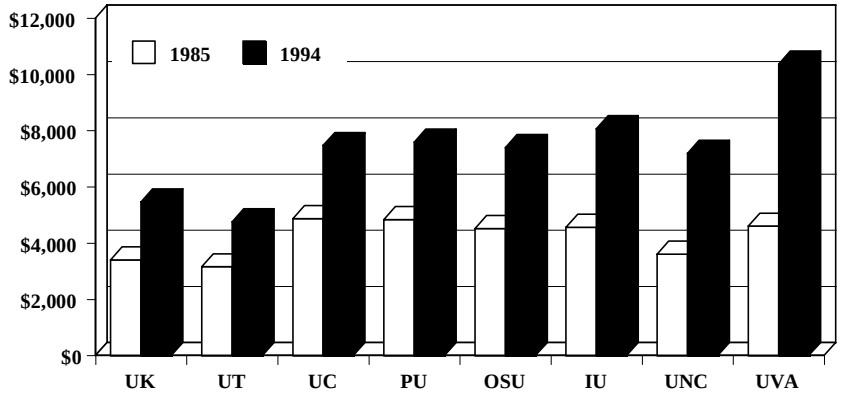
FIGURE 1

Undergraduate Tuition at the University of Kentucky and Surrounding Universities, 1985 and 1994

A. Undergraduate in-state tuition



B. Undergraduate out-of-state tuition



UK = University of Kentucky

UT = University of Tennessee

UC = University of Cincinnati

PU = Purdue University

OSU = Ohio State University

IU = Indiana University

UNC = University of North Carolina

UVA = University of Virginia

11.3 million students.[4] In Kentucky, public universities enrolled over 121,000 students, obtained $411 million in state aid, and generated over $197 million in tuition revenues. The University of Kentucky alone had a total operating budget of $1.13 billion, receiving over $345 million in state appropriations in 1996–97, and generated revenues from tuition in excess of $130 million.[5] While our analysis applies to public institutions all over the United States, we shall focus here only on higher education in Kentucky.

This analysis shall take place at four levels. In section II, we present some facts about tuition increases at the University of Kentucky and at comparable institutions, and discuss the mechanism that is currently used to determine tuition schedules in Kentucky. Next, in section III, we analyze the efficiency of this mechanism from a variety of perspectives by examining its implications for equity, competition, and educational quality. In section IV, we develop from a public choice perspective why the (unpopular) case for tuition increases has been absent from discussions on the future of higher education. We conclude with a review of policy recommendations that may serve as alternatives to the current system of financing higher education, and motivate a much needed discussion on higher education reform in Kentucky.

FACTS ABOUT TUITION INCREASES

In this section we present some facts about tuition increases, both in Kentucky and at public institutions in surrounding states. After that, we discuss the current mechanism by which the Council for Higher Education (CHE) determines tuition increases.

Relative Price of Tuition in Kentucky

In Figure 1a and Figure 1b we illustrate the cost of attending the University of Kentucky (UK) and other comparable institutions over the 1985-1994 period. The graphs distinguish tuition costs (in constant 1987 dollars) for in-state and out-of-state undergraduate students at these schools. Both in-state and out-of-state

tuitions have increased at a much faster rate for the other universities under review than at the University of Kentucky. Therefore, the relative cost of higher education in Kentucky has decreased significantly since 1985, to the benefit of UK students and their families. As a result, these persons are able to spend a larger portion of their incomes on consuming other goods and services, unrelated to higher education expenditures, than the residents of other states where UK's benchmark institutions are located.

Related to the relative decline in tuition costs for Kentucky over the past decade is an explosion in the "college premium," or the additional wages that college graduates earn over those workers who did not complete or attend college. Empirical studies examining these two sets of persons suggest that college graduates receive $500,000 to $1,000,000 more than high school graduates in their lifetimes. Labor economists who have investigated the relationship between education and earnings have found that the wage premium of skilled workers is 40–50 percent higher than in 1963. In Kentucky, the monetary returns to schooling are even greater than those for the U.S., and this return has been increasing over time. For example, in 1994 college graduates (with only a bachelor's degree) in Kentucky earned 60 percent more than high school graduates, holding all demographic and other characteristics constant. In 1988, this premium stood a little over 48 percent, suggesting a 25 percent increase in the returns to college over a six-year interval.[6] In Figure 2, we demonstrate this increase for Kentucky and graph the average wages of college graduates to high school graduates in Kentucky for 1979–93. The premium received by highly trained workers such as college graduates is expected to continue, as the demand for skilled labor grows and as the expanding international trade rewards the U.S.'s comparative advantage in such labor.[7]

The purpose of the above discussion was to highlight the extent to which the relative price of tuition in Kentucky has fallen with respect to other states, and to document the increase in the returns to college. In the ensuing analysis, we will appeal to both facts as we advocate the case for tuition increases.

The Current System

In Kentucky, tuition schedules for all public universities are determined by the Council for Higher Education (CHE). CHE's formula is as follows: For each group of universities (doctoral, masters, community college), CHE compares the share of in-state tuition at comparable benchmark institutions to the per capita incomes in their respective states. For example, as Table 1 illustrates, the tuition for UK and the University of Louisville, Kentucky's two doctoral institutions, is determined by comparing the ratio of tuition at several nearby universities to the per capita income in their respective states. Note that the tuition schedule for 1996–97 and 1997–98 in Kentucky was derived by consulting 1994–95 prices in other states. By this criteria, CHE determined that the median tuition at other states was 11.8 percent of their average per capita incomes. It therefore set tuition at UK and UofL at 11.8 percent of Kentucky's per capita income. Out-of-state tuition is determined by multiplying the in-state rate by a factor of three.[8] Similar rate-setting mechanisms determine the tuition schedule at UK and UofL's professional schools of law, dentistry, and medicine. This system of determining tuition increases has several major shortcomings:

- Because tuitions are determined only every two years, a significant portion of the increase will only offset the effect of inflation. With annual inflation currently at 2.8 percent, a tuition increase of only 5.0 percent every two years cannot offset the effect of higher prices that universities face, a fact often lost at student rallies that protest tuition increases. A more sensible approach would at the very least implement an inflation-indexed tuition increase schedule.

TABLE 1

Tuition and its Percent of State Per Capita Personal Income (PCPI) at Kentucky's Benchmark Institutions, 1994–95

Benchmark institution	1994–95 tuition	Percent of state PCPI
University of Virginia	$3,724	16.5%
University of Cincinnati	3,234	15.5
Virginia Polytech & State University	3,339	15.0
University of Akron	2,888	13.8
Purdue University	2,798	13.7
Indiana University	2,742	13.5
Virginia Commonwealth University	3,034	13.4
University of Toledo	2,694	12.9
Ohio State University	2,481	11.9
University of Missouri (Columbia)	2,424	11.7
University of Missouri (Kansas City)	2,424	11.7
University of Illinois	2,760	11.6
University of Tennessee	1,830	9.4
West Virginia University	1,332	7.7
Georgia State University	1,526	7.5
University of North Carolina (Chapel Hill)	874	4.4
North Carolina State University	874	4.4
University of Houston	672	3.4
Median		**11.8%**

- The rate schedule does not reflect the costs of the production of higher education.[9] Instead, it simply measures the ratio of tuition prices to per capita incomes in other states — a crude measure of the "burden" of higher education in other states two years previous. If the real costs of production of higher education are increasing, independent of inflation, as a result of recruiting superior faculty and providing better resources to students, CHE's formula does not incorporate a means to charge higher tuition to cover these costs. Furthermore, if Kentuckians place a higher value on higher education than residents in other states, and are therefore willing to pay more for better public universities, the current system cannot incorporate such a willingness to pay for better quality. One consequence of this deficiency is that the brightest high school graduates from Kentucky probably leave the state to attend college.

- CHE's formula relies on per capita incomes and tuitions for 1994–95 to determine the tuition schedule in 1996–97 and 1997–98. Such an approach overlooks the fact that during the interim Kentucky's per capita income would also have grown. As a result, Kentuckians in 1996–97 and 1997–98 can afford more for tuition than the CHE formula requires. CHE justifies this deficiency by illustrating the non-availability of current data on per capita income as this data are typically lagged by two years. While this statement is correct, it makes little sense to assume that Kentuckians in 1997–98 were only as well off as West Virginians or Tennesseeans in 1994–95. Expectations about inflation and projections of per capita income growth are readily available and could be easily incorporated into the calculations.

- CHE's formula relies on per capita income in Kentucky as a reasonable measure of the ability of Kentuckians to afford going to college. This assumption holds only if students from the average Kentucky family are most likely to attend college. As we illustrate in the next section, however, students who attend state universities such as UK typically come from families with higher incomes than the average family. Therefore, while tuition rates are determined by assuming that a student from the average Kentucky family attends college, in reality a far more affluent student actually attends college. Affluent families are able to afford much higher tuition charges, and they benefit considerably from the current tuition formula.

- As a result of the above argument, the current system of determining tuition schedules is highly regressive — all Kentuckians pay the taxes that finance higher education. A disproportionate share of the tuition subsidy to higher education, however, is received by more affluent families. At UK for example, in 1995 only 48 percent of full-time undergraduates applied for financial aid, and were determined to be needy.[10] Furthermore, because of the college premium, tuition subsidies only function to increase disparities in the income distribution. These subsidies benefit richer students who, as a result of advanced training, will go on to earn more than those who did not attend college.

As the above criticisms demonstrate, there is little economic logic to justify CHE's tuition-setting formula. In the following section, we examine other implications of the current rate setting regime, which have detrimental effects for competition and equity.

The Case for Tuition Increases

There are four principal reasons why tuition subsidies should be reduced and why a tuition increase should fund this reduction in tuition. They include concerns over equity, quality, competition, and efficiency. Below, we examine each in detail.

Equity Considerations

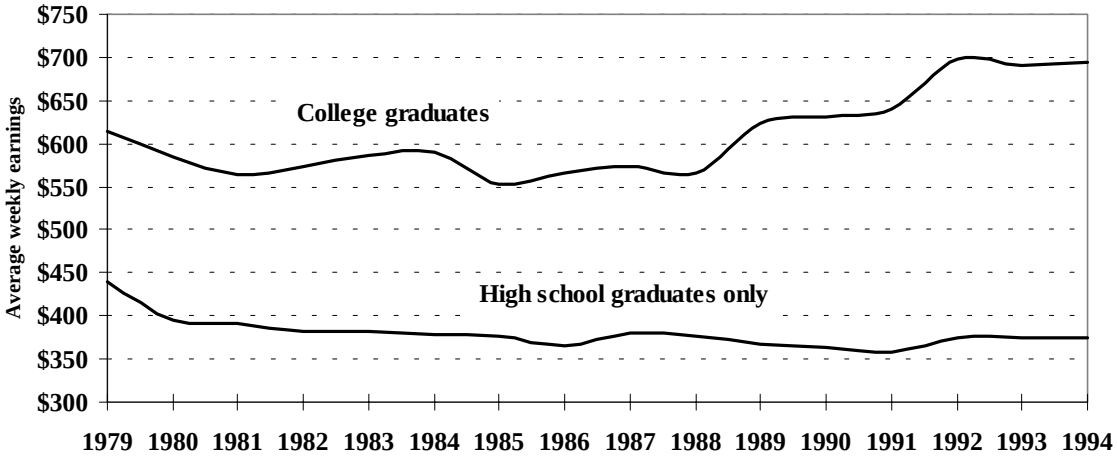
Proponents of tuition subsidies are quick to emphasize their role in correcting equity imbalances. Typically, they argue that a high ability student from a poor family should not be prevented from going to college simply because of financial constraints. Society in general, they continue, has much to gain by subsidizing this person's education because he or she will make a much larger contribution to society than the amount invested in education. These proponents also argue that this subsidy should be extended to all students, regardless of their family's income, because education has certain "spill-over" effects — in other words, all members of society benefit when any person becomes better educated. The following section discusses this argument in detail.

Poor families cannot afford college.

Because college is expensive, poor families often find it difficult to send their children to college, a problem magnified by the rapidly increasing costs of going to college. Students who do go to college, however, will eventually have higher incomes than those who did not (see Figure 2), and therefore, they should be able to borrow money to go to college and repay those loans with future earnings. If low-income students cannot obtain loans, however, there may be a role for government involvement to correct this capital market imperfection.

FIGURE 2

Average Weekly Earnings of Kentucky Workers, College Graduates and High School Graduates Only, 1979–94



The argument for equity considerations can be justified if capital markets are imperfect.[11] In this case, however, a government's role in higher education is only to remove such market imperfections. Providing *guaranteed* loans at market interest rates, or even subsidized loans, would correct this imbalance.[12] The case for providing tuition subsidies to all students, regardless of income levels, does not follow from the lesser ability of poorer families to afford college.

Higher education has positive "spill-over" effects.

Economic theory suggests than when there are external (indirect) benefits from an activity such as higher education, markets will lead people to invest in less than the socially efficient quantity of education. The indirect benefits may include a more informed electorate, for example. Because recipients of higher education may not fully see the value of being a better informed voter, they do not fully value their education and may consume too little education from society's viewpoint. Of course, the direct benefits to higher education, such as higher productivity in the labor market, are easy to quantify because we can observe the wages paid to graduates. With no empirical evidence for these indirect effects of higher education, however, the external benefits have proven difficult to quantify.[13] After all, how does society gain from the production of an additional economist or anthropologist? Without strong evidence of public gains, it is hard to rationalize an annual expenditure of over $400 million of taxpayer money on the basis of alleged benefits.

There are two unintended consequences of tuition subsidies that we document in this section. The first concerns the burden that public institutions bear during recession years as a result of increased enrollments and lower levels of state support. The second discusses the implications of the current system on the choice of college major as well as the incentives to graduate within a reasonable amount of time.

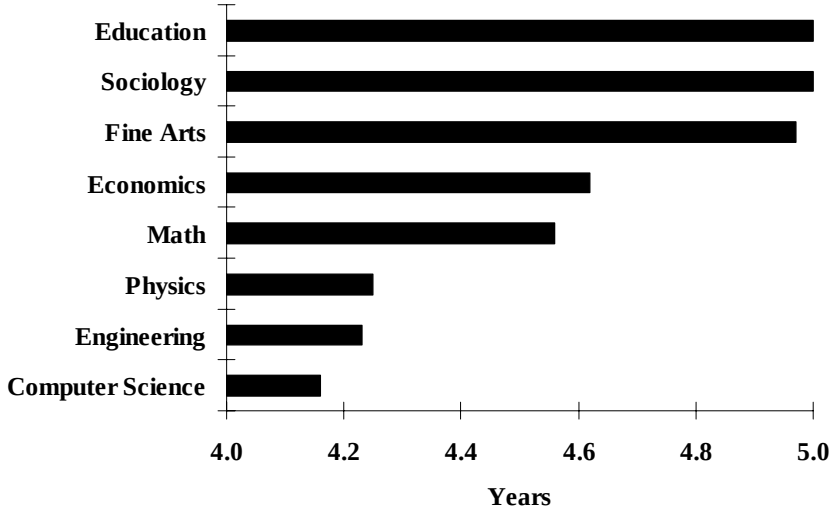
Efficient Production of Education

College enrollments are counter-cyclical, meaning they move in the opposite direction from the business cycle. Periods of growing economic activity display reduced enrollments, whereas economic downturns, or recessions, see large numbers of students returning to college. Economist Gary Becker's simple model of human capital accumulation is able to reconcile these facts: If students rationally compare the costs and discounted benefits of attending college, then during "boom" years, one of the costs of attending college, forgone wages, increases significantly, as jobs are relatively easy to find. During recessions, however, when jobs are scarce (and forgone wages are lower), it makes more sense to return to college.

The counter-cyclical movement of college enrollments has immediate implications for public universities. Typically, such universities receive a large portion of their operating expenses from the state. For example the University of Kentucky's budget for 1996–97 shows that the state's contribution to the university budget was over 30 percent. Furthermore, for public colleges in Kentucky, revenues from tuition were only 47 percent of appropriations from the state.[14] During a recession, however, the state's resources are strained as a result of lower revenues and larger welfare disbursements, resulting in lower support to public

FIGURE 3

Average Time to Complete a Bachelor's Degree for Different Majors at the University of Kentucky



universities. As a result, public universities typically go through a difficult period during recession years with substantial cutbacks in expenditures and hiring. The counter-cyclical nature of state support, when augmented with the counter-cyclical college enrollments, places a significant burden on colleges during recession years. Much of this situation could be eased with increases in tuition. Tuition increases would reduce public schools' dependence on state financing, and therefore reduce the impact of the business cycle on them. To the extent that these cutbacks during recession years cause public universities to be viewed as inferior to their private counterparts, tuition increases will help close one component of the quality differential between the two types of schools.[15]

Subsidizing college tuition also affects the time taken to graduate by reducing the costs of attending college for additional years. Under the current system, tuition subsidies are given without regard to the amount of time a student has spent in college. Therefore, a student is assured a certain level of support regardless of whether he or she takes four years or longer to graduate. Consequently, it is not surprising that students at public universities on average take much longer to graduate than their peers at private schools. These so-called "nth" year students abound at the University of Kentucky: in 1993, over 50 percent of the graduating class who were not transfer students took more than five years to graduate, with 10 percent of this group taking over seven years.[16] Once again, the fact that neither students nor their families bear the full costs of extending undergraduate careers results in other members of society having to bear the costs. In Figure 3, we graph the mean time to graduation for different majors at UK. Notice the strong negative relationship between the time taken to graduate and majors with low earnings.[17] Students with low future earnings are the ones most likely to extend the time taken to graduate because their forgone wages (from staying in school another year) are lower than those of students in other majors.

Tuition increases would reduce public schools' dependence on state financing, and therefore reduce the impact of the business cycle on them.

Tuition subsidies also affect the choice of college major. Following the work of Gary Becker, we assume that a student's choice of college major depends on his or her interests and abilities, the costs of training in that discipline, and the benefits (both monetary and non-pecuniary) that accrue to the individual as a result of that investment over a lifetime.[18] Other research has supported Becker's conclusions. Robert Willis and Sherwin Rosen found that the decision to attend college is highly sensitive to pecuniary rewards, with a 10 percent increase in starting salaries translating into a 20 percent increase in college enrollments. Similarly, Astin, *et al.*, found that 83 percent of college freshmen chose "to get a better job" as the primary reason for attending college.[19]

Because students in majors with low market earnings take longer to graduate, the current system of tuition subsidies provides a disproportionate subsidy to their education compared to the education of those who enroll in more remunerative majors. As a result, the current system disproportionately encourages students in majors with lower financial rewards. More importantly, by lowering the cost of staying in college, tuition subsidies encourage students to remain in college longer than is necessary for the efficient production of their education. Together, the current method of financing imposes significant pressures on Kentucky taxpayers, with little

return.

Implications for School Quality

The fact that tuitions for public universities in Kentucky are determined by a central authority such as CHE has several consequences for the quality of public higher education in Kentucky. For example, if a state university wants to recruit better faculty to stay competitive with other universities, it will need funding to pay for these improvements. The university could finance an improvement with either more funds from the state or higher tuitions. In view of the discussion in the preceding section, if the state cannot afford a larger contribution to a university's budget, and if the university is not permitted to raise its own tuition, then it cannot make improvements necessary to stay competitive with other institutions.[20]

To illustrate this argument better, consider the analysis by Charles Clotfelter in *Buying the Best: Cost Escalation in Elite Higher Education*, where he examines tuition increases at several elite private institutions (Harvard, Duke, University of Chicago, and Carleton College).[21] Clotfelter concludes that the primary cause behind higher college costs has not been increasing faculty salaries but the effort to provide students with better services, finance large investments in capital equipment, and improve access for students from lower-income families. Likewise, Harold Shapiro, the president of Princeton University, succinctly writes, "Simply put, the cost of what we are doing at universities is rising quickly."[22] If we accept these statements, then Clotfelter's book has disturbing ramifications for the future of public universities. If they want to stay competitive with their private counterparts, then they will necessarily have to undertake the same improvements in quality and service. If they are unable to pay for such improvements, public universities must either eliminate or reduce some of their existing functions, or prepare to provide a lower level of service.[23]

An institution such as the University of Kentucky competes with both the private and public sectors. As Figure 1 illustrates, tuition has increased at both groups of schools. Arguably, private schools will be able to finance quality improvements that public schools in Kentucky will quickly find unaffordable. Moreover, recent research in labor economics finds that students who attend better quality colleges earn higher wages.[24] In the absence of greater funding from the state, tuition increases remain the only solution to the problem of maintaining and improving quality. With these competitive pressures, if institutions such as UK continue to raise tuition at historic rates, then, in the absence of increased state funding, they will quickly become providers of lower quality education.

Reduced Competition and Monopoly Power

Kentucky's tuition subsidies are available only to those students who enroll in public universities. Students attending private schools forfeit the subsidy entirely. As a result, public universities become significantly more attractive to all qualifying students on the basis of price, sheltering public universities from competition from their private counterparts. In essence, tuition subsidies grant public colleges quasi-monopoly rights. These schools receive a large portion of their enrollments simply on the basis of their price advantage, which allows them to compromise the quality of their services.[25] Consequently, public universities do not face the same inducements to undertake quality improvements as their private cousins — and they act in ways similar to firms with monopoly rights. The lack of competition creates a complacent environment where large bureaucracies thrive, and the incentives to remove bad instructors or eliminate inferior programs is greatly reduced.[26]

In our view, this may represent the largest loss of efficiency to the current system of supporting higher education. When a private school such as Carnegie Mellon University loses a student, the school can lose up to $20,000 a year in tuition. When the University of Kentucky loses a student, the loss to the university is considerably lower. The implication of this difference is straightforward: While Carnegie Mellon obviously does not retain every student who enrolls, it is more willing to make greater efforts to retain students than the University of Kentucky simply because it has so much more to lose.

THE PELTZMAN EFFECT

In 1973, the University of Chicago economist Sam Peltzman presented a theoretical model of the impact of state subsidies on the quality of education.[27] The theoretical predictions of this model are called the "Peltzman effect," and refer to the tendency of families to spend less on education after the introduction of an education subsidy.

The logic of this model is as follows: Suppose that the state provides families with "in kind" subsidies, that is, the state does not actually give families money for paying tuition but instead subsidizes institutions of higher education. Families then have the option of sending their children to a public university (where they receive the subsidy) or to a private university (where they forfeit it). Under this structure, lower- and middle-class families will choose to accept the subsidy and send their children

to the public institution. At the same time, because they cannot supplement the tuition subsidy to improve the "quality" of a public education, such families decrease the total amount of money that they spend on higher education. Moreover, students from affluent families who would have otherwise attended a higher-quality private school now find the lower-priced public university more attractive and enroll there. If the number of such families is sufficiently large, the overall quality of education received by students may fall. The fact that students may be selecting a lower-quality public institution in order to receive the subsidy implies a secular lowering of the return to a college education.

Eliminating the "need-blind" component of the tuition subsidy would be the first requirement of any response to the current problem of funding.

Peltzman's work, and the considerable empirical literature that it has generated, are regarded as commonplace in the economics literature.[28] One recent study by Philip Ganderton found that on average low-wealth, high-ability students choose a public university whose students have an average SAT score that is 237 points below that of a private institution they would choose if they were allowed unconstrained private sector choices.

The Opponents of Tuition Increases

Economists use "public choice theory" to explain the behavior of institutions such as governments, bureaucracies, and political parties. By assuming that such entities seek to maximize an objective function that depends in part on the private interests of the individuals that comprise these groups, public choice theory seeks to develop testable predictions about the behavior of such groups. In the context of subsidies to higher education there are essentially two groups opposed to tuition increases: public university administrators and teachers, and students attending such institutions (along with their parents). We shall examine the dissenting views of each group in detail.

University administrators whose schools benefit from tuition subsidies are receiving quasi-monopoly rights to the business of higher education production.

University Administrators and Faculty

As discussed earlier, they are guaranteed enrollments simply because of the tuition subsidy: it is impossible for middle-class families to afford the full price of private schools or out-of-state tuition at other public universities.[29] Because of the immense price advantage that public support provides, public institutions do not have to compete with private schools on the basis of price.[30] They are essentially the sole producers of "higher education." This fact translates into lower incentives for administrators and faculty to improve their institutions or teaching. Tuition increases at public schools would reduce their monopoly power by making private options relatively more attractive on the basis of price. In such an environment, the hostility of university administrators and faculty to tuition increases is intelligible: Just as the subsidized wheat farmers of the plains favor their subsidies to their industry, university professors and administrators enjoy the subsidy to their "industry." [31]

Students and Families

Tuition increases obviously affect the interests of both the students who attend public universities and their parents, for they reduce the amount of money that could be used to finance the consumption of other goods. All the families who benefit from the current subsidy would be worse off as a result of higher tuitions. We emphasize once again that the issue here is not the welfare of such families, but the level, or quality, of higher education in the economy. Students at public institutions are quick to organize themselves into vocal rallies and anti-tuition campaigns at the suggestion of a potential increase. Their ability to organize themselves into effective pressure groups is far superior to that of the taxpayers who bear the costs of their indulgent protests.

Conclusions

In this paper we have studied the case for tuition increases at public institutions from a number of perspectives. We have described the rationale for determining tuition schedules in Kentucky and have demonstrated various consequences of the current system. Insofar as higher education in the state should be subsidized because certain students are financially constrained, it makes little sense to provide that subsidy to all students regardless of income levels. Eliminating the "need-blind" component of the tuition subsidy would be the first requirement of any response to the current problem of funding. It would also free up millions of dollars of revenues that could be returned to taxpayers

or used for expenditures in other areas of need.

To conclude our discussion of the case for tuition increases we propose two policy recommendations:

Implement a voucher system for higher education that applies to both public and private universities.
Rather than simply giving institutions an allocation, we propose tying the money directly to the student through a voucher. A university would select the tuition payment it charges, and students would pay the tuition with a voucher as well as a direct payment. Thus, if the University of Kentucky chooses to charge $9,000 a year and the Commonwealth chooses to provide the student with a voucher of $4,000, the student would be required to pay the remaining $5,000 directly. To force public schools to be more competitive, we propose extending this vouchers to both public and private schools in the Commonwealth.

Make the vouchers need-based.
If economic efficiency and improved access to higher education for poor families are the goals of Kentucky policymakers, then the voucher system for higher education should be need-based.[32] This system would reduce the burden on the state from not having to subsidize all public university students and expand the choices and opportunities of students from poorer families. Additionally, we propose the implementation of strict but reasonable time limits on the number of years that the vouchers may be received.

FOOTNOTES

[1] *The Kentucky Kernel*, November 3, 1994, 1. Such protests are not isolated to public universities in Kentucky. See, for example, *The New York Times*, "Students protest education cuts at rallies around U.S," (March 30, 1995), A7(N), A14(L). In addition, *The Chronicle of Higher Education* (Nov 25, 1992, and March 10, 1995) reports on demonstrations at Louisiana State University and schools in New York over budget cuts to public universities.

[2] Pell grants range from $400–$2,340 per school year and are direct financial-aid awards. Federal Perkins loans require that the aggregate value of the loan not exceed $9,000 for undergraduates. Interest is computed at 5 percent annually nine months after the student ceases to be at least a part-time student. Direct Stafford loans are restricted to a total amount of $17,250 for undergraduates; repayment begins six months after leaving school, and interest is capped at 8.25 percent. Students who do not qualify for the Direct Stafford program may avail of the Unsubsidized Federal Stafford Loan program, where interest accrues while the student is in school.

[3] U.S. Congress, Congressional Budget Office (CBO) *Student Aid and the Cost of Post Secondary Education*, January 1991.

[4] U.S. Bureau of the Census, *Statistical Abstract of the United States*, 115th ed., Washington, D.C., Tables 281 and 286, 1995.

[5] Office of the President, University of Kentucky, Operating Budget: University of Kentucky 1996-1997, 1.

[6] Mark C. Berger, "The Earnings of Kentucky Workers, 1988-1994," 1996 *Kentucky Annual Economic Report*, Center for Business and Economic Research, University of Kentucky, 47-52. Berger uses data from the March files of the Current Population Survey (CPS).

[7] Kevin M. Murphy and Finis Welch. (1992). "Industrial Change and the Rising Importance of Skill," in Sheldon Danziger and Peter Gottchalk, eds., *Uneven Tides: Rising Inequality in the 1980s*, (New York: Russell Sage Foundation), pp.101-32.

[8] Kentucky is not the only state that determines out-of-state tuitions as a fixed multiple of in-state tuition. Similar formulas (with the multiples in parentheses) are also applied at Ohio State (3), Purdue University (3), University of North Carolina at Chapel Hill (6), University of Virginia (3), Penn State University (2), and the University of Tennessee (3).

[9] Our comparison of universities to (non-profit) firms may trouble some readers. We point out, however, that universities hire and fire employees, produce a service, set prices for their output, market themselves, collect revenues, buy physical capital, and maintain investment portfolios. They are affected by competition, scrutinized by auditors, and buffeted by the business cycle much like any other firm. For a recent theoretical and empirical justification of this approach see Michael Rothschild and Lawrence J. White, "The University in the Marketplace: Some Insights and Some Puzzles," in Charles Clotfelter and Michael Rothschild, eds., *Studies of Supply and Demand in Higher Education*, Chicago: University of Chicago Press, 1993.

[10] University of Kentucky, Office of Financial-Aid, survey response to *Peterson's Annual Survey of Undergraduate Financial Aid*, Fall 1995.

[11] Imperfections in credit markets exist as a result of asymmetric information between borrowers and external financiers. Specifically, students know more about the quality of their return distributions than do lenders. This informational uncertainty may lead to self-enforcing contracts which allow students to borrow against their future earnings. Collateral is another market mechanism for overcoming this imbalance. However, students are particularly hurt by the illegality of servitudinal indemniture, since they have no other collateral to offer. For theoretical discussions see H. Bester, "The Role of Collateral in Credit Markets with Imperfect Information," *European Economic Review* 31 (!987): 887-99, and C. Azariadis, "Human Capital and Self Enforcing Contracts." *Scandinavian Journal of Economics* 90 (1988): 507-28.

[12] Subsidized loans are usually justified on the grounds that without them students will not borrow the large sums of money necessary to finance a college education. In other words, students will be discouraged by the size of their potential debts and therefore not attend college. Yet, since the costs of attending college must ultimately be paid, either by students or taxpayers, should not the direct beneficiaries be the ones who finance their education?

[13] The positive "spillover" effects of education have been documented for lower levels of education (e.g., high school), where there are returns to society from having an informed and literate workforce.

[14] Research Associates of Washington, *State Profiles: Financing Public Higher Education*, Washington, D.C., 1994.

[15] For example, after the 1991 recession, the University of California, Berkeley, was forced to make drastic reductions in its faculty. For a report, see Kit Lively, "Colleges are left guessing as California struggles to adopt a budget," *The Chronicle of Higher Education* 38 (July 15, 1992), A26, and Salma Abdelnour, "California colleges brace for big cuts in state financing," *The Chronicle of Higher Education* 38 (June 17, 1992), A21. Closer to home, a 15 percent budget cut at the University of Kentucky forced President Charles Wethington to freeze hiring and reduce department size through attrition.

[16] These data are obtained from Amitabh Chandra, "Signaling and Self-Selection in the Choice of College Major," Senior Honors Thesis. Department of Economics and Honors Program, University of Kentucky, 1994.

[17] Mark C. Berger, "Private Returns to Specific College Majors," in William E. Becker and Darrell E. Lewis, eds., *The Economics of American Higher Education*, Norwell, Mass.: Kluwer Academic Publishers, 1992, 141-71.

[18] For theoretical and empirical research in this area see Gary Becker, *Human Capital*, 2nd ed., New York: Columbia University Press, 1975, and Robert J. Willis and Sherwin Rosen, "Education and Self-Selection," *Journal of Political Economy* 87 (1979): S7-S36, and Mark C. Berger, "Predicted Future Earnings and Choice of College Major," *Industrial*

and Labor Relations Review 41 (1988): 418-29.

[19] A.W. Astin, K.C. Green, W.S. Korn, and M Schalit, *The American Freshman: National Norms for Fall 1985*, Los Angeles: Higher Education Research Institute, University of California at Los Angeles, 1985.

[20] This point becomes even more alarming when we note that in Kentucky spending per full-time higher education student has fallen more sharply than in any other southern state, declining by almost 17 percent in the past decade.

[21] Charles T. Clotfelter, *Buying the Best: Cost Escalation in Elite Higher Education*, Princeton: Princeton University Press, 1996.

[22] Harold T. Shapiro, "Current Realities and Future Prospects." *Academe* (January/February 1993): 10-16.

[23] Because of our premise of competition between private and public schools, public universities will only be able to reduce those activities that do not affect quality. Such reductions are limited to trimming excessive bureaucracies and eliminating peripheral colleges and departments.

[24] Kermit Daniel, Dan A. Black, and Jeffrey Smith, "College Quality and the Wages of Young Men," University of Kentucky Department of Economics and Center for Business and Economic Research Working Paper, 1996.

[25] A massive reduction in quality would of course send the best students elsewhere. Public universities also run excellent honors programs for their best students (whom they also recruit aggressively). We view such efforts as an astute mechanism to compete in areas where the demand for their services is most volatile. Ultimately, however, the average student at a public university still receives a lower level of service than if tuition subsidies were available to students at both public and private schools.

[26] Consider, for example, the battle between the elite private universities in the country over the best faculty, researchers, and students. Students benefit from such a system as each school seeks to provide a better level of service at a lower price (several of these schools pursue "need-blind" admission policies). Faculty are able to elicit higher salary offers from their schools because of the availability of competing offers.

[27] Sam Peltzman, "The Effect of Government Subsidies in Kind on Private Expenditures: The Case of Higher Education," *Journal of Political Economy* 81 (1973): 1-27.

[28] See, for example, Philip T. Ganderton, "The Effect of Subsidies in Kind on the Choice of a College," *Journal of Public Economics* 48 (1992): 269-92.

[29] We reiterate that the Peltzman model does *not* say that such families are worse off as a result of subsidies in-kind. On the contrary, they are unambiguously better off. The issue, however, is that society in general is consuming a lower level of educational quality.

[30] The fact that public universities still compete with each other does not reject the monopoly hypothesis, for the overall level of competition would be more if they competed with private schools as well.

[31] Higher education is not unique in this respect. For example, the National Education Association (NEA) has consistently opposed providing families with a tax credit of $500 that could be applied to tuition at private institutions. The NEA has called this proposal "fiscally unsound," and "unconstitutional." The NEA has joined with other organizations in a coalition to fight tuition tax credits. Included in this group are the American Federation of Teachers, American Association of Colleges for Teacher Education, American Humanist Association, and the United Auto Workers. See National Education Association *Tuition Tax Credits*. (June 1982), mimeo.

[32] Ideally, the state should only provide guaranteed loans or subsidized interest rates for students. Over the years as students began repaying these loans, the system could become essentially self-supported.

The Internationalization of the Kentucky Economy

Michael Webb

In the 1980s and continuing into the 1990s, Kentucky has seen a growing export boom, driven largely by automobiles and industrial machinery. Direct merchandise exports account for about seven percent of state income. Including indirect exports, which are Kentucky products processed elsewhere, that number probably doubles. In addition, by 1995 foreign-affiliated firms were providing almost 61,000 jobs in Kentucky. While manufactured exports have increased, Kentucky agricultural goods and commodities fell during the first half of the 1990s. Most of the goods exported from Kentucky went to Canada and East Asia, which replaced Western Europe as the second most important destination. Likewise, Canadian and Japanese firms have been the key new foreign investors in Kentucky from 1991 to 1995, respectively providing 33 percent and 42 percent of the rise in foreign investment.

INTRODUCTION

The rapid internationalization of the Kentucky economy that began in the mid 1980s continued into the 1990s, with the state's export boom picking up pace. At the same time, foreign investment in Kentucky continued to grow.

Kentucky's export boom — especially in manufactured goods — continued into the mid-1990s, primarily fueled by exports of automobiles and industrial machinery. Direct merchandise exports alone provided over seven percent of state income. If we account for indirect exports, which are processed elsewhere before being exported, it is likely that the contribution to income exceeds 14 percent. And this does not account for the export of services from Kentucky. Exports provided jobs for a substantial number of Kentuckians, especially for those in higher-end manufacturing. Lower-end manufacturing, relying on lower-wage workers, and agriculture, did not participate in the export boom to the same degree.

Imports continued to flow into the U.S. in the first half of the 1990s. Although import data are not available for states, Kentucky was certainly a full participant in the expansion of imports during the 1991–95 period. It is clear that imports provide important consumer goods that enable the wages of Kentucky workers to go further. But are imports good for everyone? Obviously, no: some workers who lose their jobs will have trouble finding other work and experience economic hardship. At the same time, imports provide the Kentucky economy with important sources of reasonably priced inputs for many manufacturers. Imports also provide incentives for domestic producers to economize and innovate, and so act to spur economic growth. Furthermore, imports free up resources — such as workers, managers, and financial capital — from such sectors as the shoe, textile, and furniture industries. Those resources are eventually used in sectors where Kentucky firms are competitive. As shown in the 1989 *Kentucky Annual Economic Report*, Kentucky's exports are typically found in higher-wage sectors.

Investment in Kentucky by foreigners also continued to grow in the early 1990s. Jobs provided by foreign-affiliated firms in the state rose by 10.8 percent from 1991 to 1995. By 1995 these firms were providing over 61,000 jobs, almost six percent of total Kentucky jobs, and higher than the U.S. average. With those jobs often comes training and the transfer of technology, and, in the case of the Toyota assembly plant in Georgetown, very valuable publicity for the state, providing a further impetus to the state's economic growth.

In this article, I first look at the boom in exports from 1991–95. Subsequent sections analyze manufacturing and agriculture exports. Last, I examine the impact of foreign investment in Kentucky during the first half of the 1990s.

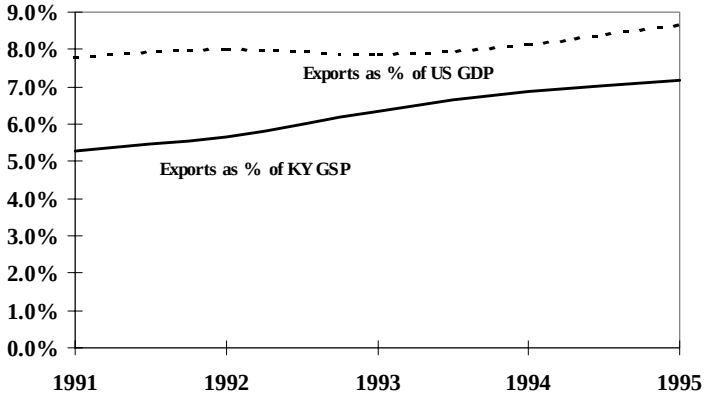
THE KENTUCKY EXPORT BOOM OF THE 1990S

The boom in merchandise exports for the U.S. and Kentucky in the late 1980s continued in the first half of

I thank Kathleen Toma for excellent research assistance with this article.

FIGURE 1

Direct Merchandise Exports as a Percent of Income, 1991–95



Source: Survey of Current Business, 1996.

the1990s. For Kentucky, the export boom picked up its pace and outstripped U.S. growth. The 1991–95 growth in Kentucky merchandise exports averaged over 11 percent a year, yielding a 52 percent growth rate for the entire period. As a result, these exports moved from just over five percent of state income to over seven percent, as illustrated in Figure 1. This compares with smaller export growth for the U.S. as a whole, with merchandise exports increasing from just under eight to below nine percent of U.S. income in 1995.

Export growth was especially vibrant in manufacturing. Manufactured exports rose by 88 percent from 1991 to 1995 at a 17.1 percent pace of annual growth. Chemical exports grew by 23 percent at a 5.3

Export growth was especially vibrant in manufacturing. Manufactured exports rose by 88 percent from 1991 to 1995 at a 17.1 percent pace of annual growth.

percent annual growth rate. Both values far exceed the U.S. annual growth rate for the 1991–95 period. On the other hand, exports of the smaller agriculture and mining sectors continued to fall: agriculture exports fell by 37 percent and mining exports by 43 percent.

It is important to note that the seven percent figure for Kentucky substantially understates the impact of merchandise exports on the state because it includes only direct exports. Many of the goods produced in states like Kentucky are subsequently shipped to plants located on the east or west coast, and then assembled and exported from there. We are not able to account for these goods, but evidence suggests that the inclusion of indirect exports more than doubles the contribution of exports to Kentucky.

There are no data on the export of services at the state level. For the U.S. as a whole, exports of services rose by 17.5 percent from 1991 to 1995, and in 1995 stood at almost 22 percent of total U.S. exports. We would expect Kentucky service exports to have grown accordingly. Growth in services was hampered by foreign restrictions on service imports, and U.S. trade policy has focused on reducing foreign barriers, with some success.

Kentucky's Manufactured Exports

Already in 1991, the year for which we have the most recent U.S. export-employment data, exports were providing 16.6 percent of Kentucky manufacturing employment — 8.1 percent from direct exports and 8.5 percent from indirect exports.[1] With over 70 percent growth in manufactured exports by 1995, we should expect that exports were contributing over 28 percent of Kentucky manufacturing employment by the mid-1990s..

The sectoral distribution of the expansion in the 1990s is provided in Table 1. While the growth in Kentucky exports is primarily due to expansions in two sectors, a wide array of industries experienced the Kentucky export boom of the first half of the 1990s.

A key contributor to the dramatic growth in merchandise exports was the transportation equipment sector. Exports of automobiles and auto parts expanded throughout the period. With an annual growth rate for exports greater than 26 percent, auto equipment exports grew by 154 percent over the 1991–95 period. By 1995, exports stood at $2 billion (1995 dollars) and accounted for a substantial 34 percent of Kentucky exports, as illustrated in Table 1. The growth is most strongly linked to the expansion of the Toyota manufacturing facility in Georgetown but also to the strong rise in auto production elsewhere; employment in this sector in the Louisville area rose by 44 percent during the four years.

The second key contributor to the export boom was the growth in Kentucky's manufacturing industry in the Northern Kentucky–Louisville–Lexington triangle. The impressive expansion showed up in four sectors. Industrial machinery, which accounts for 16 percent of Kentucky exports, grew by 29 percent during 1991–95. This was associated with rapid growth in the machine

TABLE 1

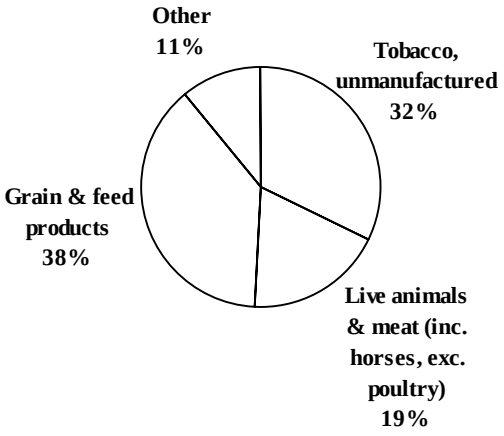
Sectoral Distribution and Growth in Kentucky Merchandise Exports, 1991–95

Industry	Share of Kentucky 1995 exports	1991–1995 export growth rate
Manufacturing	84.3%	71.7%
Transportation equipment	34.4	154.0
Industrial machinery	15.7	29.5
Electronic, electric equipment	5.6	51.9
Fabricated metal products	5.5	82.3
Food and kindred products	5.5	170.3
Primary metals	3.2	76.8
Instruments and related products	1.3	42.8
Other	26.3	36.0
Chemicals and allied products	11.2	23.0
Mining	1.4	-49.7
Agricultural production	3.1	-35.8

Source: Adjustments to data from U.S. Census Bureau, Foreign Trade Dvision by MISER, 1996.

FIGURE 2

Kentucky Agriculture Exports, 1995



Source: Kentucky Agricultural Statistics Service

tool sector, and U.S. production is largely clustered in the Cincinnati area and in the Kentucky "triangle." Electronic equipment exports, providing six percent of the Kentucky total exports, grew by 52 percent for the period — probably the result of expanding exports into Europe and Asia by Lexmark, a Lexington-based producer of computer printers. Two smaller manufacturing sectors that enjoyed substantial export growth rates over the period were primary metals with 77 percent growth (over 15 percent annually) and fabricated metal products, with 68 percent growth (almost 14 percent annually).

Kentucky's Agricultural Exports

Direct exports of Kentucky agriculture totaled $184.3 million in 1955, while direct plus indirect exports were substantially greater at $868.9 million.[2] The much larger number associated with indirect exports reflects the processing of tobacco and other commodities from Kentucky that occurs in other states before being exported. The performance of Kentucky's direct agricultural exports in 1991–95 did not match the performance of its manufactured goods. In fact, direct livestock exports fell by 35.6 percent and crop exports fell by 80 percent.

State data show that direct plus indirect exports also fell. Unmanufactured tobacco and live animals, which include horses, still constitute the majority of exports (see Figure 2) but fell by 23 percent and 24 percent, respectively, over the 1991–1995 period. Two smaller sectors registered export gains: Soybeans and related product exports increased by nearly 17 percent from 1991–94, almost a 4.5 percent annual growth rate. And feed grains and products increased by about 21 percent, though this growth mostly occurred in 1995.

WHERE KENTUCKY EXPORTS ARE GOING

It is clear from Table 2 that the export boom of the early 1990s was fueled by exports to Canada and East Asia, which replaces Western Europe as the second-largest importer of Kentucky merchandise exports.

Canada is the most important destination of Kentucky exports, taking almost 40 percent of the total. The largest component of U.S. trade with Canada is in automobiles and auto parts, and it is reasonable to assume that this holds true for Kentucky exports as well. Moreover, export growth to Canada was substantial, at 127 percent from 1991–95. This is likely due to the explosion in automobile production and export from Kentucky discussed previously. It is unlikely to have been affected by the North American Free Trade Act (NAFTA) because trade between the U.S. and Canada was already largely unrestricted. One possible factor for the increase may have been the reduction in restrictions on hauling goods from the U.S. into Canada that occurred in the late 1980s.

East Asia accounts for 26.6 percent of Kentucky exports, with Japan taking almost 15 percent of the total. Moreover, Kentucky exports to the region rose by 62 percent over the period. The two largest East Asian customers for Kentucky goods also increased their imports from the state, Japan by 56 percent and Korea

TABLE 2

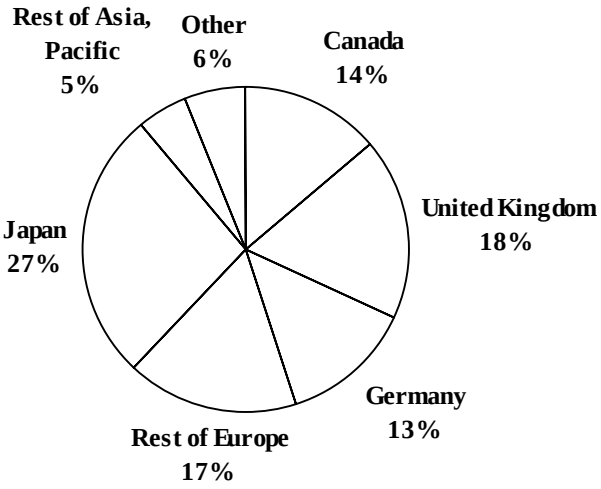
Destinations of Kentucky Merchandise Exports, 1991–95

	Share of Kentucky exports, 1995	Percent change in exports, 1991–95
Canada	38.8%	126.8%
East Asia	26.6	
Japan	14.6	56.0
Korea	2.7	44.2
Australia	2.0	120.0
Hong Kong	1.6	89.0
Taiwan	1.3	26.8
Western Europe	20.0	
France	5.5	-10.5
United Kingdom	4.1	5.2
Germany	4.0	-8.8
Netherlands	2.9	9.5
Italy	1.8	18.0
Belgium	1.7	-39.6
Latin America	4.7	
Mexico	2.7	-11.3
Brazil	2.0	280.7

Source: MISER, 1996.

FIGURE 4

Total Foreign Investment in Kentucky, Kentucky Employment by Origin



Source: MISER, 1996.

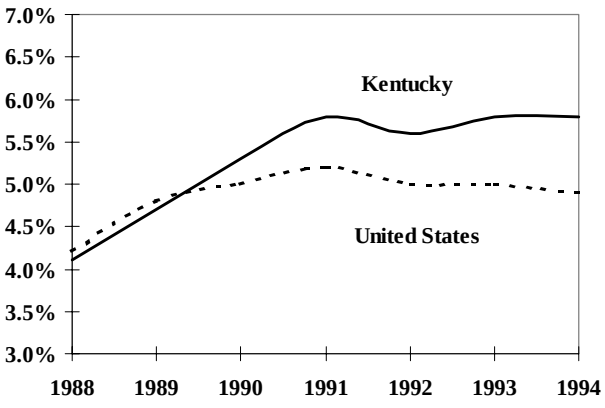
by 44 percent.

The third important destination for Kentucky merchandise exports is Western Europe, which took almost 23 percent of Kentucky exports in 1995. While none of the countries' imports match those of Japan, three countries — France, United Kingdom, and Germany — provide substantial markets for Kentucky exports (most goods going to the Netherlands will be re-exported to European and other countries). The performance of Kentucky exports to Europe for the period paralleled the experience for all U.S. exports. Sluggish growth and recessions hit France, Germany and the United Kingdom in the early 1990s, reducing their demands for imports.

Finally, Mexico and Latin America take a small share of Kentucky exports. Mexico accounted for only 2.7 percent of Kentucky exports in 1995 while Latin America as a whole accounted for 7.6 percent. In fact, exports to Mexico actually fell by 11 percent during 1991–95, due to the 1994–95 financial crisis that hit the country. In 1995 alone, Kentucky exports to Mexico fell by 40 percent. The expansion in exports to Brazil, the second most important destination of Kentucky exports in the region, followed a series of fundamental reforms by the Brazilian government to adopt more market-oriented and freer trade policies, opening up the Brazilian market to exports and leading to substantial economic growth there.

FIGURE 3

Share of Private Employment by Foreign Investors in Kentucky and the U.S., 1988–94



Source: Survey of Current Business Statistics, May 1996, and MISER, 1996.

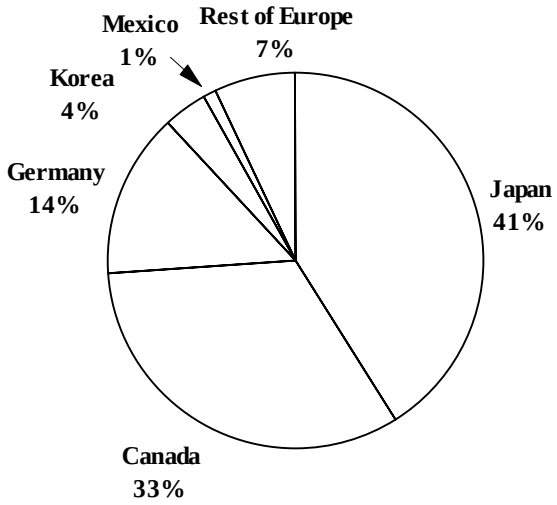
FOREIGN INVESTMENT IN KENTUCKY

In 1995, foreign-affiliated firms employed over 61,000 workers in Kentucky. This contrasts sharply with the 21,000 jobs associated with foreign investment in 1987, when Kentucky's boom in foreign investment began, primarily with the establishment of the Toyota plant in Georgetown.[3]

By 1988, foreign affiliates were providing just over four percent of all jobs in the state. Foreign investment in Kentucky began to surpass the national figures in

FIGURE 5

Kentucky Employment by New Foreign Investment, by Origin



Source: Kentucky Cabinet for Economic Development.

1990, and the gap has since widened. From 1991 to 1995, employment by new foreign affiliates rose by 10.8 percent (this does not include increasing employment by existing foreign affiliates). A recent upturn in foreign investment in 1994 through mid-1996 has provided a 9.9 percent increase in Kentucky employment related to foreign affiliates in less than three years.

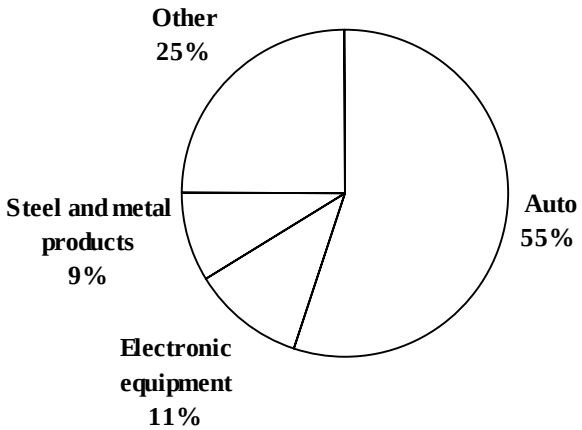
Kentucky's attractiveness to foreign investment is due to the reputation of its workforce, its location, and the manufacturing boom that has characterized the state. Foreign investment in Kentucky is led, of course, by the Toyota plant, which employs 7,000 workers. The Toyota facility is supplemented by investments from other Japanese firms throughout the state, many of them working as suppliers for Toyota. In fact, 42 percent of new foreign investment (approximately 2,500 jobs) in the state during 1991–95 was by Japanese firms, and the majority of these were in the automobile sector.

Foreign investment from Western Europe contributes the greatest share of Kentucky employment, as illustrated in Figure 4. The United Kingdom provides the largest source of foreign investment in the state, contributing 18 percent, while Western Europe as a whole provides 48 percent. This is mostly in basic manufacturing: metals, plastics, and similar industries as well as the automobile sector. East Asia provides 32 percent of foreign investment, led by Japan at 27 percent. Most Japanese investment, of course, is in the automobile industry.

The key new foreign investors in Kentucky during 1991–1995 have been from Japan and Canada (see Figure 5). Japanese firms provided 42 percent of the rise in foreign investment during the period, while Canadian firms contributed another 33 percent. Western Europe provided only 20.2 percent of the increase. Comparing Figures 4 and 5, it is clear that the primary origin of foreign investment, like the primary destination of Kentucky exports, is shifting away from Europe and toward East Asia and Canada. This is reflected in the sectors in which new investments are to be found — more than half in the automobile sector (see Figure 6).

FIGURE 6

Kentucky Employment Due to New Foreign Investment, by Industry Sector



FOOTNOTES

[1] *Exports from Manufacturing Establishments 1990-1991,* U.S. Department of Commerce, 1994.

[2] Data on direct plus indirect exports of Kentucky agriculture goods comes from *Kentucky Agricultural Statistics*, Kentucky Agricultural Statistic Service.

[3] Foreign investment data for Kentucky are from the Kentucky Cabinet for Economic Development.

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