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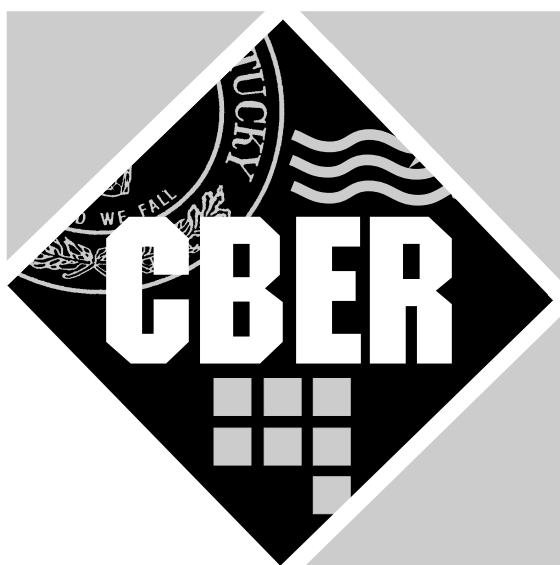
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1999



**Center for Business and Economic Research
University of Kentucky**



UNIVERSITY OF KENTUCKY
CAROL MARTIN GATTON
COLLEGE of BUSINESS and ECONOMICS

Kentucky Annual Economic Report



1999

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From the Director . . .

The Center for Business and Economic Research (CBER) is pleased to publish the 27th *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 1999 Report contains seven articles that provide state and national economic forecasts and address many of the major economic policy issues facing the Commonwealth.

In publishing this report, we draw on expertise from the Gatton College of Business and Economics at the University of Kentucky and continue the practice of inviting members of Kentucky state government to provide their insights on economic issues facing the state. Our authors include seven faculty members and one graduate student from the Department of Economics, one research associate from the Center for Business and Economic Research, and two economists from the Kentucky Legislative Research Commission. One of the strengths of CBER is that we are able to bring together some of the best economists in the state to work on our research projects.

The first article contains forecasts for the Kentucky economy for the next three years. Dr. Eric C. Thompson, CBER's Associate Director, maintains and updates the University of Kentucky State Econometric Model, which produces these forecasts. Dr. Thompson forecasts that gross state product will average 2.4 percent in 1999 and that Kentucky will add about 29,000 jobs in 1999. Overall, he forecasts that the Kentucky economy will be more moderate in the coming year compared to 1998.

This year, we are pleased to include an overview of the United States economy by Dr. Christopher J. Waller, the recently named Gatton Chair in Macroeconomics and Monetary Theory in the Department of Economics. Dr. Waller provides a summary of the strong yet volatile U.S. economy we saw in 1998 and offers some predictions for the coming year. He predicts that the U.S. economy will grow at a steady pace in 1999 although we may see slight rises in the unemployment rate, inflation, and long-term interest rates.

The other five articles consider economic policy and business issues in Kentucky. Dr. William H. Hoyt examines one of the most debated issues in Kentucky in recent years, the Kentucky Education Reform Act (KERA). He provides an evaluation of the KERA reforms and notes that expenditures per student in Kentucky school districts, one of the reform's major goals, has become more equal but that other measures, such as test scores, graduation rates, and college attendance rates, have not gained relative to other states.

My article with Sharon Kane examines why more Kentuckians are working in recent years compared to a decade ago. Specifically, we document the substantial rise in the female employment rate in Kentucky. We conclude that rising education levels of Kentuckians has been the

most important reason behind this increase. With more people working in Kentucky compared to previous years, the state's per capita income might continue to rise, which has been a major policy goal of the Patton administration.

Drs. Michael Clark and Ginny Wilson of the Kentucky Legislative



Research Commission look at the recent reforms in health insurance in Kentucky. Reforms passed by the General Assembly in 1994 strongly limited the ability of insurance carriers to charge customers based upon their health status. They note that this caused some carriers to cease operations in Kentucky, but they point out that later reforms attempted to remedy the situation and have stabilized the health insurance industry in the Commonwealth.

Health care reform is the topic of the next article by Drs. Eric C. Thompson, James H. Stoker, and Dan A. Black. In the context of Kentucky's recent legislation creating a managed care system for the state's Medicaid program, they look at the effects of similar legislation in Tennessee. They find that the Medicaid managed care program there had a negligible impact on decreasing the number of health care establishments as more patients were covered by the program without a concurrent increase in program expenditures.

In the final article, Steven N. Allen, a research associate at the Center for Business and Economic Research, looks at the use of computers and the Internet at Kentucky businesses. Using a recent survey of large Kentucky businesses, he finds widespread use of computers and the Internet at these businesses. He also shows that about 90 percent of Kentucky businesses in the survey place some value on computer skills when they are hiring new employees, but that relatively few businesses have begun to use online commerce as part of their sales strategies.

The past year was one of the most successful in recent years for the Center for Business and Economic Research. We conducted many projects for various clients, including ones for the Kentucky Arts Council, the Kentucky Department of Parks, and several others. We also completed a study on the potential effects of deregulation in the Kentucky electric utility industry and conducted Bank One's annual survey of Central Kentucky businesses. In the spring of 1999, we will be releasing a comprehensive study of long-term trends in the Kentucky economy. This collaboration with the Kentucky Office of Financial Management and Economic Analysis will provide a needed look at the changing conditions of the Kentucky economy over the past thirty years. We anticipate maintaining an active research program in the coming year and look forward to challenging new projects.

Mark C. Berger

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Department of Economics, University of Kentucky

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		William H. Hoyt	

The Center for Business and Economic Research (CBER) is the applied economic research branch of the Carol Martin Gatton 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, CBER 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.

CBER's research includes a variety of interests. Recent projects have been conducted on manpower, labor, and human resources; transportation economics; health economics; regulatory reform; public finance; and economic growth and development. In addition to the *Kentucky Annual Economic Report*, CBER publishes a quarterly newsletter, *Kentucky Business and Economic Outlook*, which contains quarterly forecasts for the Kentucky economy as well as other business and economic issues. CBER 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.

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Steven N. Allen is a research associate at the Center for Business and Economic Research at the University of Kentucky. Mr. Allen received a M.A. in economics in 1998 and a B.A. in history in 1996, both from the University of Kentucky. Since coming to the Center in 1995, he has worked on a variety of applied economic projects in Kentucky, including studies of the proposed Interstate 66 project, the economic impact of the arts in Kentucky, the deregulation of the electric utility industry, and many other projects. For the past three years, he also has served as managing editor of the *Kentucky Annual Economic Report*.



Dr. Mark C. Berger

Dr. Mark C. Berger is the Director of CBER and William B. Sturgill Professor of Economics at the University of Kentucky. Dr. Berger received a Ph.D. in economics from The Ohio State University in 1981. He has conducted applied economic research studies on a variety of subjects including higher education, health issues, human capital, the earnings and employment of workers, and the estimation of the demand for electricity. He has received research funding from a variety of public and private sources, including the U.S. Small Business Administration, the National Science Foundation, the National Institutes of Health, the U.S. Department of Labor, and several Kentucky state government agencies. Dr. Berger's research has been published in some of the leading journals in economics and public policy, including *American Economic Review*, *Journal of Political Economy*, *Review of Economics and Statistics*, *Industrial and Labor Relations Review*, and the *Journal of Human Resources*.



Dr. Dan A. Black

Dr. Dan A. Black is Professor of Economics and Ashland Oil Research Fellow at the University of Kentucky, and a Senior Fellow at the Carnegie-Mellon University Regional Census Data Center. 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 recent book on on-the-job training from the Upjohn Institute and is currently examining the retirement decisions of American households with Mark Berger, Amitabh Chandra, and Frank Scott.

Dr. Michael Clark

Dr. Michael W. Clark is an economist with the Legislative Research Commission (LRC). He received his Ph.D. in economics from the University of Kentucky in 1996. Before joining the LRC, he was an analyst for Kentucky Utilities. His current work deals with various public policy issues such as health insurance, workers' compensation, and deregulation of electric utilities.



Sharon Kane

Sharon Kane is a research assistant at the Center for Business and Economic Research and a graduate student in the Department of Economics at the University of Kentucky. Prior to coming to the University of Kentucky, she worked in the mortgage lending industry. She received her B.A. degree in economics from the University of Tennessee-Chattanooga in 1986.

Authors



Dr. William H. Hoyt

Dr. William H. Hoyt is Associate Professor of Economics at the University of Kentucky. He also has previously served on the faculty at Georgetown University. Dr. Hoyt received his Ph.D. in economics from the University of Wisconsin in 1986. His areas of research 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 work has also appeared in previous editions of the *Kentucky Annual Economic Report*, focusing on Kentucky's tax system in 1995 and welfare reform in 1997.



Dr. James H. Stoker

Dr. James H. Stoker is Assistant Professor of Economics at the University of Kentucky. Dr. Stoker received his Ph.D. in economics from the University of Chicago in 1995. His primary research interests are monetary economics, banking, and financial history. His research has been published in *The Review of International Economics*.

Dr. Ginny Wilson

Dr. Ginny Wilson has been Chief Economist for the Legislative Research Commission since 1987. She is currently on temporary leave from that position to serve as a Visiting Professor in the University of Kentucky's Martin School of Public Policy and Administration. Dr. Wilson received her Ph.D. in agricultural economics from the University of Kentucky in 1993. Her interest and experience involves the conduct of applied policy analyses requested by members of the Kentucky General Assembly. Examples of past areas of study include assessment of the Commonwealth's debt position and management of state debt authorities, evaluation of the impact of proposed legislation on the Kentucky economy, investigation of regional differences in the characteristics of the poor in Kentucky, and analysis of data on health insurance markets in the state.



Dr. Eric C. Thompson

Dr. Eric C. Thompson is Associate Director of CBER and a Research Assistant Professor in the Department of Economics and CBER at the University of Kentucky. Dr. Thompson received his Ph.D. in agricultural economics from the University of Wisconsin in 1992. Previously, he was a Research 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 expertise lies in the fields of economic forecasting and regional economics. He has conducted many studies on local and state economic development and currently maintains and updates the University of Kentucky State Econometric Model.



Dr. Christopher J. Waller

Dr. Christopher J. Waller is the Carol Martin Gatton Chair of Macroeconomics and Monetary Theory at the University of Kentucky and a Research Fellow of the Center for European Integration Studies at the University of Bonn. He received his B.S. from Bemidji State University (Minnesota) in 1981 and his Ph.D. from Washington State University in 1985. From 1985-1998 he was a faculty member at Indiana University. Dr. Waller has been a Visiting Professor at Washington University, the University of Mannheim, and the National University of Ukraine-Kiev. He has also served as a Visiting Scholar at the Board of Governors of the Federal Reserve System and the Federal Reserve Bank of St. Louis. He has also served as a consultant to the Federal Reserve Bank of Cleveland. His research interests include monetary search models, the political economy of central banking, bargaining theory, and intranational banking integration.

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Eric C. Thompson

The Kentucky economy is forecast to see moderate growth from 1999 through 2001. During 1999, growth is expected to be slower for Kentucky and the United States compared to past years. Real gross state product is forecast to grow at a 2.4 percent rate in 1999, real total personal income is forecast to grow about 1.5 percent in each quarter of 1999, and total population is forecast to grow about 0.7 percent in 1999. Employment growth is forecast to average about 29,000 new jobs each year from 1999 to 2001, with the services sector leading the way with about 14,000 new jobs each year. Retail trade employment growth is also forecast to be strong, adding about 9,800 jobs in 1999, while manufacturing employment is forecast to increase by only about 500 jobs in 1999. Strong growth in occupations is also forecast to occur in services and marketing and sales occupations.

The U.S. Economy in 1998: Uncharted Waters 13

Christopher J. Waller

The year 1998 saw many macroeconomic events not seen in more than two decades and in some cases not since the Great Depression. While most of these events were 'good,' such as federal government surpluses, low unemployment, near zero inflation, and solid growth of national income, 1998 also produced a tremendous burst of volatility in asset markets, record trade deficits, and perverse interest rate relationships. This has made the Federal Reserve's job of navigating the U.S. economy much more complicated and uncertain. While the outlook for next year is murky, the economy should be able to avoid a recession and continue to grow at a respectable rate, although probably at a lower rate than we have observed in the last couple of years.

An Evaluation of the Kentucky Education Reform Act 21

William H. Hoyt

The Kentucky Education Reform Act (KERA) caused drastic changes in the way education is provided in Kentucky. Because KERA attempted to equalize funding and dramatically alter the curriculum and governance of schools, it is appropriate to see how effective the reforms have been in affecting spending and educational outcomes. Comparisons of measures before and after KERA show that it has equalized funding among school districts, with some districts gaining substantially in their funding of students. Teacher salaries and student/teacher ratios have also improved relative to national averages since the introduction of KERA. Educational outcomes have not improved, however. There has been no appreciable gain in test scores or graduation rates in Kentucky relative to other states, and there is no evidence that KERA has increased college attendance rates of Kentucky high school graduates.

Why Are More Kentuckians Working? 37

Mark C. Berger and Sharon Kane

Kentucky's female employment increased substantially from 1986 to 1996, from 44.5 percent in 1986 to 52.8 percent in 1996, a larger increase than seen nationwide. At the same time, Kentucky's male employment rate decreased from 68.0 percent to 65.8 percent during this period, while the U.S. rate stayed the same. The most important factor behind the increase in the female employment rate has been the increase in education among Kentucky females from 1986 to 1996, as more education tends to lead to higher employment rates. Also important was the change in industry structure and, to a lesser extent, growth in gross state product and a decrease in average household size. The analysis is less clear for Kentucky males, but nationwide male employment rates have been falling over time.

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Michael Clark and Ginny Wilson

Health insurance reforms in Kentucky in 1994, 1996, and 1998 dramatically changed the nature of health insurance in the state. One part of the legislation limited the ability of insurance companies to charge different premiums based upon individual characteristics such as age, gender, and health status. Because all insured persons would then be charged an average premium based upon the average health status of the entire group, those in better health may have opted to drop their insurance because they would be paying a higher premium than otherwise. Legislation passed by the General Assembly again allowed insurance companies to segment their customers by health status but does not allow them to deny coverage to high-risk people.

Medicaid Managed Care and the Tennessee Health Care Industry: Potential Implications For Kentucky 55

Eric C. Thompson, James H. Stoker, and Dan A. Black

The 1998 Kentucky General Assembly passed legislation creating a managed care program for Kentucky Medicaid recipients. In 1994, Tennessee introduced a managed care program for its Medicaid recipients called TennCare. The Tennessee program expanded to cover thousands of additional patients without a concurrent increase in medical expenditures. This overall increase in cost may cause some counties to lose health care providers and facilities. TennCare appeared to cause a modest reduction in the number of health care facilities in Tennessee counties located on the border of the state. The analysis shows that about 1 in 34 border counties would have one fewer establishment in each health care industry after TennCare, with losses more likely to occur in counties with smaller populations. As Kentucky moves to a similar managed care system, it seems that the effect of such a program on the number of health care establishments is likely to be small.

Computer and Internet Usage at Businesses in Kentucky 61

Steven N. Allen

Virtually all businesses in Kentucky use computers in some way. Many businesses are also beginning to use the Internet as a communications medium and sales and marketing platform for their goods and services. Results of a recent survey of large Kentucky businesses show that almost 70 percent of businesses use the Internet for electronic mail and information searches while smaller numbers use it for marketing and promotion of products and online commerce. Kentucky businesses also indicated that they place a good deal of importance on the computer skills of prospective employees, even though many firms still provide computer and Internet training to their employees. Finally, most businesses using the Internet consider it a productive tool for their business.

Quarterly Forecasts for the Kentucky Economy, 1999 - 2001

Eric C. Thompson

The Kentucky economy is forecast to see moderate growth from 1999 through 2001. During 1999, growth is expected to be slower for Kentucky and the United States compared to past years. Real gross state product is forecast to grow at a 2.4 percent rate in 1999, real total personal income is forecast to grow about 1.5 percent in each quarter of 1999, and total population is forecast to grow about 0.7 percent in 1999. Employment growth is forecast to average about 29,000 new jobs each year from 1999 to 2001, with the service industry leading the way with about 14,000 new jobs each year. Retail trade employment growth is also forecast to be strong, adding about 9,800 jobs in 1999, while manufacturing employment is forecast to increase by only about 500 jobs in 1999. Strong growth in occupations is also forecast to occur in services and marketing and sales occupations.

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 1999. Annual forecasts are presented for 1999, 2000, and 2001.

The Kentucky economy is forecast to experience moderate growth from 1999 through 2001. Growth in gross state product, which is a measure of the value of all of the state's goods and services, is forecast to average 2.2 percent per year over the three-year period, while employment growth is forecast to average 1.6 percent annually. Future growth in the Kentucky economy is expected to be broad-based. All major industry groups besides manufacturing and mining are expected to add employment from 1999 to 2001; however, nine of 20

specific manufacturing industries are expected to add employment. Finally, all nine occupational groups are forecast to add jobs over the next three years.

Moderate job growth is forecast to lead to wage and salary income growth of 1.8 percent per year, and a total income growth rate of 1.4 percent annually. Employment and income growth is forecast to encourage net migration into Kentucky and yield an expected increase in the state's population of 0.7 percent per year. Overall, job growth in Kentucky is forecast to exceed national job growth, but population is forecast to grow slower in Kentucky than in the United States as a whole.

The Kentucky Forecast

The rate of growth in the Kentucky economy is forecast to exceed slightly the national growth rate (see the Appendix for a description of the national forecast). Faster growth is forecast for Kentucky because the state is expected to experience only a small job loss in its manufacturing sector, while manufacturing jobs nationally are forecast to decline sharply. This relatively strong performance is expected for Kentucky even though the state does not have a large concentration of rapidly growing national manufacturing industries, such as those in computers and related industries.

Even the slightly faster growth forecast for Kentucky can have important consequences for the

Quarterly Forecasts for the Kentucky Economy, 1999 - 2001

economy. To give one example, Kentucky's annual total employment growth rate is forecast to exceed the national rate by 0.1 percent on average from 1999 through 2001. This percentage difference translates into 7,500 additional jobs for Kentucky over the three years.

Recent Developments

During 1998, both the Kentucky and national economies grew at a strong rate. Employment in the Kentucky and national economies grew at a rate of 2.2 percent per year. To achieve this growth rate, Kentucky added roughly 37,400 jobs in 1998, and this growth rate in 1998 was the same as that in 1997. These figures for 1998 were based on actual employment data from the first six months of the year and estimated values for the last six months.

The strong performance in the Kentucky economy in 1998 was in part due to a growing manufacturing sector. Manufacturing employment increased by 1,700 jobs in Kentucky in 1998. The more rapidly growing manufacturing industries in Kentucky in the past year included wood and furniture products and plastic products. Coal mining employment did not grow in Kentucky in 1998.

Other major industry groups posted employment gains in 1998. The services and retail trade sectors accounted for the most job growth. The services industry is expected to have grown at a 3.1 percent rate and added 13,400 jobs in 1998. Business and health services led the way in service industry growth. The retail trade industry is expected to have grown at a rapid 2.5 percent rate and added 8,400 jobs. Modest 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 1998.¹ Real personal income is estimated to have grown by 3.2 percent.

The Next Year

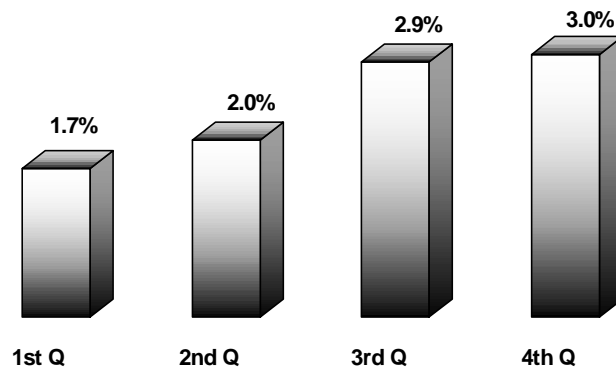
The 1999 forecast calls for a slowing of economic growth both in Kentucky and the United States. This

is true for a range of measures, from real value-added output, real personal income, and total employment. Growth rates are forecast to be quite similar in Kentucky and the United States.

Real value-added output, or real gross state product, is forecast to grow at a moderate 2.4 percent rate in 1999. Growth is forecast to be steady but rising throughout the year, as shown in Figure 1. Gross state product is forecast to grow at an annual rate of 1.7 percent in the first quarter and 2.0 percent in the second quarter before rising to 2.9 percent and 3.0 percent in the third and fourth quarters, respectively.

FIGURE 1

1999 Kentucky Gross State Product Growth



Such steady growth is also evident in employment forecasts for 1999. Total employment growth is forecast to reach an annual growth rate of 1.8 percent in the first quarter of 1999, 2.0 percent in the second quarter, 1.2 percent in the third quarter, and 3.0 percent in the fourth quarter. Growth in real total personal income is forecast to be somewhat steadier. Total personal income growth is forecast to be around 1.5 percent in each of the four quarters of 1999. With consistent employment and income growth, population growth is also expected to continue in Kentucky in 1999. Population is forecast to increase by 28,300 persons during the year, or a 0.7 percent rate of growth.

Just as in previous years, the greatest growth among industries in 1999 is forecast for services and retail trade. Service industry employment is forecast to grow by 3.4 percent in 1999, adding a total of

15,000 jobs. Business services, growing at 6.1 percent, and health services, growing at 2.6 percent, are forecast to add the most new service jobs. Retail trade employment is forecast to grow at 2.9 percent in 1999, adding 9,800 new jobs.

The manufacturing industry is expected to add only a few jobs in Kentucky in 1999. Manufacturing employment is forecast to rise by 0.2 percent. This translates into 500 net new manufacturing jobs. Transportation equipment, wood and furniture products, paper products, chemical products, plastic products, and fabricated metals are forecast to be the strongest manufacturing industries in 1999. Following the trend of the last decade, coal mining employment is forecast to decline by roughly 2.3 percent in 1999, or by about 400 jobs.

The Three-Year Forecast

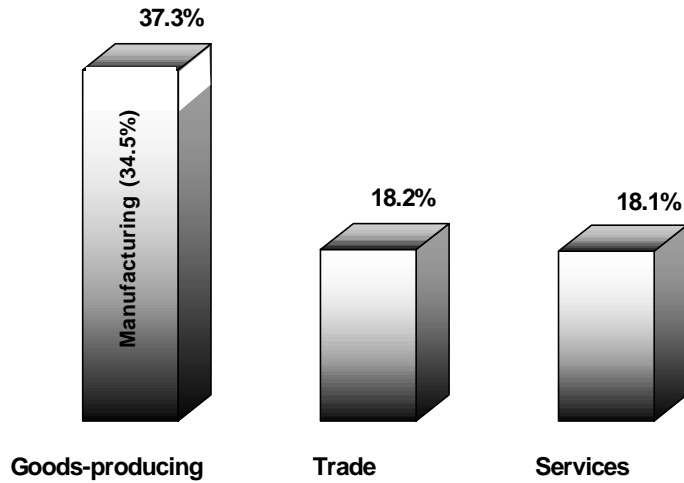
Growth in the Kentucky economy is forecast to decelerate further in 2000 and 2001, but overall growth rates for the three-year period still will be moderate. Real gross state product is forecast to grow by nearly 2.2 percent on average for the three years. Total employment is forecast to average 1.6 percent per year, and real total personal income is forecast to grow by 1.4 percent on average. Each of these growth rates meets or exceeds national forecasts. Population growth in Kentucky is expected to lag national growth. The following three sections discuss the growth of industries, income, and population in more detail.

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

FIGURE 2

Share of Kentucky Gross State Product Growth in Selected Industry Groups, 1999 - 2001



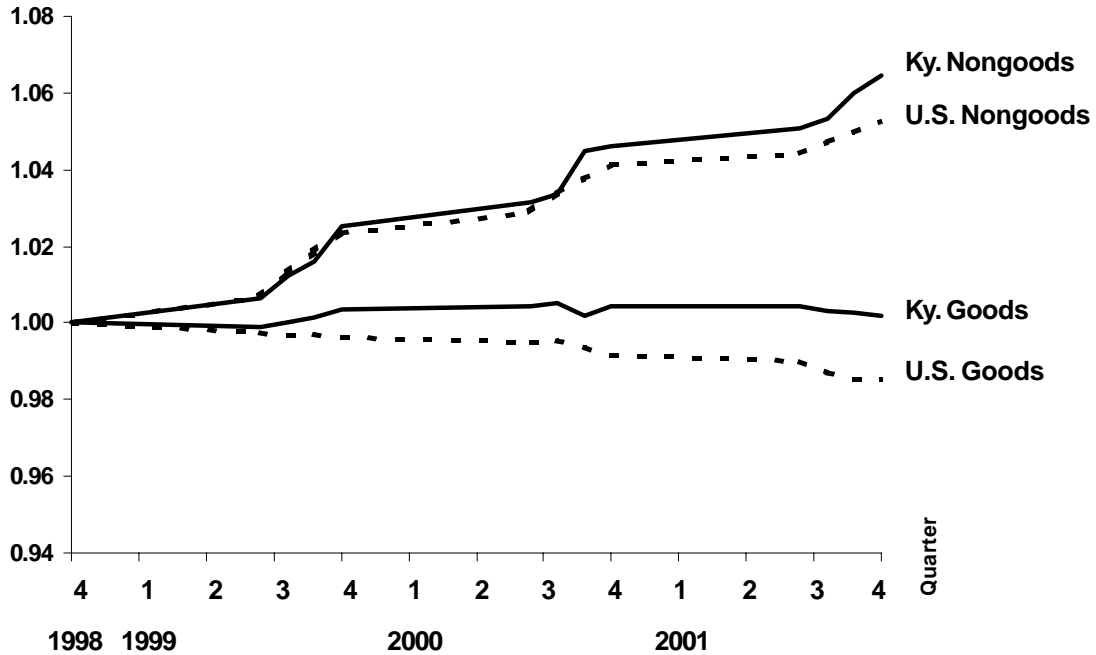
consumption, profits, business tax payments, as well as employment and earnings. As a result, analysis of gross state product data can sometimes lead to a different perspective than analysis of a less comprehensive measure, such as employment growth. In particular, while more rapid job growth in services is evidence 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 26.7 percent of real gross state product in the fourth quarter of 1998, while goods-producing industries as a whole accounted for 36.7 percent. The remaining 63.3 percent of real gross state product was divided among other industries. For example, retail and wholesale trade together accounted for 14.7 percent, and services accounted for 13.9 percent.

Manufacturing and other goods-producing industries are forecast to account for an even larger share of growth in Kentucky real GSP, portending an even more important role in the economy in the future. As Figure 2 shows, manufacturing is forecast to account for 34.5 percent of growth in real GSP from 1999 through 2001. Goods-producing industries are forecast to account for 37.3 percent of

FIGURE 3

Indices of Employment Forecasts for Goods- and Nongoods-Producing Industries in Kentucky and the U.S., 1999 - 2001



growth in real GDP. 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 real GDP growth. Retail and wholesale trade are forecast to account for 18.2 percent of real gross state product growth from 1999 through 2001, while services are forecast to account for 18.1 percent of growth.

Strong growth in real gross state product is consistent with growing employment. However, an increase in real GDP does not guarantee that employment also will increase. Productivity, or real GDP per worker, can grow rapidly enough in some industries that total employment will decline even as gross state product grows. This trend is occurring nationally in many goods-producing industries (manufacturing, mining, and construction). Figure 3 shows indices for employment in 1999 through 2001 compared to employment in the fourth quarter of 1998. As depicted, goods-producing employment is forecast to decline slightly in the United States

from the fourth quarter of 1998 through the fourth quarter of 2001.

Growth in real GDP in goods-producing industries, however, is expected to lead to a slight increase in employment in Kentucky. As shown in Figure 3, employment in goods-producing industries is forecast to increase just slightly throughout the three-year period. Goods-producing industries are forecast to grow on average by 0.1 percent per year. Table 1 shows growth and growth rates for gross state product for the next three years.

Nongoods-producing industries also are forecast to grow more quickly in Kentucky than nationally. Figure 3 also shows growth indices for nongoods-producing industries such as services, retail trade, wholesale trade, and government in Kentucky and the United States. Non-goods-producing industries in Kentucky consistently outperform national averages. The growth rate in Kentucky is forecast to average 2.1 percent per year compared to a 1.7 percent growth rate forecast for the United States.

Quarterly Forecasts for the Kentucky Economy, 1999 - 2001

TABLE 1

Real Gross State Product (GSP) by Industry in Kentucky, 1999 - 2001 (Seasonally Adjusted)

Industry	Real GSP 4th Q 1998 (\$mil)	1999 Quarterly Growth at an Annual Rate				Annual Growth Rate			Annual Averages	
		1st Q	2nd Q	3rd Q	4th Q	1999	2000	2001	Growth (\$mil)	Growth Rate
Total	\$73,228.63	1.68%	2.00%	2.87%	2.96%	2.38%	2.18%	2.10%	\$1,661.10	2.22%
Agriculture	1,557.57	-7.49	-4.42	32.82	14.52	7.69	-6.03	3.08	22.37	1.58
Mining	2,642.49	0.38	-1.47	1.26	0.66	0.20	0.90	0.62	15.25	0.57
Construction	3,180.92	-0.15	0.27	0.05	0.34	0.13	0.06	0.79	10.40	0.33
Manufacturing	19,576.29	1.16	2.57	3.05	3.88	2.66	3.36	2.52	573.42	2.85
TCPU	7,611.20	3.24	3.09	2.96	3.23	3.13	2.91	2.80	231.07	2.95
Trade	10,733.33	3.60	3.06	3.14	2.98	3.19	2.39	2.64	302.26	2.74
FIRE	9,384.02	1.67	1.75	1.40	2.17	1.75	1.57	1.44	151.28	1.59
Services	10,177.88	2.88	2.94	2.88	2.92	2.90	2.82	2.91	301.46	2.88
Government	8,364.94	0.49	0.46	0.41	1.09	0.61	1.15	0.15	53.59	0.64

TCPU = Transportation, Communications, and Public Utilities

FIRE = Finance, Insurance, and Real Estate

Income

Income growth in Kentucky is forecast to exceed national growth over the next three years. Figure 4 shows indices of real total personal income in Kentucky and the United States. Real income refers to income which has been adjusted for inflation. Real income growth in Kentucky is forecast to slightly exceed growth in the United States, as evident in Figure 4.

Growth rate forecasts for both Kentucky and the United States are slower than the growth rates in previous years. This is occurring in part due to an expected slowdown in employment growth over the next few years as the labor force ages and begins to grow more slowly. The slowdown is also expected due to flat or falling earnings from interest payments and investment dividends, as interest rates fall and stock market growth slows.

Faster total income growth in Kentucky is not the result of faster population growth in the state. Population in Kentucky is forecast to grow more slowly than nationally over the three-year period. Instead, faster income growth in Kentucky is the result of faster income growth per person. From 1999 through 2001, growth in real per capita, or per person, income in Kentucky is forecast to average 0.7 percent in Kentucky compared to an average

growth of 0.5 percent nationally. Kentucky's more rapid expansion is forecast to result in faster-rising average incomes for residents.

Population

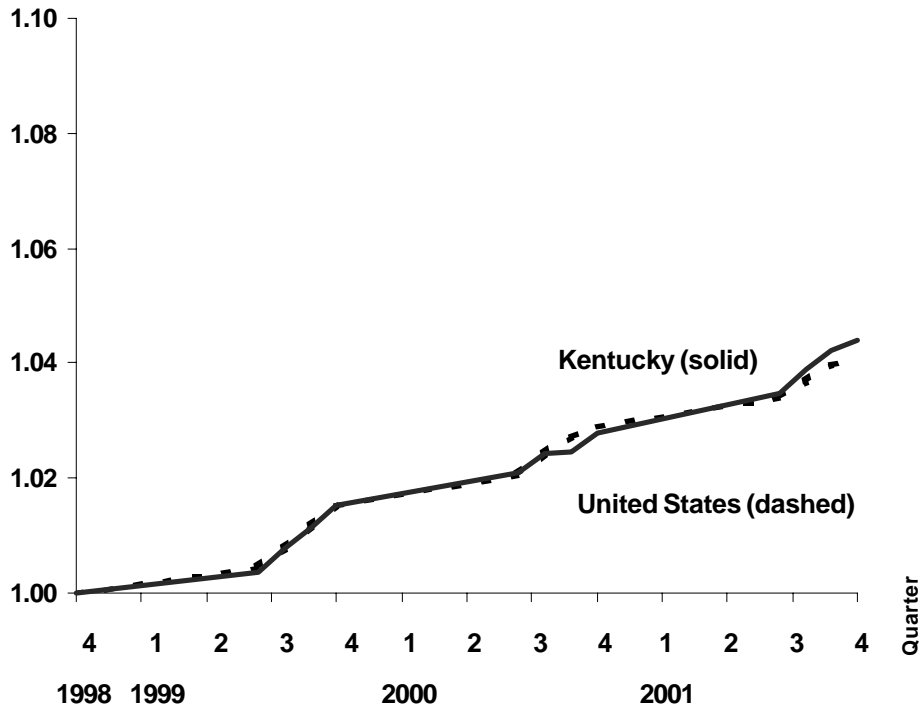
Population growth in Kentucky has been steady throughout the 1990s.² Rising in-migration, reduced outmigration, or both, have led to positive net migration, which is the number of persons migrating to Kentucky minus the number migrating out of the state.

With more persons moving to the state than leaving, 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). But population growth rates in the late 1990s have slowed somewhat from the growth rates in the early 1990s. From 1999 to 2001, Kentucky's population is forecast to grow by 0.7 percent annually compared to 0.8 percent growth forecast for the nation. This figure translates into an average increase of 29,000 residents each year. Of that total, 22,200 are due to net migration.

This growth, however, is not forecast in all population groups. As nationally, Kentucky's forecast shows an aging population. The number

FIGURE 4

Indices of Real Total Personal Income Forecasts in Kentucky and the U.S., 1999 - 2001



of persons ages 35 to 39 in Kentucky is forecast to decline slightly over the next three years, and growth is very modest in other young age groups as well. 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 50 to 59 year-olds is expected to grow by 3.2 percent per year from 1999 through 2001. Population is also forecast to grow quickly among the oldest portion of the population. The number of persons over age 85 should grow by 4.7 percent per year over the next three years.

Forecast Detail

The moderate growth forecast for the Kentucky economy is not the result of a consistent growth rate among all industries or sources of income. Rather, 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, and sources of income.

Employment

Employment growth among Kentucky industries varies substantially, but it is broad-based. Most industries are adding employment, with the exception of coal mining and selected manufacturing industries. As nationally, the majority of job growth is forecast in retail trade and services.

Total manufacturing employment is forecast to decline at an average annual rate of 0.2 percent in Kentucky from 1999 through 2001, which translates to a loss of roughly 500 jobs per year. Manufacturing employment is forecast to grow by 0.2 percent in 1999, remain flat in 2000, and decline by 0.6 percent in 2001. The forecast slowdown over the three-year period is in contrast to modest growth in the manufacturing industry in Kentucky in recent years. The forecast decline reflects a pessimistic forecast for national manufacturing employment in the next few years. Indeed, Kentucky's 0.2 percent job loss actually compares favorably with the national forecast of a 1.0 percent decline in manufacturing employment each year. Kentucky manufacturing

Quarterly Forecasts for the Kentucky Economy, 1999 - 2001

TABLE 2

Growth and Growth Rates for Nonfarm Employment in Kentucky by Industry, 1999 - 2001 (Seasonally Adjusted)

Industry	Employment 4th Q 1998	1999 Quarterly Growth				Annual Growth			Average Annual Growth		
		1st Q	2nd Q	3rd Q	4th Q	1999	2000	2001	Ky.	Ky. %	U.S. %
Total	1,767,143	1.80%	1.99%	1.17%	3.00%	1.99%	1.59%	1.29%	29,142	1.62%	1.49%
Goods-producing	421,618	-0.46%	0.59%	0.48%	0.82%	0.36%	0.09%	-0.27%	256	0.06%	-0.48%
Mining	22,272	-1.93	-3.18	-1.16	-1.56	-1.96	-1.67	-2.19	-424	-1.94	-2.48
Coal mining	18,550	-1.89	-3.90	-1.45	-1.78	-2.26	-1.75	-2.44	-390	-2.15	NA
Construction	85,187	0.51	1.90	1.03	3.40	1.70	1.02	1.50	1,216	1.41	0.36
Manufacturing	314,160	-0.61	0.50	0.45	0.29	0.16	-0.04	-0.62	-537	-0.17	-1.00
Food products	25,581	-6.39	-4.18	-1.00	-1.19	-3.22	-1.71	-2.20	-593	-2.37	-0.98
Tobacco	4,600	-1.41	-3.13	-3.71	-5.09	-3.34	-4.66	-4.75	-187	-4.25	-3.36
Textiles	4,824	1.51	5.46	4.25	4.80	4.00	4.12	1.77	164	3.29	-0.85
Apparel	23,293	1.52	0.66	-0.13	-2.31	-0.07	-0.25	-0.52	-65	-0.28	-2.76
Wood	14,759	-0.01	1.88	2.07	3.12	1.76	2.63	2.24	334	2.21	-0.08
Furniture	5,471	-2.42	8.34	9.56	9.81	6.20	1.99	-7.08	12	0.37	-1.15
Paper products	12,587	-0.22	0.73	1.32	1.98	0.95	1.51	1.52	169	1.33	-0.45
Printing and publishing	22,925	-1.62	-0.88	-1.83	-2.85	-1.80	-3.40	-4.10	-689	-3.10	-1.00
Chemicals	14,620	0.52	1.57	2.72	-0.25	1.13	-0.26	-1.27	-20	-0.13	-0.19
Petroleum and coal refining	3,086	11.43	8.01	5.50	3.55	7.08	1.11	-0.65	78	2.51	-3.39
Rubber and plastic products	20,457	1.94	3.52	5.67	2.86	3.49	2.83	2.48	618	2.93	-0.37
Leather products	961	0.49	-1.50	-0.87	-2.28	-1.04	-2.04	-3.06	-19	-2.05	-4.87
Stone, clay, and glass products	11,422	0.63	2.12	-0.99	-1.22	0.12	-1.18	-0.81	-70	-0.62	-1.52
Primary metals	17,549	-0.11	1.64	1.18	0.21	0.73	-0.12	-0.18	25	0.14	-2.18
Fabricated metals	24,064	1.19	0.72	0.67	1.98	1.14	0.56	0.18	152	0.63	-0.87
Non-electric machinery	37,189	-3.55	0.97	-0.96	-0.75	-1.09	0.17	-0.86	-220	-0.59	-2.54
Electric machinery	25,068	-0.16	-0.72	-1.19	-1.05	-0.78	-1.76	-2.52	-416	-1.69	-4.49
Transportation equipment	36,252	0.86	-0.77	0.39	3.60	1.01	0.91	0.63	311	0.85	-2.61
Instruments and related products	4,591	-2.29	-1.99	-2.33	-2.02	-2.16	-1.66	-1.60	-81	-1.81	-3.12
Miscellaneous manufacturing	4,860	-0.83	1.59	-4.92	-10.18	-3.69	-0.87	2.41	-36	-0.72	0.52
Nongoods-producing	1,334,690	2.56%	2.46%	1.40%	3.71%	2.53%	2.05%	1.76%	28,795	2.11%	1.73%
TCPU	102,263	1.89	1.55	1.28	1.85	1.64	1.16	0.92	1,284	1.24	0.94
Trade	422,869	2.76	2.38	2.54	2.44	2.53	1.54	1.74	8,344	1.94	1.73
Wholesale trade	86,359	0.92	1.20	1.44	1.18	1.19	-0.45	1.98	785	0.91	1.44
Retail trade	336,510	3.24	2.68	2.82	2.77	2.88	2.04	1.68	7,559	2.20	1.82
FIRE	70,957	0.40	0.82	0.80	0.97	0.75	1.13	1.15	724	1.01	1.67
Services	443,139	3.14	3.36	0.23	6.87	3.37	2.98	2.70	13,788	3.02	3.05
Business services	92,534	6.09	6.35	-1.58	14.14	6.10	4.89	3.91	4,824	4.97	NA
Health services	153,623	2.27	2.48	2.74	2.83	2.58	2.92	3.05	4,503	2.85	2.73
Government	295,461	2.16	1.93	1.71	2.14	1.98	1.89	0.78	4,655	1.55	1.58
Federal	38,053	1.71	0.97	0.39	-0.41	0.66	0.56	-1.46	-31	-0.08	-1.00
State and local	257,408	2.23	2.07	1.90	2.51	2.18	2.09	1.10	4,687	1.79	1.96
State	88,722	0.76	0.19	0.33	0.28	0.39	0.41	0.53	397	0.45	NA
Local	168,686	3.00	3.06	2.72	3.68	3.12	2.95	1.39	4,290	2.48	NA

TCPU = Transportation, Communications, and Public Utilities

FIRE = Finance, Insurance, and Real Estate

Quarterly Forecasts for the Kentucky Economy, 1999 - 2001

is not expected to add employment in the next few years but is forecast to continue to do much better than the nation as a whole.

As is seen in Table 2, about one-half of the state's manufacturing industries are forecast to add jobs in the next three years. Specifically, just nine of the 20 manufacturing industries are forecast to grow. Still, this compares favorably with the national forecast, where only one manufacturing industry is forecast to grow. The fastest rates of growth for Kentucky manufacturing industries are forecast for plastic products, wood products, and transportation equipment. The fastest rates of job loss are forecast for tobacco products, leather products, instruments, and electric machinery.

The construction industry in Kentucky is forecast to grow by 1.4 percent per year over the next three years. Growth is forecast to be fastest in 1999. Coal mining employment is forecast to decline during each of the next three years. It should be noted, however, that the rate of decline in the coal mining industry is expected to be small relative to the substantial declines in the 1980s and early 1990s. After declining by 1,400 jobs per year in the early 1990s, coal mining employment is forecast to decline by only 400 jobs per year in 1999 through 2001.

As with manufacturing, non-goods producing industries in Kentucky such as retail trade and services are expected to outperform their national counterparts in terms of jobs. This result is not surprising given the faster rate of income growth expected for Kentucky. As was seen in Figure 4, income is forecast on average to grow 0.1 percent faster in Kentucky than nationally. Since demand for industries like 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 as fast or faster in Kentucky than nationally.

A faster rate of growth is clearly seen in retail employment. Retail trade employment is forecast to grow by 2.2 percent in Kentucky compared to 1.8 percent nationally over the next three years. Meanwhile, government employment in Kentucky is forecast to average 1.6 percent growth over the next three years, the same rate as nationally.

Despite the much more rapid growth in retail trade, some non-goods producing industries are forecast to grow somewhat slower in Kentucky than nationally. Services employment is forecast to grow by 3.0 percent per year in Kentucky compared to

3.1 percent nationally. The finance, insurance, and real estate industry is forecast to grow by 1.0 percent per year in Kentucky compared to 1.6 percent nationally.

The forecast rate of employment growth of services, however, still exceeds the rate of growth forecast for retail trade employment. The service industry contains some of the fastest-growing portions of the economy such as business services and professional services. A trend in business 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 5.0 percent per year on average in 1999 through 2001. 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 a 2.8 percent annual rate, still a strong rate of growth, but below the average growth rate for services.

In summary, most trade and service industries are forecast to grow about as fast or faster in Kentucky than nationally. This is consistent with the slightly faster rate of income growth in the state. The state also is forecast to benefit from a better performing manufacturing sector than in the nation as a whole .

Occupations

These patterns in industry growth also are evident in the pattern of occupational growth. As Table 3 indicates, two of the three fastest-growing occupations are services occupations, and to a lesser extent, marketing and sales occupations. Workers in services occupations include health care assistants, food preparers, cleaners, and household workers, among others. Marketing and sales occupations are composed primarily of cashiers and other retail sales workers. Roughly 6,600 service jobs are forecast to be added over each of the next three years, while 4,200 marketing and sales jobs are forecast to be gained.

This growth translates into a 2.3 percent annual growth rate for services occupation jobs, and a 2.2 percent rate of growth for marketing and sales jobs. Both growth rates are well above the forecast overall growth rate of 1.6 percent for all occupations. Slower

TABLE 3

Growth and Growth Rates for Employment in Kentucky by Occupation, 1999 - 2001 (Seasonally Adjusted)

	Employment 4th Q 1998	Employment 4th Q 2001	Annual Growth	Annual Growth Rate
Total	1,767,143	1,854,568	29,142	1.62%
Executives, administrators, and managers	175,578	184,899	3,107	1.74
Professional specialty	217,336	235,649	6,104	2.73
Technicians and related support	62,621	66,380	1,253	1.96
Marketing and sales	185,175	197,628	4,151	2.19
Administrative support, including clerical	335,045	345,200	3,385	1.00
Service	280,865	300,783	6,639	2.31
Agriculture, forestry, fishing, and related	18,520	19,233	235	1.25
Precision production, craft, and repair	212,606	218,061	1,818	0.85
Operators, fabricators, and laborers	279,328	286,699	2,457	0.87

growth was forecast for those occupations that account for a substantial share of manufacturing employment, such as precision, production, craft, and repair workers, and operators, fabricators, and laborers. The annual growth rate forecast for precision, production, craft and repair workers is forecast at 0.8 percent per year, while the growth forecast is 0.9 percent per year for operators, fabricators, and laborers. A substantial share of the job growth in these occupations is forecast to occur for workers performing these tasks in non-manufacturing industries such as construction and transportation, communications, and public utilities.

Another pattern evident in occupational growth forecasts is the growth among 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 2.7 percent annually, resulting in a net increase of 6,100 workers each year. The professional specialty occupational group includes teachers, scientists, engineers, doctors, and artists, among others. Executives, administrators, managers, and technicians are other groups of workers that, on average, have a high level of education. The annual rate of job growth in these

two occupational groups is forecast to be 2.0 percent for technicians and 1.7 percent for executives, administrators, and managers. Both of these growth rates are above the average of 1.6 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 the nine aggregate occupation groups. The growth rate is forecast to exceed at least 0.8 percent per year in all major occupation groups. 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 for workers in related occupations. Overall, this implies that there are expanding opportunities for most Kentucky workers.

Income

Real total personal income is forecast to grow somewhat more rapidly in Kentucky than nationally. Income growth is forecast to average 1.44 percent per year in Kentucky from 1999 through 2001 compared to 1.35 percent nationally. An examination in Table 4 of the sources of income

Quarterly Forecasts for the Kentucky Economy, 1999 - 2001

TABLE 4

Growth Rates for Real Personal Income and its Components in Kentucky, 1999 - 2001 (Seasonally Adjusted)

Income Source	Income 4th Q 1998 (\$mil)	1999 Quarterly Growth at an Annual Rate				Annual Growth Rate			Annual Averages		
		1st Q	2nd Q	3rd Q	4th Q	1999	2000	2001	Growth (\$mil)	Growth Rate Ky.	Growth Rate U.S.
Total personal income	\$52,214.15	1.45%	1.67%	1.44%	1.58%	1.54%	1.23%	1.56%	764.50	1.44	1.35
Wage and salary income	29,483.57	1.24	2.55	2.22	2.22	2.06	1.50	1.85	541.42	1.80	1.83
Other labor income (benefits)	3,103.27	0.20	1.81	1.87	2.50	1.59	2.67	2.48	71.32	2.25	2.22
Proprietor's income	3,688.31	2.83	2.69	0.72	4.36	2.64	1.28	-0.04	48.11	1.29	1.43
Residential adjustment	-293.52	5.00	6.63	6.08	6.53	6.06	4.93	4.47	-15.91	5.15	NA
Contributions to social insurance	2,707.50	4.55	3.93	3.75	3.54	3.94	2.92	1.88	81.12	2.91	1.92
Transfer income	10,594.24	5.03	2.06	2.54	1.41	2.75	1.96	2.57	263.32	2.43	2.47
Dividends, interest, rent	7,529.78	-1.39	-1.62	-1.77	-1.27	-1.51	-0.61	-0.24	-58.86	-0.79	-1.68
Per capita income	\$13,247	0.73%	1.03%	0.66%	0.83%	0.81%	0.49%	0.81%	\$94	0.71%	0.51%

growth indicates that this slightly faster overall growth results from very similar growth rates for Kentucky and the U.S. in wage and salary income and transfer income, but better performance for Kentucky in dividend, interest and rent income.

This 1.44 percent rate of growth also reflects a slowdown relative to recent growth rate forecasts. The slowdown results from two sources. First, there is a forecast slowdown in employment growth in both Kentucky and the nation in the next few years due to slower growth in the labor supply, which is the result of an aging population. Second, expectations for much lower interest rates and modest growth in the stock markets in the next few years has also led to a forecast for a decline rather than increase in dividends, interest, and rent income in Kentucky and the nation. However, the rate of decline in Kentucky, averaging 0.8 percent per year, is expected to be roughly one-half the national rate of decline, at 1.7 percent per year.

Real wage and salary earnings are forecast to grow by 1.8 percent per year in Kentucky, the same as forecast nationally. This 1.8 percent rate of growth translates into nearly \$541 million of real income growth per year from 1999 to 2001. Benefits income (other labor income) is forecast to grow by 2.2 percent per year in Kentucky, again the same growth forecast nationally. This 2.2 percent increase is forecast to yield \$71 million in new income each year. Proprietor's income is forecast to grow by 1.3 percent

per year in Kentucky from 1999 to 2001, adding \$48 million per year to state income, while it is forecast to grow by 1.4 percent per year nationally.

Together, these three sources of working income are forecast to account for \$660 million of \$764 million of income growth per year in Kentucky. Earnings from work will be the key source for income growth in Kentucky. After subtracting out payments on wages for social insurance, earnings from work will account for 75.8 percent of income growth in the state.

Transfer income in Kentucky is forecast to grow at an average rate of 2.4 percent over the next three years. This is similar to the 2.5 percent growth rate forecast for the nation. Another interesting pattern is the continued decline forecast for Kentucky's residential adjustment over the next few years. Residential adjustment 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 October 1998 forecast for the United States 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 two alternative national scenarios are examined below.

In the first alternative scenario, there may be a recession on the horizon for 1999. Recession in the United States may be brought on by further deterioration in economic conditions in Asia and recession in Latin America. This not only hurts export-oriented sectors of the United States, but also causes a fall in U.S. stock markets and consumer confidence. The recession lasts for just three quarters in 1999 and is mild, with the economy contracting by only a few percentage points. Deep interest rate cuts by the Federal Reserve help the economy out of recession by the year 2000. DRI has assigned a probability of 30 percent to this scenario.

In the second alternative scenario, the economy continues to grow through 1999, but falls into recession in 2000. In this scenario, inflation begins to rise in 1999. Rising inflation causes the Federal Reserve to increase interest rates in late 1999 and early 2000, which hurts consumer confidence and the stock market. This causes the economy to fall into a mild, three-quarter recession in the year 2000. Year 2000 computer problems exacerbate these problems. Interest rate cuts by the Federal Reserve help the economy out of recession by the year 2001. DRI has assigned a probability of 15 percent to this scenario.

Conclusion

The Kentucky economy is forecast to experience moderate to slow growth during 1999, 2000, and 2001. Growth is expected to decelerate 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 and selected manufacturing industries. All major occupational groups are forecast to add employment. Real income and population are each forecast to grow at a slow to moderate rate. Moderate growth is forecast to help Kentucky maintain moderate 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 21,300 of the 29,100 net new jobs expected in the Kentucky economy each year. The manufacturing industry as a whole is forecast to lose 500 net jobs per year from 1999 to 2001. But, despite this slight decline in employment, manufacturing remains a key to growth in the state economy. The manufacturing sector is forecast to account for 34.5 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 match or slightly exceed growth in the national economy for most employment and income measures. Manufacturing employment is forecast to decline at a slight 0.2 percent annual rate in Kentucky from 1999 to 2001, while nationally it is expected to decline 1.0 percent each year. Growth rates in Kentucky for retail trade are forecast to exceed growth rates for the United States, while growth rates for services and government are expected to be roughly the same in Kentucky and the United States. Similarly, growth rates for wages and salaries and transfer payments are forecast to be similar in Kentucky and the United States. Population growth in Kentucky, however, is forecast to be lower than growth nationally, while per capita income is forecast to grow slightly faster in Kentucky.

Appendix: National Forecast

The forecast for Kentucky is based on the baseline forecast for the national economy in the DRI/McGraw-Hill publication *Review of the U.S. Economy* for October 1998. 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 1999, 2000, and 2001 that slows relative to the rapid growth of 1998 but which experiences moderate to slow growth. Real gross state product is forecast to grow by 1.9 percent in 1998, 2.4 percent in 2000, and 1.8 percent in 2001. A similar pattern is evident for employment and unemployment. Employment is forecast to grow by 2.0 percent nationally in 1999, 1.5 percent in 2000, and 0.9 percent in 2001. This slowdown in employment growth is partly attributed to a downturn in the rate of growth in the labor force, due to the aging of the population. The unemployment rate is forecast to average 4.6 percent in 1999, 4.7 percent in 2000, and 5.1 percent in 2001.

The moderation in the U.S. economy in 1999 through 2001 is expected to result in part from the effects of the economic and financial crises in Asia. Economic slowdown in Asia and other developing countries is expected to continue to hurt exports, which is expected to slow the U.S. economy. A continued federal government surplus also is expected to remain a fiscal drain on economic growth. At the same time, these two factors should both help to keep interest rates lower, which will aid economic growth. Lower rates also will be aided by the Federal Reserve, which is expected to maintain low rates after recent cuts. Consumer confidence is also expected to hold up with low interest rates and low unemployment rates. This also should help keep the housing market strong in the next few years. Each of these factors should aid economic growth. The Consumer Price Index, which measures inflation, rose 1.6 percent in 1998 and is forecast to rise by 2.3 percent in 1999, 2.9 percent in 2000, and 3.1 percent in 2001.

Endnotes

1. Population data for Kentucky are not yet available for the first two quarters of 1998. Thus, population values need to be forecast for the first two quarters of 1998 based on the available Kentucky employment data. In particular, Kentucky employment growth and unemployment data are key inputs into forecasts of the migration component of population. Population growth for the last two quarters of 1998 are forecast along with other Kentucky variables such as employment and 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 is a key variable in income growth equations.

The U.S. Economy in 1998: Uncharted Waters

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The year 1998 saw many macroeconomic events not seen in more than two decades and in some cases not since the Great Depression. While most of these events were 'good,' such as federal government surpluses, low unemployment, near zero inflation, and solid growth of national income, 1998 also produced a tremendous burst of volatility in asset markets, record trade deficits, and perverse interest rate relationships. This has made the Federal Reserve's job of navigating the U.S. economy much more complicated and uncertain. While the outlook for next year is murky, the economy should be able to avoid a recession and continue to grow at a respectable rate, although probably at a lower rate than we have observed in the last couple of years.

Introduction

In 1998, the U.S. economy experienced some of the best macroeconomic outcomes that policymakers could imagine. Yet by the end of the year, there was considerable uncertainty and fear about the direction of the economy. In this article, I document the economy's recent exceptional performance and contrast it with U.S. macroeconomic history. Given that we are doing so well, I then discuss events that generated the uncertainty and fear that manifested itself in the form of severe financial market volatility. I then address the issue of why our current status is not always a good indicator of the future and why policymakers do not make policy on the basis of the current state of the economy. Finally, I discuss why the current macroeconomic situation has created problems for the Federal Reserve in navigating the U.S. economy.

It Was the Best of Times . . .

The year 1998 saw many macroeconomic events not seen in more than two decades and in some cases not since the Great Depression of the 1930's. In assessing the performance of the economy, macroeconomists tend to focus on the following variables:

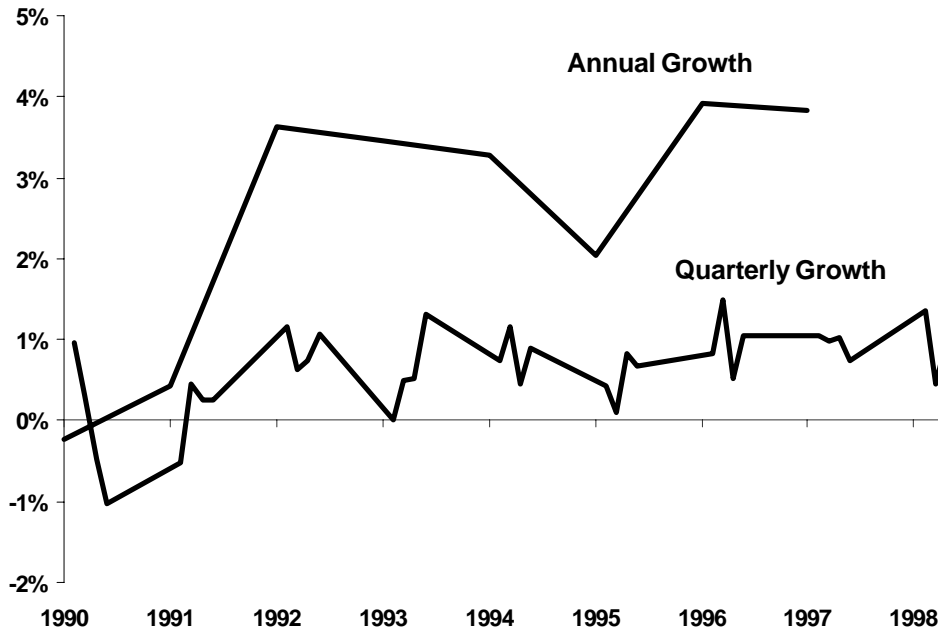
- Growth rate of the economy (national income)
- Unemployment rate
- Inflation rate
- Growth in real wages
- Federal budget deficit/surplus
- Behavior of asset prices and interest rates
- Trade deficit
- Dollar's exchange rate

Real gross domestic product (GDP) growth, which measures the value of all domestic goods and services, for 1998 has been in the range of 3.0 - 3.5 percent, which is above the long-run average of 2.5 - 3.0 percent that we have observed since the early 1970's. Figure 1 shows the percentage change in growth domestic product for 1990 through the third quarter of 1998. Although above average, GDP growth began to slow in 1998, and this has led many to question whether or not the U.S. was heading into a recession in 1999, particularly given the worldwide slowdown due to the Asian economic crisis. Some estimates put the effect of the Asian crisis on the U.S. economy as a one percentage point reduction in the growth rate for 1999.

In May 1998, the national unemployment rate, as shown in Figure 2, reached 4.3 percent, its lowest level since the late 1960s. A low unemployment rate signals a tight labor market, and consequently, real wages will tend to be pushed up. Real wages and productivity have increased recently and there is evidence that wage inequality is moderating after

FIGURE 1

U.S. Gross Domestic Product Growth, 1990 - 1998



considerably widening over the last 25 years. Upward pressure on real wages has always been a key market signal that the Federal Reserve watches since it may indicate a surge in nominal wages which gets passed along as higher output prices for consumers. As a result, the Fed is worried that the current tight labor market may be a harbinger of inflation. If labor productivity rises due to technological advances, however, workers can produce more output per unit of labor time and, as a consequence, higher wages are justified. Wage increases of this form can be paid without raising the price of final goods. Therefore, tight labor markets may provide a false signal of future inflation.

One may ask, "Why is 4.3 percent unemployment viewed as being an indicator of a tight labor market?" Economists believe that a zero unemployment rate is unlikely

is more employment in the economy than normal and firms are hiring more than usual, which means there is less slack in the labor market.

due to the fact that in a dynamic economy, people change jobs in an effort to find a more productive match between employee and employer. As a result, some amount of unemployment is the "natural" outcome of a dynamic economy.

The question is, what is the "natural" rate of unemployment? In the 1960's it was believed to be around 4 percent. In the 1970's and 1980's it was estimated to be around 5.5 percent. So when the unemployment rate falls below this natural rate, there

FIGURE 2

U.S. Monthly Unemployment Rate, 1990 - 1998

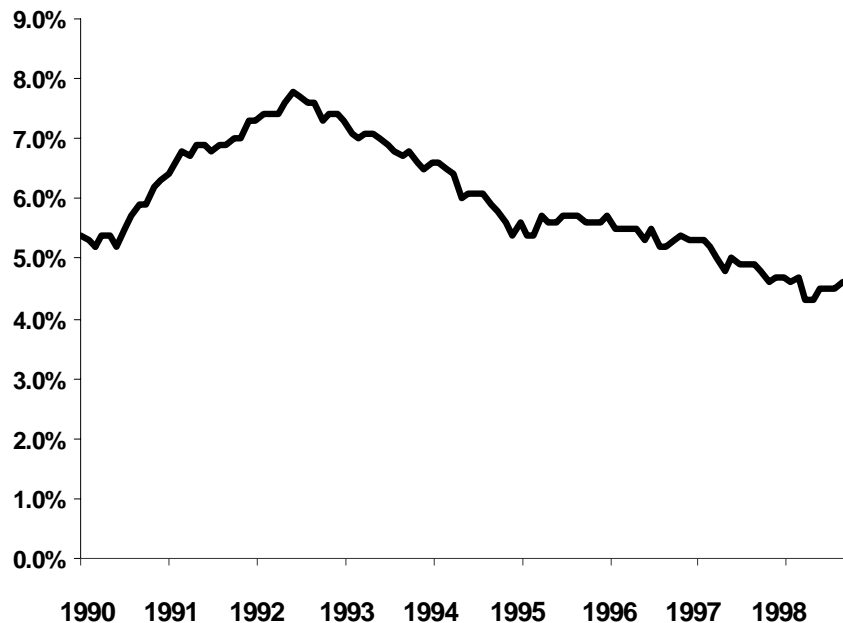
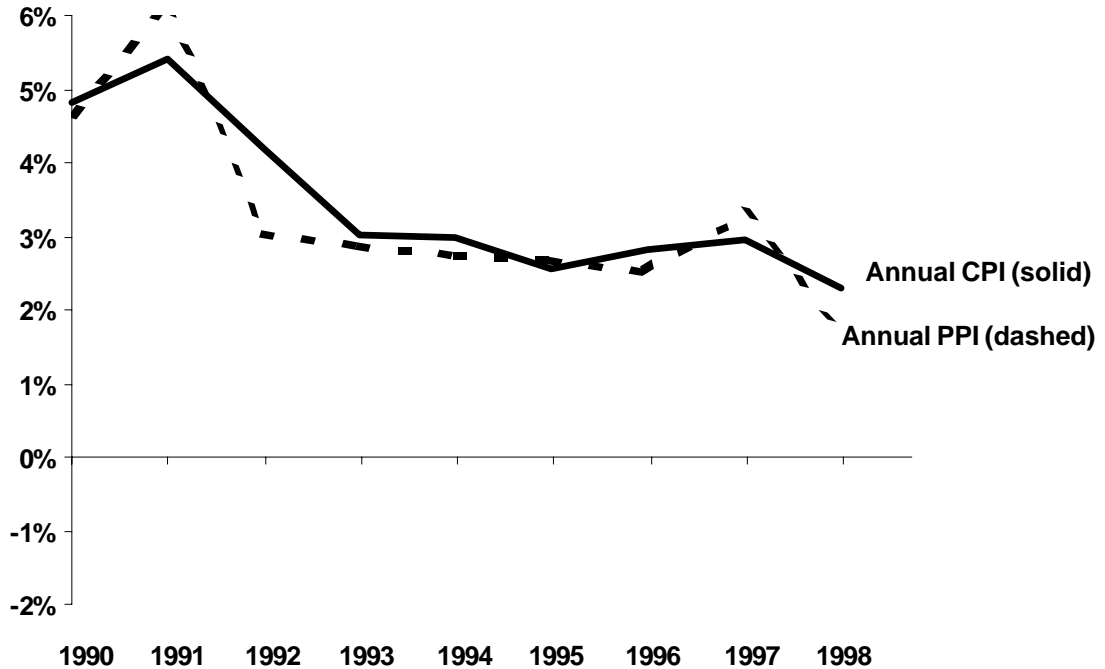


FIGURE 3

U.S. Annual Inflation Rates (Consumer Price Index and Producer Price Index), 1990 - 1998



Since the unemployment rate in 1998 was below the long-held estimate of 5.5 percent for the natural rate of unemployment, some economists believe that this will cause the economy to overheat, thereby causing higher inflation. Furthermore, at some point unemployment will start to increase back to its natural level. Other economists, however, have argued that the natural rate of unemployment has actually fallen back to its 1960's level of around 4 percent. Hence, the current rate of unemployment is in the neighborhood of the natural rate. Consequently, the current low unemployment rate should not be viewed as a signal that the economy is overheating.

The U.S. inflation rate continues to fall and, upon correcting for measurement bias, is between zero and one percent, something that again has not been seen since the early 1960s. In fact, a common belief is that we may be in or headed for a deflationary state (negative inflation), something that has not occurred since the Great Depression of the 1930's.

In recent years, the Fed has increasingly shifted its attention towards generating a slow and steady disinflation with the goal of driving the inflation rate

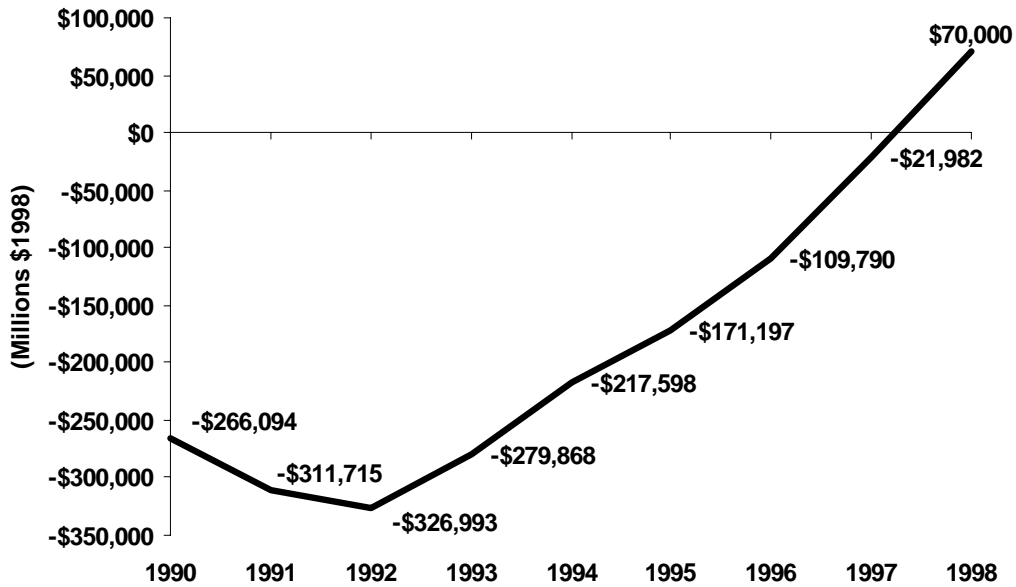
to zero or nearly so. The recent data suggests that the Fed has been very successful at doing this without generating a recession, as is commonly feared will result from a disinflationary monetary policy. But some economists now fear that the Fed has been too successful in its drive towards zero inflation and that we are about to enter a period of deflation.

Deflation is just as damaging to the economy as inflation. One need only look at the last major episode of deflation in the U.S, the Great Depression, to find evidence. The Producer Price Index (PPI), for example, has displayed a steady downward trend over the last year or so. Since the PPI is often viewed as an early warning for what will happen to the Consumer Price Index (CPI), then the recent evidence suggests the potential for deflation in the CPI in the coming year. Figure 3 shows the annual percentage changes in the Consumer Price Index and the Producer Price Index.

A major macroeconomic development over the last year or two has been the surprising decline in the size of the federal government budget deficit. The U.S. began generating large deficits in the early 1980's and those deficits increased in size until the early 1990's, reaching a peak of nearly \$300 billion.

FIGURE 4

U.S. Annual Federal Budget Deficit (-) or Surplus (+), 1990 - 1998



Since then, due to a robust economy and a combination of fiscal restraint and tax increases, the deficit began to fall dramatically until it was eliminated at the beginning of 1998.

At present, the federal government is running a surplus of nearly \$70 billion, as shown in Figure 4. The last annual budget surplus in the U.S. was in 1969. Many economists believe that this has had a reinforcing effect on the economy because as the government's demand for debt financing falls, more funds are available to finance private investment in capital goods, which in turn spurs economic growth. On the other hand, this means that there has been a significant decrease in the ratio of "risk-free" debt (issued by the U.S. government) and "risky" debt (issued by private firms). This dramatic change in the relative supplies of risk-free and risky debt comes back into play when we discuss the behavior of financial markets in 1998.

It Was the Worst of Times . . .

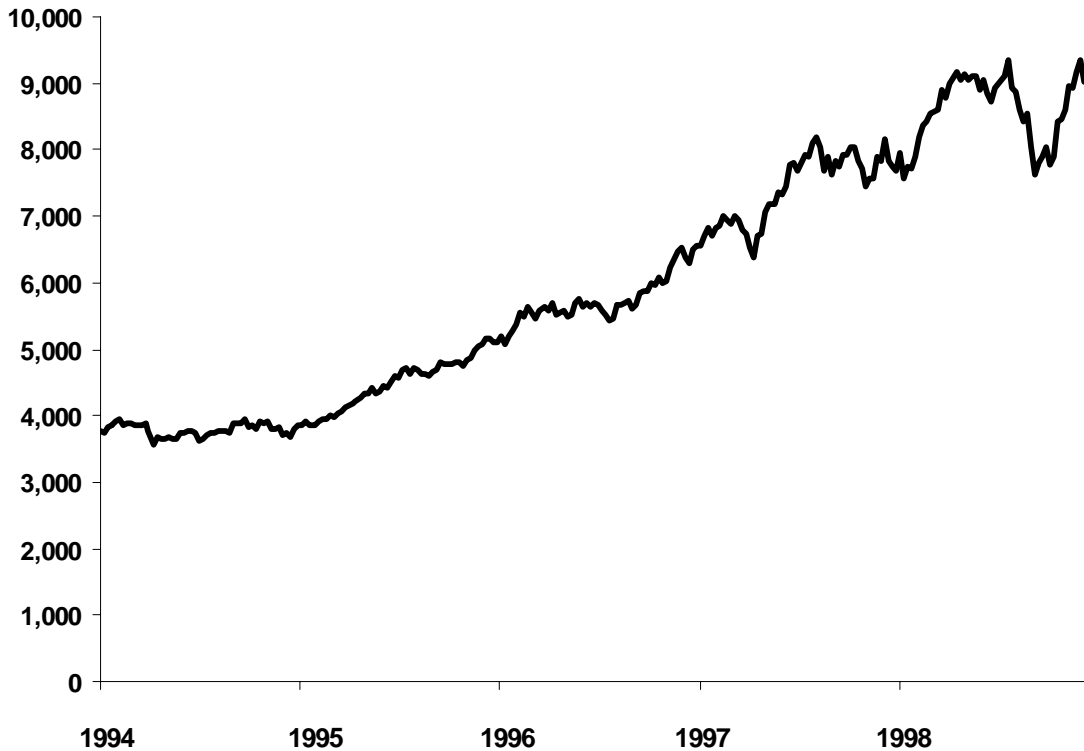
Financial markets were roiled during the fall of 1998 with large ups and downs being observed on a weekly basis. The market continued the spectacular pace observed in the prior two years with the Dow

Jones Industrial Index starting the year around 7,800 then climbing to a high of over 9,300 in July 1998, an annualized rate of change of nearly 40 percent. Then came an extraordinary sequence of price drops and price rises, and the Dow fell all the way to 7,500 at the end of August, a staggering 24 percent loss in value in little more than a month. By November 1998 the market had regained a large portion of its value with the Dow reaching 8,900 (at the time this article was written). Figure 5 shows the weekly Dow Jones Industrial Average from 1994 to 1998.

This volatility in world international markets reflected the continued effects of the Asian crisis and the anemic performance of the Japanese economy. Investors in emerging markets worried that the Asian "flu" would spread to other countries, leading to speculative attacks on those currencies. Then came the collapse of the Russian ruble, which startled international markets and led to a tremendous portfolio reallocation between equities in emerging markets and equities in developed economies. As with all contagion-type panics, the loss of confidence in equities of emerging markets spilled over to create doubts about the stability of equity markets in developed markets.

FIGURE 5

Weekly Dow Jones Industrial Average, 1994 - 1998



This led to a further portfolio reallocation and a classic flight to safety as investors began to seek shelter in the safety of U.S. government Treasury bills. The increased demand for bonds forced bond prices higher and drove down bond yields. On top of this increasing demand for risk-free debt, we observed the U.S. government dramatically decrease the supply of risk-free debt because of the elimination of the budget deficit. This combination of increasing demand and decreasing supply led to a dramatic increase in bond prices and plunging bond yields. The most noticeable aspect of this was that mortgage rates fell to 30-year lows in the U.S. since mortgage rates are tightly tied to interest rates on long-term U.S. government debt. Figure 6 shows weekly 30-year fixed rate mortgages from 1972 to 1998.

While such a shift into safe assets could reflect a permanent shift in investor attitudes, the evidence suggests otherwise. The evidence that this was a temporary flight to safety rather than a shift in long-term risk preferences appeared in a dramatic one-day ½ percentage point rise in mortgage rates driven

by an announcement by the Japanese government that it would initiate policies to revive the Japanese economy. This announcement caused investors to sell off U.S. government debt and shift into yen-denominated assets. Bond prices in the U.S. fell, yields rose, and mortgage rates increased as a result of this one-day portfolio reallocation. Such lightning quick portfolio reallocations on such whimsical news hardly reflect a permanent shift in risk attitudes.

The U.S. trade deficit exploded as a result of the Asian crisis, which has created great concern about the movement of the dollar exchange rate over the coming year. The rise of the dollar relative to the value of Asian currencies increased the relative price of U.S. goods to foreign goods. This caused a significant decline in U.S. exports and a large increase of imports into the U.S.. As a result, the U.S. trade deficit with its trading partners doubled. The drop in demand for U.S. exports has led some to fear that the economy will slow down in the coming year as exporters reduce output and employment to deal with the loss of orders from abroad. Estimates

FIGURE 6

Weekly 30-Year Fixed Mortgage Rates, 1972 - 1998

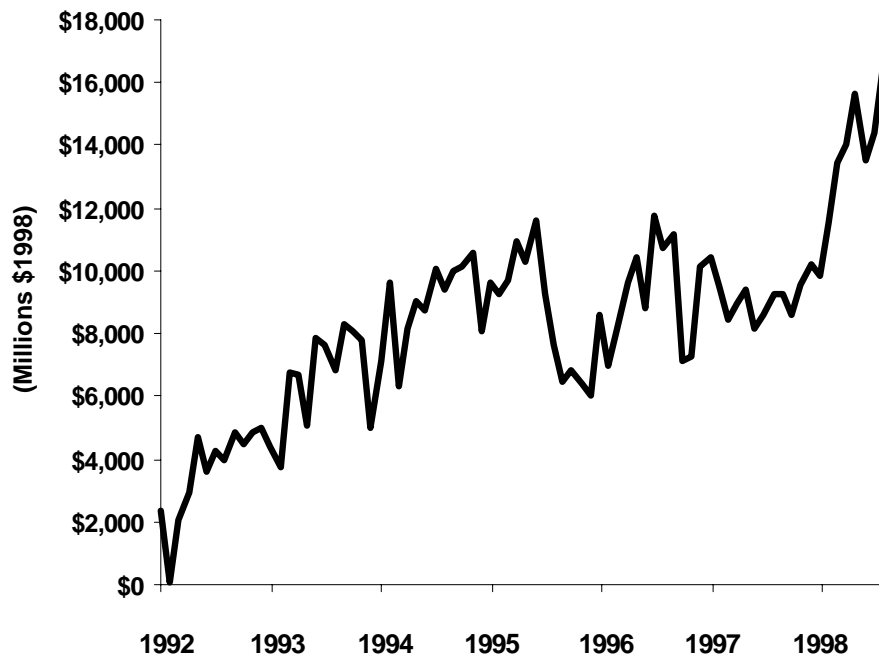


suggest the U.S. could lose up to 1.0 - 1.5 percentage points off its growth rate in the coming year as a result of the continuing Asian crisis. Figure 7 shows the monthly U.S. trade deficit from 1992 to 1998.

capitalism. From this point of view, the recent performance of the economy is normal and not an outlier.

FIGURE 7

U.S. Monthly Trade Deficit, 1992 - 1998



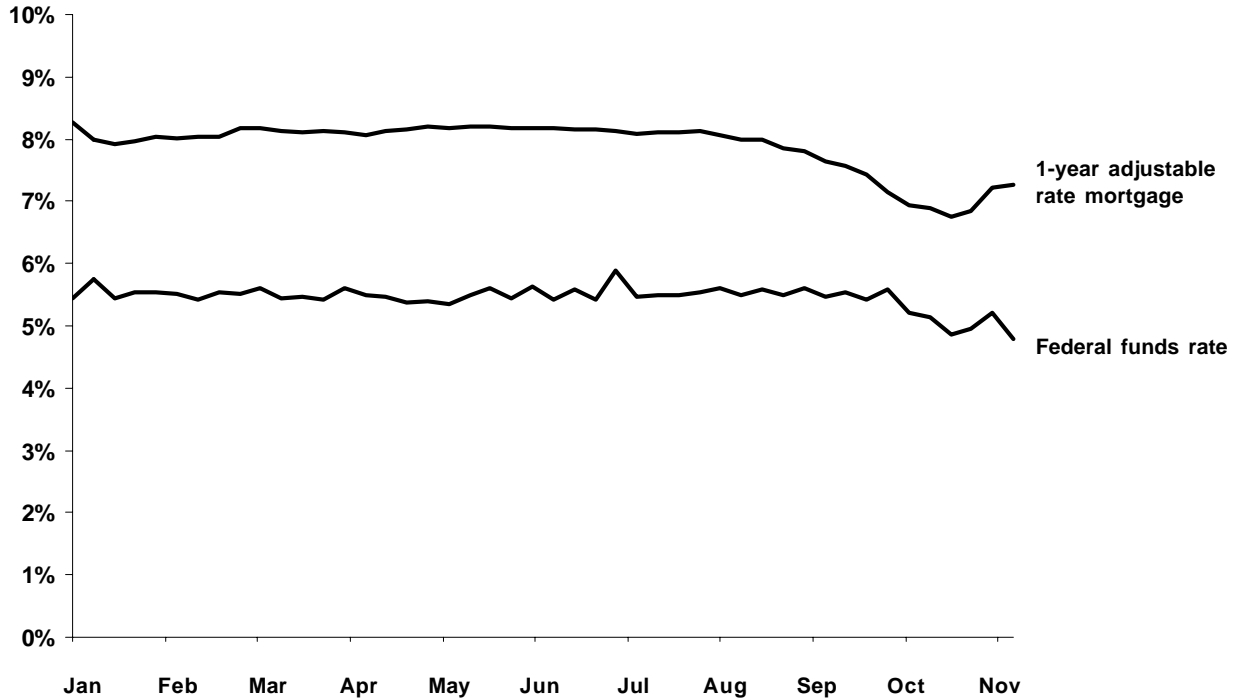
Uncharted Waters

The uniqueness of the current U.S. macroeconomic situation relative to the world macroeconomic condition has created a fair amount of concern and uncertainty for the Federal Reserve. The superb performance of the U.S. economy has led many to believe that we have just been "lucky" and that there is no place to go but down from

here. In short, the current U.S. performance is an outlier and not the norm. Thus, there is a fear that we are heading for a recession with rising unemployment and rising inflation. On the other hand, it can be argued that the exemplary performance of the U.S. economy is the result of 1) stable Federal Reserve policy, 2) the investment in high-tech capital over the last decade, and 3) tax and regulatory reforms over the last decade that have promoted free market

FIGURE 8

Weekly Federal Funds Rate and 1-Year Adjustable Rate Mortgage, 1998



The recent success of the U.S. economy presents a puzzle for the Federal Reserve in terms of how to implement monetary policy. The Fed has traditionally viewed a booming economy and a tight labor market as the result of a high demand economy. When rising aggregate demand for goods and services is the source of economic expansion, higher prices and inflation are not far behind. Consequently, a forward-looking policymaker would want to push up interest rates to stem demand and relieve some of the pressure on future prices. The point to remember is that the Fed is trying to stop inflation *before* it occurs. Thus, even though there is relatively little inflation at the current moment, the Fed is trying to anticipate the onset of inflation and head it off before it starts.

The problem is that if the economy is being driven instead by a boom in the supply of goods (arising from increases in productivity of labor and capital), then the high supply of goods will put downward, not upward, pressure on prices. In this situation, if the Fed increases interest rates, it lowers demand for goods and services, which puts even further downward pressure on prices.

As a result, rather than heading off future inflation, the Fed may actually be contributing to a deflationary environment. Consequently, the Fed faces the difficult task of trying to determine whether the booming U.S. economy is occurring because of booming demand for goods or a booming supply of goods. Since the economy has been booming for the last couple of years without any appearance of inflation, the Fed's traditional method for forecasting inflation appears to have lost its predictive power. It is in this sense that the Fed is sailing in uncharted waters.

Through the first half of 1998, there was growing evidence that the economy was booming as the result of a surge in demand. Growth rates of the money supply were too high relative to the growth rate of the economy to sustain low inflation, which led some inside the Fed to believe that inflation was just around the corner. Hence, the view from this camp was that the Fed needed to raise interest rates to head off inflation. The problem facing the Fed was that, due to the inflow of capital into the U.S. as investors sought safety, any further increase in U.S. interest rates would simply lead to a greater inflow

of capital as investors sought the higher return on U.S. assets. This would exacerbate the rise in the dollar exchange rate and the fall in the value of Asian currencies, and also undermine efforts by the International Monetary Fund to stabilize the Asian economies. Furthermore, it would worsen the U.S. trade deficit.

Given the flight to safety into U.S. Treasury bills and the Fed's steadfastness in keeping the federal funds rate constant, the term structure of interest rates flattened out dramatically and, in some cases, turned negative. By late summer, the federal funds rate, which is the interest rate banks charge each other for overnight loans, was very close to the rate charged on long-term debt. For example, one-year adjustable mortgage rates were very close to the federal funds rate at one point, as shown in Figure 8. This means that households buying relatively illiquid assets (houses) for a year could borrow at about the same rate that banks could borrow from each other for a 24-hour loan of a highly liquid asset (cash reserves).

Such a distortion in the term structure could not last. A flat or negatively sloped yield curve will not persist unless markets believe that there will be significant deflation over the coming year(s). Although the specter of deflation was significant, we had not seen such an event in over 60 years. So it was unlikely that the term structure would remain flat or negatively sloped. In short, something had to give: either the federal funds rate had to fall or long-term interest rates had to rise.

Confronted with weak international economies and an inverted yield curve, the Fed reluctantly cut the federal funds rate by $\frac{1}{4}$ percentage point in September 1998. The financial markets felt much more was needed and lost confidence in the Fed's willingness to stabilize not only the U.S. economy but the world economy. The market dove dramatically, creating even more uncertainty about the world economy. The Fed, realizing it had made a mistake, cut the federal funds rate another $\frac{1}{4}$ percentage point and lowered the discount rate to try to signal its seriousness about stabilizing the economy. This boosted the market's confidence that the Fed was an effective steward of the economy. Since then, markets have rebounded, long-term interest rates have stabilized, and the U.S. economy seems to be weathering the storm.

Where Are We Headed?

The important question now is, where are we heading? Consumer spending data in late 1998 showed that U.S. consumers did not appear to be deterred by the volatility of world financial markets or weakness in international countries. This suggests that the U.S. economy should continue growing at a steady pace in 1999. If the Fed continues down the path of cutting the federal funds rate, then we should see demand strengthening, which helps maintain a robust economy. The flow of cheap imports into the U.S. will help keep inflation down even if the Fed cuts interest rates. U.S. unemployment rates may rise some as a result of the drop in demand for U.S. exports but further interest rate cuts may offset that. As Asian economies begin to stabilize and if Japan undertakes policies to pull itself out of its six-year recession, then we will see an outflow of capital from the U.S. to these economies. This will show up as falling long-term bond prices, rising long-term interest rates, and a fall in the dollar exchange rate. Consequently, by mid- to late-1999, we may see mortgage rates rise even though the Fed is pushing short-term interest rates down.

In summary, the forecast for the U.S. economy in 1999 is stable economic growth, a slight rise in U.S. unemployment rates, a slight rise in inflation, and a rise in long-term interest rates. Although this is worse than observed in 1998, given the uncertainty and instability that permeated the U.S. economy in the fall of 1998, the outlook could have been much worse.

An Evaluation of the Kentucky Education Reform Act

William H. Hoyt

The Kentucky Education Reform Act (KERA) caused drastic changes in the way education is provided in Kentucky. Because KERA attempted to equalize funding and dramatically alter the curriculum and governance of schools, it is appropriate to see how effective the reforms have been in affecting spending and educational outcomes. Comparisons of measures before and after KERA show that it has equalized funding among school districts, with some districts gaining substantially in their funding of students. Teacher salaries and student/teacher ratios have also improved relative to national averages since the introduction of KERA. Educational outcomes have not improved, however. There has been no appreciable gain in test scores or graduation rates in Kentucky relative to other states, and there is no evidence that KERA has increased college attendance rates of Kentucky high school graduates.

Introduction

Among the many states that had their public school financing systems invalidated by court rulings, the changes required of the Kentucky system by the courts as a result of *Rose v. Council* (1989) were among the most radical. Not only did the Kentucky Supreme Court find the financing of schools in the state to be unconstitutional, but it also ruled that the “entire system of common schools is unconstitutional” and required the legislature to “recreate, re-establish” the entire system of public education. In a remarkably brief interlude, the Kentucky General Assembly, in response to the court decision, passed the Kentucky Education Reform Act (KERA) of 1990.

KERA has attracted a great deal of attention in the popular press and public discussions in both Kentucky and throughout the United States. It has been criticized and praised and played a major role in numerous state elections, including the most recent gubernatorial election. The vast attention focused on KERA, in contrast to finance reform acts in other states, must in part be attributable to the broad scope of the legislation. It was not simply striking down a finance system that was not providing enough resources for poorer districts — the court ruling emphasized *equality* in funding, not simply additional funding. Nor was the court ruling solely a statement about the funding. It was also

about the outcomes of education. Again, the court emphasized the need for education to be reformed to equalize not only spending but also performance.

Our objective is to provide an evaluation of KERA by comparing educational funding and, when possible, performance before and after KERA. We evaluate it in light of the emphasis of the original court case on equity in both financing and performance. In addition, to give more perspective on the impact of KERA, we contrast the changes in primary and secondary education in Kentucky to changes throughout the nation. In the next section, we begin by providing a brief discussion of the legislation that created KERA and some of the institutional features of KERA. In Section 3 we examine the impacts of KERA on funding of education emphasizing both changes in the distribution of funding within Kentucky and how the level of spending and equality in spending in Kentucky compares to the U.S. average and some of our neighboring states. In Section 4 we focus on measures of educational performance and outcomes and as with funding, our emphasis is both on the changes in the equality and level of performance in Kentucky schools. Again, to give perspective for at least some measures, such as dropout rates, we compare Kentucky to the rest of the nation.

KERA and Education in Kentucky

The Kentucky Education Reform Act of 1990 (KERA, House Bill 940) was not simply a change in the financing of primary and secondary education, though it radically altered the financing of education in Kentucky. KERA is unique in its attempts to integrate school finance reform with reforms in the curriculum and school governance. Instead of simply providing additional funds to local school districts, KERA provided a dramatically expanded role for the Commonwealth in mandating curricula, evaluating school performance, and placing restrictions on district employment and compensation. Broadly, then, we might classify reforms in three categories: curriculum, governance, and finance.

Curriculum

The major innovations related to curriculum are the restructuring of primary schools (particularly kindergarten to third grade); the implementation of standardized student assessment throughout the Commonwealth; the encouragement of increased use of technology; and the introduction of school-based decision making, which provides a formal structure for involving parent representatives in decisions regarding curriculum, personnel, and instruction.

The General Assembly in 1992 and again in 1994 expanded on KERA's requirement of replacing grades kindergarten to third with a "primary school program." The 1992 General Assembly listed "critical attributes" of primary schools that include "multi-age and multi-ability classrooms," "professional teamwork," and "qualitative reporting methods." Essentially, in the General Assembly's interpretation of KERA, the traditional separation of students by grade (age) is eliminated (or at least reduced) with students of both different ages and abilities found in the same classroom. The traditional classroom with a single teacher is to be replaced (at times) by team teaching. Finally, and perhaps most controversially, qualitative assessment (written reports assessing a student's performance) replaces the traditional letter grade system.

KERA created a new system of assessing students and schools: the Kentucky Instructional

Results Information System (KIRIS). Based on KIRIS, a "performance-based" approach, the progress of schools is monitored. Schools that are succeeding, that is, schools that have had increases in average KIRIS scores, are financially rewarded, along with their teachers. KIRIS is not a test in the tradition of multiple choice objective tests. Instead, students create a "portfolio" of writing and mathematics work in the 4th (writing only), 8th, and 12th grades. Thus, students may include lengthy essays in their portfolios, although the content of these essays is based on a list of topics emphasized by the Kentucky Department of Education.

School councils were created by KERA as an attempt to decentralize policies and plans for schools. These councils consist of six people: the school's principal, three teachers, and two parents with teachers and parents being elected representatives. These councils are to make decisions on curriculum, instruction and instructional materials, discipline, extracurricular programs, and the school budget. In addition, the council is charged with hiring principals if that position vacant and consult with the principal on the hiring of teachers.

Increased use of technology, including computers, was provided special funds in KERA, and acceptable use of these funds is outlined in the Kentucky Education Technology System (KETS). To obtain matching funds from KETS, districts must have prepared and submitted a plan for use of technology in their district.

Governance

In addition to the school councils discussed earlier, KERA restructured the organization of primary and secondary education at the state level, creating a Board of Elementary and Secondary Education and a Commissioner of Education. At the district level, the legislation was designed to reduce employment based on nepotism or political involvement. In addition, the local superintendent's power vis-à-vis the local school board was increased with the Commissioner of Education having veto power over any dismissal of the superintendent by the local board.

Finance

Kentucky, through foundation grants and power equalization programs, had extensive state

funding assistance of local education prior to KERA. Under the previous funding system, however, local support varied dramatically. For example, the Kentucky Office of Education Accountability reported that in 1989-90, property wealth per pupil varied from \$39,138 to \$341,707; local equivalent mill rates varied from \$0.229 to \$1.119; and local revenue per student varied from \$80 to \$3,716. While state aid also varied from \$1,750 to \$2,753 per student, average per pupil spending for instruction still varied from \$1,499 to \$3,709.¹

The focus of KERA was to reduce these disparities in educational funding. To do so, a new funding program called Support Educational Excellence in Kentucky (SEEK) was established. Under this program, districts are to receive a guaranteed level of revenue per student. In 1990-91 this base was \$2,305 per pupil and gradually increased to \$2,570 per pupil in 1995-96. This base is adjusted (increased) for at-risk children (measured by participation in federal school lunch programs), transportation, and exceptional students. While the state guarantees this amount of revenue, the district must share in the financing by providing a minimum level of effort equivalent to \$0.30 per \$100 of property value. This funding, however, need not be obtained through the property tax. Then the state funding, the adjusted base guarantee equals the base plus additional funding for at-risk children, transportation, and exceptional student, minus the local effort.

In addition to this uniform funding base, each district can increase its funding by up to 15 percent of the base while receiving state funding if its property value per student is less than 150 percent of the state average. If its property tax base is below this amount, the state provides state funding to guarantee revenue equal to the amount collected on this property value. This is referred to as Tier I funding. Through Tier II funding, the district can collect up to an additional 30 percent beyond the base and Tier I funding, but it will receive no matching state funds. This funding must also be approved by a vote of the electorate in the district. Finally, the state also provided a guaranteed annual minimum increase in state funds (8 percent in 1991-92 and 5 percent in 1991-92) and an annual maximum increase (25 percent).

How Kentucky Compares Before and After KERA

While KERA has led to many changes in both the financing and the actual delivery of educational services, the major increases in educational spending were not new for Kentucky. The increase in real spending per student from 1989-90 to 1995-96 in Kentucky, 30 percent, was the highest among the 50 states, which had an average increase in real spending per student of 3.8 percent. As Table 1 indicates, Kentucky moved from ranking 45th in spending per student to 31st during this period. While this was a major increase in spending, it is not unprecedented for Kentucky. During the five-year period from 1984-85 to 1989-90, real spending per student also increased by 22 percent, well above the national average of 16.8 percent. In fact, from 1969-70 to 1995-96, the 148.7 percent increase in real spending per student in Kentucky was the highest among all 50 states and significantly above the national average increase of 84.2 percent. Thus, while KERA was a major increase in spending and an increase that came very quickly (10 percent in one year), even prior to KERA, Kentucky had seen major increases in educational spending.

As we emphasized earlier, KERA was the legislative response to a court order about the equality of educational spending and performance, not the *level* of spending. While educational spending had been increasing in Kentucky prior to the legislation, KERA changed the distribution of these increases and dramatically changed the relationship between educational spending and revenues and district property wealth and income.

We can see how KERA changed the distribution of educational funds in several ways. We first compare the distribution of funding among districts in Kentucky to some neighboring states. To do this we use a measure of inequality, the Gini coefficient. The Gini coefficient is a measure of inequality (generally income) that ranges between 0 and 1. If the Gini coefficient equals 0 there is no difference in distribution across groups — everyone receives the same funding. On the other hand, a coefficient of 1 means one group (individual) has all the resources.

In our case, we examine the distribution of educational spending per student among school districts in the state and compare that to four states bordering Kentucky. As Table 2 shows, the Gini

An Evaluation of the Kentucky Education Reform Act

TABLE 1

Real Expenditures per Student in the United States, 1988-89 and 1995-96

	Expenditures per Student 1988-89	Rank	Expenditures per Student 1995-96	Rank	Percentage Change 1988-95	Rank
United States	\$5,921		\$6,146		3.8%	
Alabama	4,075	48	4,716	45	15.7	7
Alaska	9,837	2	9,012	4	-8.4	50
Arizona	4,975	34	4,860	43	-2.3	44
Arkansas	4,173	47	4,710	46	12.9	10
California	5,271	31	5,108	37	-3.1	46
Colorado	5,763	23	5,521	32	-4.2	47
Connecticut	8,742	5	8,817	5	0.9	36
Delaware	6,913	11	7,267	10	5.1	24
District of Columbia	10,008	1	9,565	2	-4.4	48
Florida	5,817	21	5,894	27	1.3	35
Georgia	4,911	39	5,377	35	9.5	13
Hawaii	5,253	32	6,051	22	15.2	8
Idaho	3,611	50	4,465	49	23.6	3
Illinois	6,254	16	6,128	20	-2.0	41
Indiana	5,462	28	6,040	24	10.6	12
Iowa	5,462	29	5,772	29	5.7	21
Kansas	5,664	24	5,971	25	5.4	23
Kentucky	4,267	45	5,545	31	30.0	1
Louisiana	4,229	46	4,988	40	17.9	4
Maine	6,047	19	6,546	15	8.3	17
Maryland	7,341	8	7,382	9	0.6	37
Massachusetts	7,613	7	7,613	7	0.0	39
Michigan	6,565	15	7,166	11	9.2	15
Minnesota	6,062	18	6,162	19	1.6	34
Mississippi	3,647	49	4,250	50	16.5	6
Missouri	5,434	30	5,626	30	3.5	29
Montana	5,472	27	5,847	28	6.9	20
Nebraska	5,559	25	6,083	21	9.4	14
Nevada	4,934	38	5,320	36	7.8	18
New Hampshire	6,128	17	5,958	26	-2.8	45
New Jersey	9,624	4	9,955	1	3.4	30
New Mexico	4,427	43	4,587	47	3.6	28
New York	9,770	3	9,549	3	-2.3	43
North Carolina	4,939	37	5,090	39	3.1	31
North Dakota	5,038	33	4,979	41	-1.2	40
Ohio	5,974	20	6,266	17	4.9	26
Oklahoma	4,308	44	4,881	42	13.3	9
Oregon	6,606	14	6,615	14	0.1	38
Pennsylvania	7,136	9	7,492	8	5.0	25
Rhode Island	7,731	6	7,936	6	2.7	33
South Carolina	4,763	40	5,096	38	7.0	19
South Dakota	4,570	41	4,780	44	4.6	27
Tennessee	4,450	42	4,548	48	2.2	33
Texas	4,942	36	5,473	33	10.7	11
Utah	3,299	51	3,867	51	17.2	5
Vermont	6,987	10	6,837	13	-2.1	42
Virginia	5,787	22	5,433	34	-6.1	49
Washington	5,557	26	6,044	23	8.8	16
West Virginia	4,950	35	6,325	16	27.8	2
Wisconsin	6,713	13	7,094	12	5.7	22
Wyoming	6,853	12	6,243	18	-8.9	51

Source: National Center of Education Statistics, U.S. Department of Education

coefficient in 1989-90 ranks Kentucky third among the five states but by 1994-95, Kentucky is second only to West Virginia in indicating equality of funding and decreased significantly between the two periods.

the impact of KERA by examining both the relationship between revenues per student and property value per student. In Figure 1a we depict the relationship between total revenue per student and assessed property value per student (in \$1,000)

In Table 3, expenditures per student are given for the academic years 1994-95, 1989-90, and 1985-1986. Inspection of Table 3 suggests that while generally the largest (percentage) increases in funding went to the districts spending less both between 1985 and 1989 and between 1989 and 1994, the variation in increases was much more pronounced between 1989 and 1994. For example, from 1985-86 to 1989-90 real spending per student in Kentucky increased by 18.7 percent while it increased by only 13.2 percent between 1989-90 and 1994-95, despite the fact that real increases in educational spending across the state were much greater during the later period. One notable exception appears to be the Jefferson County school district, which saw only a 6.7 percent increase in real spending in both periods. At the other end, while those districts that had large increases in spending after KERA tended to have larger than average increases prior to KERA, these increases were not nearly as large. For example, Somerset Independent school district had the greatest increase in spending from 1989-90 to 1994-95 at 71.6 percent but only had a modest 15.9 percent increase in spending between 1985-86 and 1989-90.

KERA has continued and expanded on a trend in redistribution of resources among the school districts and, in a very real sense, eliminated an inequity in educational spending, if not educational outcomes. We can see

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for the 1988-89 academic year. As the line in the figure shows, we find a strong positive relationship between revenue per student and property value per student in a district. Based on the relationship we estimate, we would predict a difference in spending of \$1,336 (in 1994 dollars) per student based on differences in property value per student between the district with the highest property value per student (Harlan County) and the lowest (Elliot County).

Figure 1b shows the same relationship between revenues per student and property value per student for the 1994-95 academic year. As the figure shows, during this year there is no apparent relationship between revenue per student and property value per student. While the slope of the line in Figure 1b is slightly positive, it is not statistically different from zero, and, if we use it to predict the difference in spending between the districts with the highest (Frankfort Independent) and lowest property values (Franklin County), this difference is only \$20.

Figure 2 (page 29) presents the same type of comparison between revenue per student and per capita income in the school district. Again, as shown in Figure 2a, in the 1988-89 school year there was a strong relationship

(text continued on page 28)

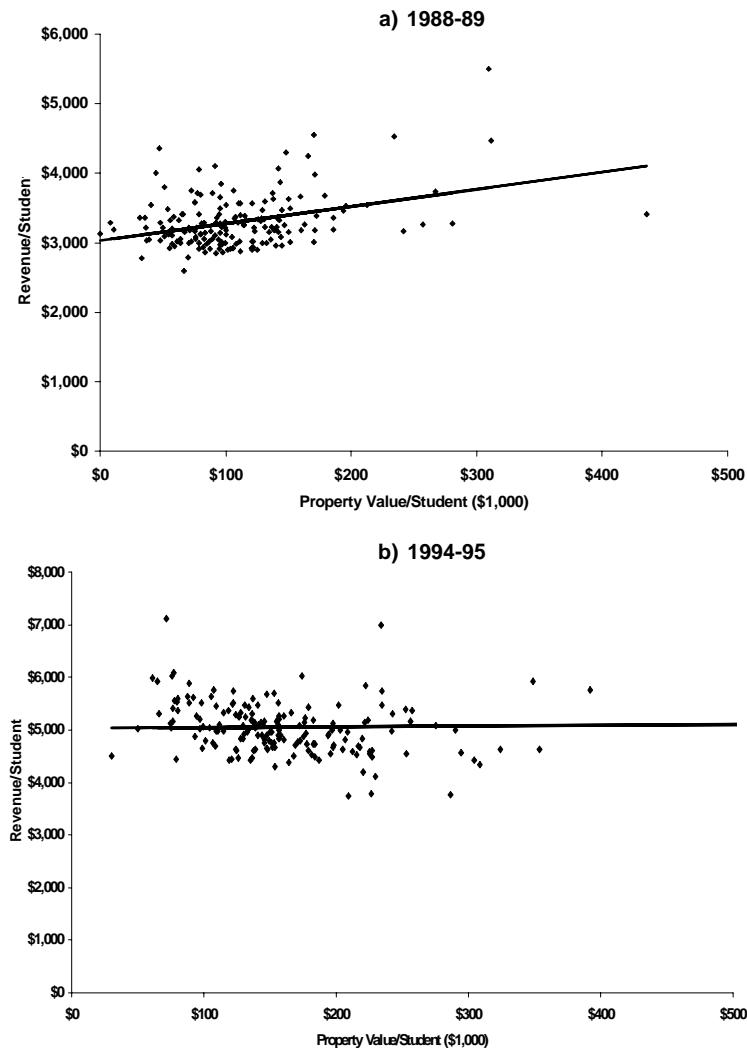
TABLE 2

Gini Coefficients for Kentucky and Selected Adjacent States, 1989 - 1990 and 1994 - 1995

	Gini Coefficient 1989 - 1990	Rank	Gini Coefficient 1994 - 1995	Rank
Kentucky	0.1001	3	0.0700	2
Indiana	0.0908	2	0.0944	4
Ohio	0.1642	5	0.1262	5
Tennessee	0.1012	4	0.0922	3
West Virginia	0.0343	1	0.0290	1

FIGURE 1

Relationship between Revenue/Student and Property Value/Student in Kentucky School Districts, 1988-89 and 1994-95



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TABLE 3

Expenditures per Student in Kentucky Public School Districts, 1985 - 1995

	Exp/Stud 1994-95	Rank	Exp/Stud 1989-90	Rank	Exp/Stud 1985-86	Rank	% Change 1985-89	Rank	% Change 1989-1994	Rank
Kentucky	\$5,010		\$4,425		\$3,728		18.7%		13.2%	
Adair Co	\$5,336	50	\$4,398	100	\$3,381	109	30.1%	70	21.3%	39
Allen Co	4,255	156	4,192	126	3,444	91	21.7	128	1.5	130
Anchorage Ind	6,468	5	7,105	2	7,524	1	-5.6	174	-9.0	163
Anderson Co	3,640	172	4,088	146	2,979	174	37.2	24	-10.9	167
Ashland Ind	4,091	163	4,652	52	4,120	20	12.9	160	-12.1	170
Augusta Ind	5,255	56	5,269	15	4,360	14	20.9	131	-0.3	144
Ballard Co	5,060	81	4,957	27	3,653	53	35.7	31	2.1	128
Barbourville Ind	4,827	102	4,491	79	2,965	175	51.5	3	7.5	101
Bardstown Ind	5,168	72	4,765	43	4,196	17	13.6	157	8.5	100
Barren Co	4,786	104	4,073	150	3,110	160	31.0	63	17.5	58
Bath Co	5,607	32	4,635	54	3,659	49	26.7	85	21.0	43
Beechwood Ind	3,765	171	5,060	21	4,016	26	26.0	100	-25.6	172
Bell Co	5,881	17	4,423	96	3,502	83	26.3	90	33.0	8
Bellevue Ind	4,559	130	4,542	69	3,385	106	34.2	38	0.4	136
Berea Ind	5,034	83	5,415	11	3,885	35	39.4	17	-7.0	158
Boone Co	4,107	162	4,423	95	3,578	63	23.6	118	-7.1	159
Bourbon Co	5,755	23	4,504	76	4,088	24	10.2	166	27.8	21
Bowling Green Ind	5,193	66	5,471	10	4,175	18	31.0	61	-5.1	156
Boyd Co	4,255	155	4,244	122	3,726	47	13.9	156	0.3	137
Boyle Co	4,778	106	4,179	129	3,213	146	30.1	71	14.3	76
Bracken Co	4,386	144	4,662	50	3,892	34	19.8	139	-5.9	157
Breathitt Co	5,820	20	4,875	34	3,627	57	34.4	37	19.4	46
Breckinridge Co	5,678	25	4,447	90	3,576	64	24.4	114	27.7	22
Bullitt Co	4,288	151	3,934	162	3,273	134	20.2	135	9.0	96
Burgin Ind	4,715	113	4,661	51	3,561	68	30.9	64	1.2	133
Butler Co	4,498	136	4,229	124	3,232	141	30.8	65	6.4	108
Caldwell Co	4,575	128	4,269	118	3,300	131	29.4	72	7.2	102
Calloway Co	5,029	84	4,432	93	3,630	55	22.1	127	13.5	79
Campbell Co	4,110	161	4,451	89	3,629	56	22.6	124	-7.7	161
Campbellsville Ind	4,662	119	4,262	120	3,310	124	28.7	74	9.4	93
Carlisle Co	4,598	124	4,389	101	3,654	51	20.1	136	4.8	116
Carroll Co	5,848	18	4,819	40	4,809	7	0.2	173	21.4	38
Carter Co	4,457	141	4,951	28	3,341	119	48.2	6	-10.0	165
Casey Co	5,392	47	4,171	131	3,481	85	19.8	138	29.3	15
Caverna Ind	5,410	45	5,164	18	3,250	138	58.9	2	4.8	115
Christian Co	5,096	78	4,278	113	3,224	145	32.7	47	19.1	49
Clark Co	4,513	131	4,134	139	3,305	127	25.1	107	9.2	95
Clay Co	5,638	29	5,142	19	3,558	70	44.5	11	9.7	91
Clinton Co	6,465	6	4,846	37	3,601	61	34.6	36	33.4	7
Cloverport Ind	6,012	14	5,327	14	4,692	9	13.5	158	12.9	82
Corbin Ind	4,770	109	3,826	170	3,175	151	20.5	133	24.7	27
Covington Ind	6,145	10	5,079	20	4,004	28	26.9	84	21.0	42
Crittenden Co	4,760	111	4,120	142	3,230	143	27.5	81	15.5	70
Cumberland Co	5,061	80	4,560	67	3,748	44	21.7	129	11.0	87
Danville Ind	5,652	27	4,884	33	3,653	52	33.7	40	15.7	69
Daviess Co	5,228	59	4,432	92	3,366	114	31.7	54	18.0	56
Dawson Springs Ind	4,656	120	4,679	49	3,737	45	25.2	105	-0.5	146
Dayton Ind	5,245	58	4,468	84	3,427	96	30.4	68	17.4	61
East Bernstadt Ind	NA	173	3,701	173	2,996	171	23.5	120	NA	175
Edmonson Co	5,278	54	4,024	156	3,069	166	31.1	59	31.2	11
Elizabethown Ind	4,651	121	4,512	73	3,941	31	14.5	155	3.1	125
Elliott Co	6,077	11	4,891	32	3,874	37	26.3	92	24.2	29
Eminence Ind	5,170	71	4,583	64	3,824	40	19.8	137	12.8	83
Erlanger-Elsmere	4,508	134	4,722	46	3,688	48	28.1	76	-4.5	153
Estill Co	5,294	53	4,478	82	3,469	86	29.1	73	18.2	54
Fairview Ind	4,141	160	4,587	62	3,269	135	40.3	15	-9.7	164
Fayette Co	5,374	48	6,023	6	4,427	12	36.0	29	-10.8	166
Fleming Co	4,968	89	4,567	66	3,906	33	16.9	150	8.8	98
Floyd Co	5,594	35	3,921	165	3,164	152	23.9	116	42.7	3
Frankfort Ind	6,030	13	6,034	5	4,820	6	25.2	106	-0.1	142
Franklin Co	4,069	165	4,468	83	3,603	59	24.0	115	-8.9	162
Ft. Thomas Ind	4,408	143	4,615	57	3,878	36	19.0	140	-4.5	152
Fulton Co	5,681	24	4,856	35	3,562	67	36.3	28	17.0	65
Fulton Ind	5,974	15	5,027	22	3,579	62	40.5	14	18.8	50
Gallatin Co	4,959	91	4,188	127	3,301	130	26.9	83	18.4	52
Garrard Co	4,600	123	4,370	105	3,417	98	27.9	77	5.3	112
Glasgow Ind	4,668	118	4,610	58	3,086	164	49.4	4	1.3	132

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	Exp/Stud 1994-95	Rank	Exp/Stud 1989-90	Rank	Exp/Stud 1985-86	Rank	% Change 1985-89	Rank	% Change 1989-1994	Rank
Grant Co	\$4,588	126	\$4,411	97	\$3,535	78	24.8%	113	4.0%	120
Graves Co	3,977	167	3,792	172	3,355	117	13.0	159	4.9	114
Grayson Co	4,491	137	4,102	143	3,570	65	14.9	154	9.5	92
Green Co	4,462	140	4,603	60	3,407	100	35.1	34	-3.1	149
Greenup Co	4,949	92	4,149	135	3,289	132	26.2	96	19.3	48
Hancock Co	4,206	157	4,909	30	4,009	27	22.4	126	-14.3	171
Hardin Co	4,676	117	4,059	152	3,091	163	31.3	57	15.2	71
Harlan Co	5,670	26	5,189	16	3,490	84	48.7	5	9.3	94
Harlan Ind	5,174	69	4,453	88	3,304	128	34.8	35	16.2	67
Harrison Co	4,591	125	3,911	167	3,383	107	15.6	153	17.4	60
Harrodsburg Ind	5,134	74	5,025	23	3,769	42	33.3	41	2.2	127
Hart Co	4,512	132	4,341	107	3,542	75	22.6	125	3.9	121
Hazard Ind	4,784	105	4,081	149	3,255	136	25.4	103	17.2	62
Henderson Co	4,687	116	4,623	56	3,515	80	31.5	55	1.4	131
Henry Co	4,887	96	4,583	63	3,386	105	35.3	33	6.6	104
Hickman Co	4,979	87	4,505	75	3,558	71	26.6	86	10.5	88
Hopkins Co	4,942	93	4,443	91	3,390	103	31.0	62	11.2	86
Jackson Co	5,621	31	4,545	68	3,442	93	32.1	53	23.7	31
Jackson Ind	4,696	114	4,427	94	3,543	74	24.9	109	6.1	109
Jefferson Co	5,474	42	6,201	4	5,813	2	6.7	170	-11.7	169
Jenkins Co	6,179	8	4,402	99	3,560	69	23.7	117	40.4	4
Jessamine Co	3,960	169	4,088	145	3,466	87	18.0	146	-3.1	150
Johnson Co	5,196	64	4,096	144	3,247	139	26.2	97	26.9	24
Kenton Co	4,308	149	4,485	81	3,553	72	26.2	93	-3.9	151
Knott Co	5,556	38	4,307	112	3,139	154	37.2	25	29.0	17
Knox Co	5,804	21	4,467	85	3,428	95	30.3	69	29.9	14
Larue Co	4,309	148	4,051	154	3,365	115	20.4	134	6.4	107
Laurel Co	4,716	112	4,172	130	3,000	170	39.0	19	13.0	80
Lawrence Co	4,862	98	4,464	87	3,412	99	30.8	66	8.9	97
Lee Co	5,181	68	4,165	132	3,326	122	25.2	104	24.4	28
Leslie Co	5,511	40	4,325	110	3,103	162	39.4	16	27.4	23
Letcher Co	5,485	41	4,163	133	3,111	159	33.8	39	31.8	10
Lewis Co	5,027	86	4,273	116	3,422	97	24.9	112	17.7	57
Lincoln Co	5,592	36	4,053	153	3,177	150	27.6	80	38.0	5
Livingston Co	4,507	135	4,503	77	3,568	66	26.2	94	0.1	141
Logan Co	5,221	60	4,315	111	3,442	92	25.4	102	21.0	41
Ludlow Ind	4,266	154	4,001	158	3,303	129	21.1	130	6.6	105
Lyon Co	7,740	3	4,980	25	3,362	116	48.1	7	55.4	2
Madison Co	4,584	127	3,905	168	3,333	120	17.1	148	17.4	59
Magoffin Co	5,132	75	4,540	70	3,327	121	36.5	27	13.0	81
Marion Co	5,324	51	4,350	106	3,452	89	26.0	99	22.4	35
Marshall Co	3,946	170	4,270	117	3,212	147	33.0	43	-7.6	160
Martin Co	5,034	82	3,981	159	3,231	142	23.2	121	26.5	25
Mason Co	4,354	147	3,340	176	3,625	58	-7.9	175	30.4	13
Mayfield Ind	5,535	39	4,832	39	3,633	54	33.0	42	14.6	75
McCracken Co	4,305	150	4,044	155	2,982	173	35.6	32	6.5	106
McCreary Co	5,834	19	4,524	72	3,405	101	32.9	44	29.0	18
McLean Co	4,761	110	4,330	108	3,144	153	37.7	23	10.0	90
Meade Co	3,967	168	3,930	163	3,180	149	23.6	119	0.9	135
Menifee Co	5,187	67	3,961	160	3,111	158	27.3	82	31.0	12
Mercer Co	4,360	146	3,690	174	3,057	167	20.7	132	18.1	55
Metcalfe Co	5,606	33	4,698	47	3,538	76	32.8	46	19.3	47
Middlesboro Ind	5,423	44	4,465	86	3,368	113	32.6	48	21.5	37
Monroe Co	5,626	30	4,931	29	3,733	46	32.1	52	14.1	77
Montgomery Co	5,173	70	4,539	71	3,830	39	18.5	144	14.0	78
Monticello Ind	4,854	99	3,948	161	3,371	112	17.1	149	22.9	33
Morgan Co	5,644	28	4,750	45	3,254	137	46.0	9	18.8	51
Muhlenberg Co	4,468	139	4,489	80	3,553	73	26.4	89	-0.5	145
Murray Ind	7,062	4	5,965	7	4,729	8	26.1	98	18.4	53
Nelson Co	4,373	145	4,130	140	3,306	125	24.9	110	5.9	110
Newport Ind	5,558	37	5,552	9	4,401	13	26.2	95	0.1	140
Nicholas Co	4,828	100	4,124	141	3,504	82	17.7	147	17.1	63
Ohio Co	4,509	133	4,006	157	3,126	156	28.1	75	12.5	84
Oldham Co	4,077	164	4,276	114	3,805	41	12.4	161	-4.7	154
Owen Co	4,968	90	4,243	123	3,846	38	10.3	165	17.1	64
Owensboro Ind	6,212	7	6,202	3	5,603	4	10.7	162	0.2	138
Owsley Co	8,366	1	8,492	1	4,323	15	96.4	1	-1.5	147
Paducah Ind	5,762	22	5,756	8	4,167	19	38.1	22	0.1	139
Paintsville Ind	4,563	129	4,511	74	4,089	23	10.3	164	1.2	134
Paris Ind	5,116	77	4,904	31	3,376	111	45.2	10	4.3	118
Pendleton Co	4,802	103	3,896	169	3,282	133	18.7	143	23.3	32
Perry Co	5,270	55	3,926	164	3,106	161	26.4	88	34.2	6
Pike Co	5,198	63	4,062	151	3,210	148	26.5	87	28.0	20
Pikeville Ind	5,342	49	5,354	13	4,099	21	30.6	67	-0.2	143
Pineville Ind	5,196	65	4,328	109	5,690	3	-23.9	176	20.0	44

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	Exp/Stud 1994-95	Rank	Exp/Stud 1989-90	Rank	Exp/Stud 1985-86	Rank	% Change 1985-89	Rank	% Change 1989-1994	Rank
Powell Co	\$4,886	97	\$4,088	147	\$3,112	157	31.4%	56	19.5%	45
Providence Ind	4,973	88	4,086	148	3,457	88	18.2	145	21.7	36
Pulaski Co	4,014	166	3,807	171	3,450	90	10.3	163	5.5	111
Raceland Ind	4,171	159	4,377	104	3,429	94	27.7	78	-4.7	155
Robertson Co	5,071	79	5,169	17	5,086	5	1.6	172	-1.9	148
Rockcastle Co	5,207	61	4,151	134	3,032	168	36.9	26	25.4	26
Rowan Co	5,120	76	4,407	98	3,528	79	24.9	111	16.2	68
Russell Co	5,134	73	4,651	53	3,226	144	44.2	12	10.4	89
Russell Ind	4,693	115	4,503	78	3,389	104	32.9	45	4.2	119
Russellville Ind	5,452	43	5,014	24	3,602	60	39.2	18	8.7	99
Science Hill Ind	NA	175	3,498	175	3,013	169	16.1	151	NA	176
Scott Co	4,894	95	4,267	119	3,380	110	26.3	91	14.7	74
Shelby Co	4,477	138	4,276	115	3,401	102	25.7	101	4.7	117
Silver Grove Ind	5,403	46	4,853	36	3,954	30	22.7	123	11.3	85
Simpson Co	6,062	12	4,590	61	3,381	108	35.7	30	32.1	9
Somerset Ind	8,150	2	4,750	44	4,097	22	15.9	152	71.6	1
Southgate Ind	NA	176	4,692	48	4,469	10	5.0	171	NA	174
Spencer Co	5,202	62	4,201	125	3,537	77	18.8	142	23.8	30
Taylor Co	4,420	142	4,253	121	3,075	165	38.3	21	3.9	122
Todd Co	4,827	101	4,143	136	3,136	155	32.1	51	16.5	66
Trigg Co	4,773	107	5,401	12	3,659	50	47.6	8	-11.6	168
Trimble Co	5,028	85	4,380	103	4,001	29	9.5	168	14.8	72
Union Co	5,247	57	4,574	65	3,305	126	38.4	20	14.7	73
Walton Verona Ind	4,932	94	4,842	38	3,937	32	23.0	122	1.9	129
Warren Co	4,194	158	3,920	166	2,990	172	31.1	60	7.0	103
Washington Co	4,772	108	4,608	59	3,514	81	31.1	58	3.6	123
Wayne Co	5,599	34	4,628	55	4,208	16	10.0	167	21.0	40
Webster Co	4,602	122	4,388	102	3,321	123	32.1	50	4.9	113
West Point Ind	NA	177	4,968	26	3,749	43	32.5	49	NA	173
Whitley Co	5,321	52	4,138	137	3,242	140	27.6	79	28.6	19
Williamsburg Ind	4,279	152	4,137	138	2,910	176	42.2	13	3.4	124
Williamstown Ind	6,175	9	4,786	42	4,024	25	18.9	141	29.0	16
Wolfe Co	5,884	16	4,806	41	4,454	11	7.9	169	22.4	34
Woodford Co	4,276	153	4,185	128	3,345	118	25.1	108	2.2	126

Note: All dollar values are expressed in constant 1994 dollars.
Source: National Center of Education Statistics, U.S. Department of Education.

between per capita income and revenue per student, with an additional \$1,000 in per capita income increasing revenue per student by approximately \$61. The predicted difference between the district with the highest income per capita (Oldham County) and the lowest per capita income (Owsley County) is \$852. From Figure 2b it is apparent that there is not a strong relationship between district per capita income and revenue per student in 1994-95. In fact, there is a weak (statistically insignificant) negative relationship between per capita income and revenue per student.

While KERA has led to significant increases in educational spending, what is most significant about its impact is not the magnitude of these increases but which districts received them. KERA, in a very real sense, has eliminated the inequity in educational spending in the state. While there are still differences in spending throughout the state, these differences are of a smaller magnitude than they were prior to KERA. Further, these differences are unrelated to either income or property wealth — poor districts, in either income or property wealth, can be expected to receive as much funding as wealthy districts.

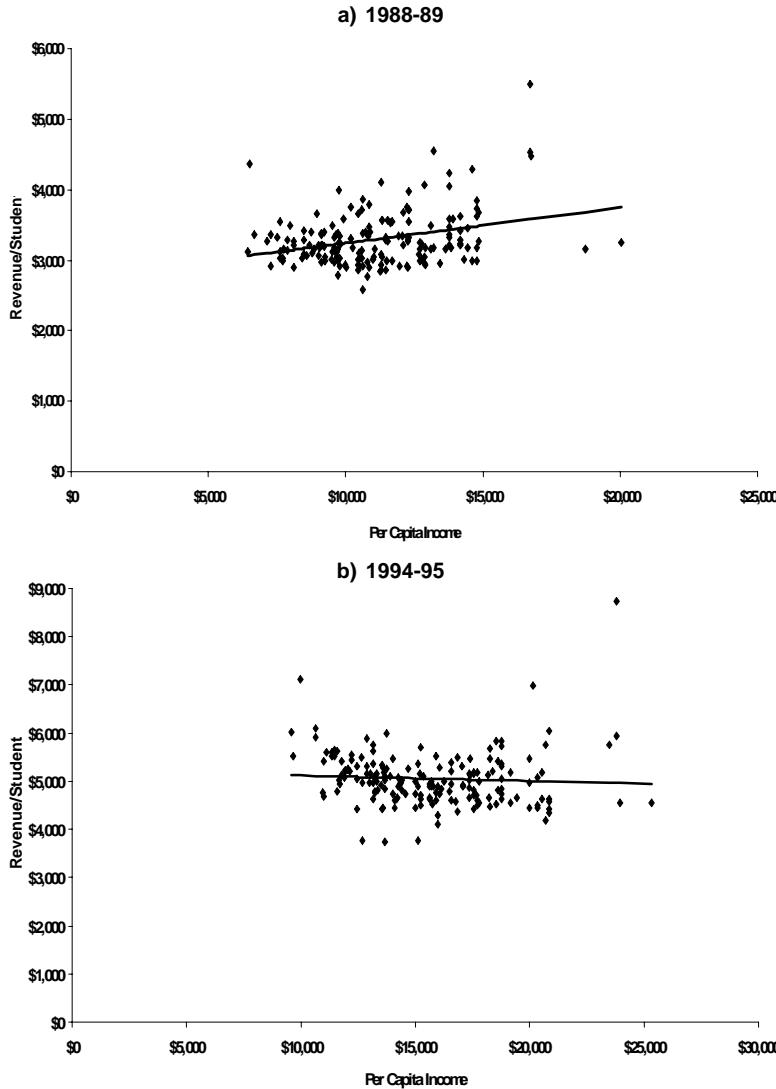
How Has the Money Been Spent?

While much of the media attention and discussion that preceded KERA was focused on the unequal funding of schools and corrupt assessment practices, attention was also paid to how districts used their resources. Concerns about the appropriate use of educational monies are also apparent in the KERA legislation itself. In particular, KERA has increased standardization of curricula, attempted to increase parent and teacher input in governance, and placed restrictions on employment practices in attempts to eliminate nepotism and politically motivated appointments.

While it is beyond the scope of this report to provide a thorough examination of how successful KERA has been in ensuring that funds are used productively, we can offer some general information on how the additional funds KERA has provided have been spent.

FIGURE 2

Relationship between Revenue/Student and Per Capita Income in Kentucky School Districts, 1988-89 and 1994-95



Comparison between Kentucky and the Rest of the U.S.

Table 4 provides information regarding personnel and employment in primary and secondary education aggregated to the state level. Again, we make comparisons among the states both before and after the implementation of KERA. The legislation did reduce class sizes in Kentucky, from 17.7 students per teacher in 1988-89 to 16.9 students per teacher in 1994-95. However, during a period

when per pupil spending increased by 30 percent, the highest among all the states, this was only a 4.5 percent reduction in the student-teacher ratio, ranking 13th among the states.

At the same time, teacher salaries in Kentucky did increase from an average of \$32,688 (in 1996 dollars) in 1988-89 to \$33,950 in 1996-97. This 3.86% increase in salaries was the 11th highest among the states and increased Kentucky's rank from 38th to 30th in the ranking of average teacher salaries. Again, while this was a significant increase in teacher salaries relative to other states, only a small share of the increase in educational spending from KERA can be attributed to increased teacher salaries.

Prior to KERA in the 1988-89 academic year, 46 percent of current expenditures by school districts were teacher salaries, while by the 1995-96 academic year only 41 percent of current expenditures were teacher salaries. The decrease in the share of expenditures going to teacher salaries is related to the fact that only 32 percent of the increase in current expenditures from 1988-89 to 1995-96 was for increases in salaries and increased numbers of teachers in Kentucky.

While Kentucky has increased its number of teachers relative to students during a time when the majority of states have seen fewer teachers per student, teachers as a percentage of total public school staff have decreased significantly, as Table 4 illustrates. Kentucky has traditionally been a state with a low percentage of its staff employed as teachers, ranking 45th in 1988-89 with about 50 percent of its staff employed as teachers. By 1995-96, however, the state ranked last among the states with only about 46 percent of its staff being teachers.

What are the Results?

Perhaps the one feature of KERA that distinguishes it more from earlier educational

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TABLE 4

Student/Teacher Ratio, Teacher Earnings, and Teachers as a Percentage of Total Staff, 1988 - 1995

	Student/Teacher 1988	Rank	Student/Teacher 1995	Rank	1989-1995 Change	Rank	Teacher Earnings 1988-89	Rank	Teacher Earnings 1994-95	Rank	1989-1994 Change	Rank	Teachers/Total Staff 1988	Rank	Teachers/Total Staff 1994	Rank
United States	17.2		17.3		0.1		\$38,765		\$38,509		-0.7		53.8%		52.0%	
Alabama	18.1	38	16.9	29	-1.2	7	32,538	39	32,549	38	0.0	22	53.2	32	52.9	27
Alaska	16.8	25	17.3	37	0.5	38	54,748	1	50,647	1	-7.5	47	46.5	49	49.1	41
Arizona	18.9	43	19.6	46	0.7	42	37,368	24	33,350	33	-10.8	49	52.7	34	50.1	40
Arkansas	17.0	28	17.1	34	0.1	31	28,053	50	29,975	44	6.9	4	54.7	27	53.8	19
California	22.4	50	24.0	51	1.6	50	45,478	5	43,474	9	-4.4	36	50.2	44	52.0	33
Colorado	17.6	35	18.5	42	0.9	45	38,757	18	36,175	23	-6.7	43	52.5	35	52.5	29
Connecticut	13.3	1	14.4	5	1.1	46	48,964	2	50,426	2	3.0	15	86.9	1	54.5	10
Delaware	16.4	23	16.8	27	0.4	37	41,415	11	41,436	12	0.1	21	54.8	26	54.5	12
District of Columbia	13.4	2	15.0	11	1.6	49	48,818	3	45,012	6	-7.8	48	58.4	9	56.4	7
Florida	17.2	31	18.9	43	1.7	51	35,369	28	33,881	30	-4.2	35	50.8	41	48.3	43
Georgia	18.3	40	16.5	25	-1.8	2	35,298	29	36,042	24	2.1	16	49.7	46	48.2	45
Hawaii	19.1	44	17.8	40	-1.3	5	40,356	15	35,842	25	-11.2	50	42.1	50	62.3	3
Idaho	20.1	47	19.0	44	-1.1	9	29,809	44	31,818	39	6.7	5	63.0	5	58.6	4
Illinois	16.9	27	17.1	35	0.2	33	40,838	13	42,679	11	4.5	10	56.4	15	54.3	16
Indiana	17.5	34	17.5	37	0.0	29	38,236	21	38,236	17	0.9	18	51.2	40	48.0	47
Iowa	15.7	15	15.5	15	-0.2	25	33,800	33	33,275	34	-1.6	29	53.9	31	52.1	32
Kansas	15.0	11	15.1	13	0.1	31	35,875	26	35,837	26	-0.1	23	57.6	11	53.7	20
Kentucky	17.7	37	16.9	30	-0.8	13	32,688	38	33,950	29	3.9	11	49.9	45	46.3	51
Louisiana	17.6	36	17.0	31	-0.6	15	29,463	46	28,347	48	-3.8	33	48.9	47	50.5	39
Maine	14.1	6	13.9	3	-0.2	22	32,699	37	33,800	31	3.4	13	57.3	12	52.3	30
Maryland	16.8	26	16.8	28	0.0	28	44,443	8	41,148	13	-7.4	45	54.4	29	54.4	13
Massachusetts	14.0	5	14.6	8	0.6	39	42,248	10	43,806	8	3.7	12	56.5	15	55.4	8
Michigan	19.7	46	19.7	46	0.0	30	45,460	6	44,251	7	-2.7	30	47.1	48	46.9	50
Minnesota	17.2	32	17.8	41	0.6	40	40,202	16	37,975	18	-5.5	38	56.3	17	62.7	2
Mississippi	18.2	39	17.5	39	-0.7	14	29,604	45	27,720	49	-6.4	41	63.1	4	47.6	48
Missouri	15.7	16	15.4	14	-0.3	20	34,099	32	34,342	28	0.7	19	51.8	39	48.0	46
Montana	15.7	17	16.4	24	0.7	41	32,021	40	29,950	45	-6.5	42	77.5	3	54.2	17
Nebraska	14.7	9	14.5	7	-0.2	24	31,266	42	31,768	40	1.6	17	55.8	19	52.9	28
Nevada	20.4	49	19.1	45	-1.3	6	37,815	23	37,340	20	-1.3	28	85.8	2	58.5	5
New Hampshire	16.2	21	15.7	18	-0.5	18	35,012	30	36,867	22	5.3	8	54.4	28	53.3	22
New Jersey	13.5	3	13.8	1	0.3	35	43,318	9	49,349	4	13.9	3	55.3	22	53.2	25
New Mexico	18.3	41	17.0	32	-1.3	4	31,858	41	29,715	46	-6.7	44	52.3	36	48.3	44
New York	14.7	10	15.5	16	0.8	43	48,061	4	49,560	3	3.1	14	55.3	23	51.0	38
North Carolina	17.1	30	16.2	22	-0.9	11	33,748	34	31,225	43	-7.5	46	52.0	37	52.2	31
North Dakota	15.1	12	15.9	21	0.8	44	29,173	48	27,711	50	-5.0	37	56.1	18	54.3	14
Ohio	17.4	33	17.1	36	-0.3	21	38,905	17	38,831	15	-0.2	24	54.1	30	55.2	9
Oklahoma	16.2	22	15.7	19	-0.5	19	29,332	47	29,270	47	-0.2	25	54.8	25	47.0	49
Oregon	18.4	42	19.8	48	1.4	48	38,536	19	40,900	14	6.1	6	53.1	33	51.8	35
Pennsylvania	15.7	18	17.0	33	1.3	47	40,973	12	47,429	5	15.8	1	55.4	21	53.0	26
Rhode Island	14.5	7	14.3	4	-0.2	23	44,887	7	43,019	10	-4.2	34	62.3	6	63.5	1
South Carolina	17.0	29	16.2	23	-0.8	12	33,597	35	32,659	36	-2.8	31	58.0	10	53.3	23
South Dakota	15.5	14	15.0	12	-0.5	17	26,919	51	26,764	51	-0.6	26	59.4	7	53.2	24
Tennessee	19.1	45	16.7	26	-2.4	1	33,592	36	33,789	32	0.6	20	50.5	42	54.0	18
Texas	16.7	24	15.6	17	-1.1	8	34,782	31	32,644	37	-6.1	40	29.5	51	52.0	34
Utah	24.9	51	23.8	50	-1.1	10	29,964	43	31,750	41	6.0	7	57.2	14	53.6	21
Vermont	13.8	4	13.8	2	0.0	27	35,542	27	37,200	21	4.7	9	57.3	13	49.1	42
Virginia	15.9	19	14.4	6	-1.5	3	37,982	22	35,837	27	-5.6	39	51.9	38	54.3	15
Washington	20.1	48	20.4	49	0.3	34	38,286	20	37,860	19	-1.1	27	55.7	20	51.4	36
West Virginia	15.1	13	14.6	9	-0.5	16	28,721	49	33,159	35	15.5	2	54.8	24	54.5	11
Wisconsin	15.9	20	15.8	20	-0.1	26	40,358	14	38,950	15	-3.5	32	59.0	8	57.9	6
Wyoming	14.5	8	14.8	10	0.3	36	36,234	25	31,721	42	-12.5	51	50.4	43	51.2	37

finance reform acts in other states is the emphasis on equality in student performance and achievement, and not simply equality in funding.

Attempts to achieve equality in performance required a means of monitoring and measuring the performance of students. This led to the development of the Kentucky Instructional Results Information System (KIRIS). KIRIS is an ambitious testing system, relying not simply on objective questions but also

requiring extensive writing and even group projects.

The results of KIRIS have been criticized for a number of reasons, however. Evidence of fraud has surfaced in some districts², possibly as a result of the bonuses provided to schools and teachers based on performance on the KIRIS. A recent study by the Rand Corporation argues that the increase in KIRIS scores is an overestimate of the increase in performance by Kentucky students. The study supports this

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conclusion by noting that the increases in KIRIS scores are much higher than the increase in scores for Kentucky students on the National Assessment in Educational Progress (NAEP) during the same period, as well as the gains in scores received by Kentucky students taking the American College Test (ACT), a standard test required for college entry. The study suggests that much of the gain might be related to teaching directed at questions that are reused over time.

We provide a few different measures of performance to compare Kentucky to other states, including the scores from the Math NAEP, graduation rates, and ACT scores. Table 5 provides NAEP math scores for both 4th and 8th grades for 1990 and 1996 as well as measures of the changes in these scores. Kentucky's score on the 8th grade Math NAEP has risen relative to the national average, ranking 5th in percentage increase among the 28 states in which the test was administered during both years. In 1996, Kentucky ranked 28th in scores of the 43 states administering the exam. The 4th grade test began in 1992, and scores in Kentucky increased by 2.8 percent from 1992 to 1996, compared with an average U.S. increase of 3.2 percent. Again, Kentucky ranked 28th among the states administering the exam.

The ACT scores in 1995 and 1998 give a similar story, with Kentucky having a slight increase in scores from 20.1 to 20.2, while the national average increased from 20.8 to 21.0. While Kentucky's scores are lower than the national average, some caution in interpreting these results is warranted since a much higher percentage of Kentucky students (67 percent in 1998) take the exam than the national average (37 percent). The higher the percentage of students taking the exam, the lower the scores we should expect.

Also in Table 5 are figures on the percentage of 18- to 24-year-olds who have completed high school for the 1989-91 period. We see that during this period, and in the 1994-96 and 1996-98 periods, the figure for Kentucky is below the national average for three three-year periods: 1989-1991, 1994-96, and 1996-98.³ Kentucky's high school completion rate is below the national average during all three periods, and there have only been modest gains in Kentucky since KERA. Of course, when considering these figures, it is important to remember that some of the

individuals represented by these graduation rates may not have been in school under KERA for more than a few years or even at all.

Overall, and not too surprisingly, these measures suggest that at least thus far, KERA has had little impact on the performance of Kentucky students and schools compared to the rest of the United States.

Comparisons Among Districts

Given the criticisms of KIRIS and limited information at the district level on test scores, we focus on two other important measures of school performance: the dropout rate and the percentage of graduates planning to attend college. Given the strong evidence of the impact of high school completion on earnings and the substantial difference in earnings between high school graduates and college graduates, decreases in dropout rates and increases in college attendance should signal increases in future earnings.

Table 6 gives the percentage of 12th graders planning to attend college for 1993 and 1997 as well as the change in the percentage between the two years.⁴ As the table shows, there has been only a slight increase in planned college attendance for the state between 1993 and 1997. Some districts, however, have had significant increases in planned college attendance. Seven of the ten districts with the greatest increases in the percentage planning to attend college were districts who ranked 155 or below (out of 173 districts in the state) in terms of the percentage of students planning to attend college in 1993.

The dropout rate for 1991 and 1995 for the 7th through 12th grade is also included in Table 6. The overall dropout rate for Kentucky has actually increased for this period by almost one percent. Of course, educational quality is not the only reason that dropout rates may change. For example, changes in economic conditions and alternatives to schooling will also have a significant impact on the dropout rate. Again, while the dropout rate has increased overall, a number of districts have seen significant decreases. In fact, eight of the ten districts with the greatest reduction in dropout rates were districts that were in the top ten in terms of highest dropout rates in 1991-92. While it is more likely that those districts that have the greatest dropout rates

(text continued on page 35)

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TABLE 5

National Assessment in Education Progress (NAEP) Scores and High School Completion Rate, 1990 - 1996

	8th Grade Math NAEP						4th Grade Math NAEP						Completion Rate			
	1990	Rank	1990-96		Change	Rank	1992	Rank	1992-96		Change	Rank	1989	1992	1994	
			1996	Rank					1996	Rank			-91	-94	-96	
United States	262		271		3.4%			217		224		3.2%		85.0%	86.1%	85.8%
Alabama	253	31	257	38	1.6	25	207	38	212	40	2.4	15	82.2	83.3	86.8	
Alaska			278	10					224	21			88.7	89.8	87.8	
Arizona	260	21	268	25	3.1	16	214	26	218	31	1.9	19	83.2	83.7	85.8	
Arkansas	256	26	262	34	2.3	20	209	36	216	34	3.3	7	87.1	87.5	86.7	
California	256	27	263	31	2.7	17	207	39	209	41	1.0	28	76.7	78.9	78.6	
Colorado	267	11	276	14	3.4	12	220	15	226	15	2.7	13	87.8	87.6	87.9	
Connecticut	270	9	280	8	3.7	6	226	7	232	3	2.7	14	89.7	92.6	96.1	
Delaware	261	18	267	27	2.3	22	217	21	215	35	-0.9	37	85.9	93.7	88.8	
District of Columbia	231	35	233	41	0.9	29	191	42	187	44	-2.1	38	82.0	86.4	87.8	
Florida	255	30	264	30	3.5	7	212	32	216	33	1.9	18	83.2	83.2	80.1	
Georgia	259	23	262	33	1.2	26	214	27	215	36	0.5	32	85.5	79.4	81.3	
Hawaii	251	32	262	36	4.4	4	213	31	215	37	0.9	31	92.9	90.7	92.6	
Idaho	271	8					220	16					83.1	86.7	85.2	
Illinois													85.4	86.7	89.3	
Indiana	267	12	276	15	3.4	13	220	17	229	8	4.1	5	88.9	88.4	88.3	
Iowa	278	2	284	2	2.2	24	229	18	229	6	0.0	35	94.5	94.2	91.6	
Kansas													92.5	92.2	91.6	
Kentucky	257	25	267	28	3.9	5	214	28	220	28	2.8	10	81.6	83.3	82.2	
Louisiana	246	34	252	39	2.4	19	203	40	209	42	3.0	9	80.6	83.9	82.2	
Maine			284	4			231	1	232	1	0.4	34	90.5	94.0	91.8	
Maryland	261	19	270	21	3.4	10	216	25	221	27	2.3	16	87.3	92.9	93.4	
Massachusetts			278	11			226	8	229	7	1.3	25	89.6	91.2	92.0	
Michigan	264	14	277	12	4.9	2	219	19	226	16	3.2	8	86.3	89.2	89.1	
Minnesota	275	4	284	3	3.3	15	227	6	232	17	2.2	17	92.0	93.2	95.3	
Mississippi			250	40			200	41	208	43	4.0	6	84.0	88.8	83.9	
Missouri			273	19			221	14	225	17	1.8	20	88.0	90.0	88.0	
Montana			283	7					228	11			92.7	91.6	89.8	
Nebraska	276	3	283	5	2.5	18	224	10	228	10	1.8	22	90.8	95.9	93.3	
Nevada									218	32			82.6	83.4	81.4	
New Hampshire	273	6					229	3					87.3	86.6	87.7	
New Jersey	270	10					226	9	227	12	0.4	33	90.0	91.0	87.0	
New Mexico	256	28	262	35	2.3	21	212	33	214	38	0.9	30	84.7	83.7	82.7	
New York	261	20	270	22	3.4	11	217	22	223	24	2.8	12	87.7	87.5	90.9	
North Carolina	250	33	268	26	7.2	1	211	34	224	20	6.2	1	82.8	85.3	87.2	
North Dakota	281	1	284	1	1.1	28	228	4	231	4	1.3	26	95.6	96.6	93.0	
Ohio	264	15					217	23					89.3	89.6	87.7	
Oklahoma	263	17							223	26			87.1	83.1	87.0	
Oregon			276	16			219	20					89.2	82.9	81.1	
Pennsylvania	266	13					223	12	226	14	1.3	24	90.2	89.7	89.6	
Rhode Island	260	22	269	24	3.5	9	214	29	220	29	2.8	11	87.4	90.7	87.5	
South Carolina			261	37			211	35	213	39	0.9	29	82.6	87.0	88.4	
South Dakota													87.6	93.2	89.6	
Tennessee			263	32			209	37	219	30	4.8	3	87.7	76.5	83.3	
Texas	258	24	270	23	4.7	3	217	24	229	9	5.5	4	78.4	80.5	79.3	
Utah			277	13			223	13	227	13	1.8	21	93.9	93.9	91.3	
Vermont			279	9					225	18			85.9	89.8	87.0	
Virginia	264	16	270	20	2.3	23	220	18	223	23	1.4	23	87.0	88.6	86.6	
Washington			276	17					225	19			87.4	87.3	86.8	
West Virginia	256	29	265	29	3.5	8	214	30	223	25	4.2	4	82.7	85.6	89.3	
Wisconsin	274	5	283	6	3.3	14	228	5	231	5	1.3	27	93.4	93.4	92.5	
Wyoming	272	7	275	18	1.1	27	224	11	223	22	-0.4	36	91.4	91.6	89.4	

Source: National Center for Education Statistics, U.S. Department of Education.

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TABLE 6

College Attendance and Dropout Rate in Kentucky Public School Districts, 1991 - 1997

	Percent Attending College						Dropout Rate, 7th-12th Grades					
	1993	Rank	1997	Rank	1993-97 Change	Rank	1991-92	Rank	1995-96	Rank	1991-95 Change	Rank
Kentucky	49.8%		51.0%		1.2%		2.96%		3.85%		0.89%	
Adair Co	52.0%	68	53.5%	60	1.5%	77	3.05%	95	3.11%	84	0.06%	82
Allen Co	38.6	135	49.7	81	11.1	18	3.64	121	2.86	76	-0.78	36
Anderson Co	47.5	88	54.9	55	7.4	30	1.86	34	5.14	156	3.28	171
Ashland Ind	63.7	24	71.1	12	7.4	29	1.45	18	1.90	33	0.45	103
Augusta Ind	37.5	139	43.5	113	6.0	41	2.78	77	0.74	11	-2.04	15
Ballard Co	41.5	120	32.1	155	-9.4	145	1.13	12	2.41	57	1.28	133
Barbourville Ind	72.4	11	57.9	42	-14.5	162	2.91	87	1.57	22	-1.34	27
Bardstown Ind	66.2	19	55.7	51	-10.5	151	2.35	50	2.73	68	0.38	100
Barren Co	35.3	145	35.7	141	0.4	83	3.13	99	0.31	5	-2.82	8
Bath Co	35.3	146	44.7	105	9.4	22	5.23	156	3.82	116	-1.41	24
Beechwood Ind	89.8	2	89.2	1	-0.6	95	0.00	1	0.00	1	0.00	78
Bell Co	41.6	119	38.8	128	-2.8	109	4.34	142	4.10	125	-0.24	62
Bellevue Ind	40.9	125	34.0	145	-6.9	135	4.00	134	3.67	110	-0.33	57
Berea Ind	67.3	18	70.4	13	3.1	62	2.92	90	2.33	52	-0.59	45
Boone Co	45.3	98	63.3	24	18.0	5	2.11	40	2.30	50	0.19	88
Bourbon Co	47.7	87	44.0	110	-3.7	113	2.95	91	4.53	134	1.58	147
Bowling Green Ind	70.8	14	73.4	7	2.6	66	2.12	41	2.32	51	0.20	89
Boyd Co	57.9	36	47.6	92	-10.3	149	1.18	14	2.60	65	1.42	143
Boyle Co	47.2	90	62.2	28	15.0	13	1.65	25	4.01	121	2.36	162
Bracken Co	55.9	43	43.4	114	-12.5	160	2.71	75	3.09	82	0.38	101
Breathitt Co	64.5	21	54.6	56	-9.9	147	2.41	56	3.90	117	1.49	146
Breckinridge Co	28.3	164	52.6	65	24.3	4	1.74	29	2.77	73	1.03	118
Bullitt Co	37.1	142	33.0	150	-4.1	116	4.28	141	3.97	120	-0.31	58
Burgin Ind	30.0	162	54.5	57	24.5	3	1.69	26	1.73	25	0.04	81
Butler Co	37.4	141	31.1	158	-6.3	130	3.97	133	3.72	112	-0.25	61
Caldwell Co	43.2	113	32.5	154	-10.7	153	2.22	44	3.12	85	0.90	116
Calloway Co	52.2	63	49.6	82	-2.6	107	2.31	48	0.68	8	-1.63	23
Campbell Co	18.1	170	56.1	48	38.0	1	1.64	24	2.75	70	1.11	123
Campbellsville Ind	57.8	37	58.1	39	0.3	84	2.67	70	3.28	93	0.61	106
Carlisle Co	43.8	108	52.5	66	8.7	25	1.05	11	4.19	128	3.14	169
Carroll Co	36.3	143	34.4	143	-1.9	104	3.32	110	3.25	91	-0.07	74
Carter Co	47.1	92	49.0	86	1.9	72	3.93	131	5.02	149	1.09	119
Casey Co	43.6	109	41.4	118	-2.2	106	4.51	149	3.54	105	-0.97	33
Caverna Ind	52.5	61	46.9	97	-5.6	125	2.37	52	1.85	32	-0.52	48
Christian Co	52.1	65	55.6	53	3.5	59	4.67	151	5.35	159	0.68	107
Clark Co	51.6	71	51.6	71	0.0	86	3.44	116	4.77	142	1.33	138
Clay Co	27.7	165	34.9	142	7.2	33	4.91	152	9.91	172	5.00	174
Clinton Co	50.6	73	44.3	107	-6.3	129	5.63	163	2.73	69	-2.90	7
Cloverport Ind	33.3	156	50.0	79	16.7	10	3.11	98	2.27	48	-0.84	35
Corbin Ind	72.0	13	60.5	29	-11.5	156	2.78	78	4.44	133	1.66	149
Covington Ind	33.5	155	25.5	169	-8.0	142	5.46	158	5.93	165	0.47	104
Crittenden Co	51.7	70	50.5	76	-1.2	98	1.23	16	2.41	58	1.18	127
Cumberland Co	41.4	122	44.8	104	3.4	61	2.84	81	4.23	130	1.39	142
Danville Ind	77.4	9	78.5	5	1.1	79	1.90	37	2.13	46	0.23	94
Daviess Co	52.0	67	56.0	50	4.0	55	1.86	33	2.56	63	0.70	108
Dawson Springs Ind	61.5	28	37.5	132	-24.0	170	3.75	126	6.19	166	2.44	164
Dayton Ind	34.6	149	52.1	67	17.5	6	4.08	136	5.38	160	1.30	134
Edmonson Co	33.8	152	27.5	164	-6.3	131	3.65	122	1.74	26	-1.91	19
Elizabethown Ind	72.1	12	67.4	17	-4.7	119	1.57	21	3.37	97	1.80	154
Elliott Co	45.8	96	45.3	101	-0.5	93	3.10	97	4.19	129	1.09	120
Eminence Ind	56.6	41	57.7	43	1.1	80	2.24	46	2.62	67	0.38	99
Erlanger-Elsmere	44.1	106	48.7	88	4.6	50	2.35	49	1.69	23	-0.66	38
Estill Co	37.7	138	33.8	147	-3.9	115	4.23	139	5.02	150	0.79	111
Fairview Ind	58.6	33	48.1	90	-10.5	152	0.80	6	1.93	35	1.13	125
Fayette Co	67.7	17	72.0	10	4.3	51	1.89	36	4.95	147	3.06	168
Fleming Co	38.7	134	44.0	111	5.3	47	2.80	79	2.37	56	-0.43	54
Floyd Co	55.3	48	62.4	27	7.1	34	3.56	119	2.43	59	-1.13	29
Frankfort Ind	52.6	59	69.7	14	17.1	9	5.60	162	3.29	95	-2.31	12
Franklin Co	56.0	42	57.0	44	1.0	81	3.22	103	2.75	71	-0.47	51
Ft. Thomas Ind	81.3	5	87.0	2	5.7	44	0.41	2	0.53	6	0.12	87
Fulton Co	50.0	77	49.1	85	-0.9	97	4.48	148	2.27	49	-2.21	13
Fulton Ind	41.1	124	46.5	98	5.4	46	4.41	144	1.81	30	-2.60	11
Gallatin Co	37.8	136	28.6	162	-9.2	144	5.64	164	3.73	114	-1.91	20
Garrard Co	41.4	121	51.5	72	10.1	20	3.94	132	4.01	122	0.07	83

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	Percent Attending College						Dropout Rate, 7th-12th Grades					
	1993	Rank	1997	Rank	1993-97 Change	Rank	1991-92	Rank	1995-96	Rank	1991-95 Change	Rank
Glasgow Ind	62.4%	26	65.9%	20	3.5%	58	3.31%	108	3.13%	86	-0.18%	65
Grant Co	26.9	167	33.4	148	6.5	37	3.22	104	4.07	123	0.85	114
Graves Co	45.3	99	53.9	59	8.6	26	2.66	68	3.47	103	0.81	112
Grayson Co	39.4	131	32.6	152	-6.8	133	3.66	124	3.17	88	-0.49	50
Green Co	43.3	112	41.7	117	-1.6	101	2.75	76	2.37	55	-0.38	56
Greenup Co	47.2	91	37.2	134	-10.0	148	2.64	66	3.06	81	0.42	102
Hancock Co	52.0	66	59.6	34	7.6	28	1.79	31	1.34	17	-0.45	53
Hardin Co	43.2	114	49.2	84	6.0	39	2.26	47	3.61	107	1.35	140
Harlan Co	48.5	81	43.5	112	-5.0	120	4.09	137	2.35	53	-1.74	22
Harlan Ind	64.0	22	74.2	6	10.2	19	1.59	22	1.81	29	0.22	93
Harrison Co	54.3	51	56.1	49	1.8	73	2.42	58	5.09	154	2.67	165
Harrodsburg Ind	52.7	58	60.0	31	7.3	32	2.54	63	4.74	141	2.20	161
Hart Co	34.4	151	47.6	93	13.2	16	5.59	161	1.76	28	-3.83	3
Hazard Ind	82.4	4	72.5	9	-9.9	146	2.92	89	0.72	10	-2.20	14
Henderson Co	53.5	55	59.2	35	5.7	45	2.36	51	2.37	54	0.01	80
Henry Co	41.1	123	39.2	125	-1.9	105	4.43	147	5.14	157	0.71	109
Hickman Co	48.4	82	33.3	149	-15.1	163	3.16	102	2.05	42	-1.11	30
Hopkins Co	54.6	50	52.8	62	-1.8	103	2.83	80	4.09	124	1.26	129
Jackson Co	33.6	154	26.5	167	-7.1	137	3.43	114	2.08	43	-1.35	26
Jackson Ind	52.4	62	67.9	16	15.5	12	3.27	106	0.59	7	-2.68	10
Jefferson Co	52.6	60	54.2	58	1.6	75	2.21	43	5.72	163	3.51	172
Jenkins Co	63.9	23	37.8	130	-26.1	171	2.69	71	2.60	66	-0.09	73
Jessamine Co	50.0	76	49.8	80	-0.2	87	3.77	127	6.44	168	2.67	166
Johnson Co	43.4	111	39.7	122	-3.7	112	4.04	135	3.41	99	-0.63	42
Kenton Co	50.5	74	59.9	32	9.4	23	2.23	45	2.00	38	-0.23	64
Knott Co	55.3	47	62.7	26	7.4	31	3.49	117	2.90	78	-0.59	44
Knox Co	32.8	157	26.0	168	-6.8	134	3.39	111	4.85	145	1.46	145
Larue Co	44.5	104	47.1	96	2.6	67	2.42	57	3.67	108	1.25	128
Laurel Co	45.2	100	53.0	61	7.8	27	6.21	167	6.32	167	0.11	85
Lawrence Co	45.9	95	49.0	87	3.1	64	4.41	145	3.44	100	-0.97	32
Lee Co	41.9	117	47.9	91	6.0	40	4.34	143	4.54	135	0.20	90
Leslie Co	58.2	34	51.2	74	-7.0	136	5.29	157	2.04	40	-3.25	5
Letcher Co	53.8	53	58.0	40	4.2	54	2.37	53	1.92	34	-0.45	52
Lewis Co	29.9	163	36.6	135	6.7	35	1.73	27	1.50	20	-0.23	63
Lincoln Co	31.8	159	37.8	131	6.0	42	3.75	125	4.85	146	1.10	121
Livingston Co	34.7	148	37.3	133	2.6	68	2.67	69	2.10	45	-0.57	47
Logan Co	31.5	160	33.0	151	1.5	76	1.74	28	2.56	62	0.82	113
Ludlow Ind	48.1	86	50.0	78	1.9	71	1.18	13	0.91	12	-0.27	59
Lyon Co	57.6	39	47.2	95	-10.4	150	2.10	39	0.69	9	-1.41	25
Madison Co	55.6	45	51.8	68	-3.8	114	2.91	88	2.78	74	-0.13	70
Magoffin Co	44.2	105	44.4	106	0.2	85	3.92	129	2.58	64	-1.34	28
Marion Co	42.3	116	36.4	136	-5.9	126	2.45	59	3.44	100	0.99	117
Marshall Co	59.3	32	63.1	25	3.8	55	2.37	54	5.31	158	2.94	167
Martin Co	57.3	40	51.7	69	-5.6	124	4.27	140	5.54	162	1.27	131
Mason Co	55.4	46	44.0	109	-11.4	155	2.65	67	2.02	39	-0.63	41
Mayfield Ind	59.6	31	60.1	30	0.5	82	3.53	118	3.39	98	-0.14	69
McCracken Co	59.9	30	56.8	47	-0.1	88	2.09	38	1.97	36	-0.06	76
McCreary Co	34.6	150	34.0	146	-0.6	94	5.57	160	6.88	170	1.31	136
McLean Co	44.7	102	39.3	124	-5.4	122	1.62	23	2.98	79	1.36	141
Meade Co	39.1	133	31.4	157	-7.7	139	2.85	83	5.00	148	2.15	160
Menifee Co	48.9	80	30.6	160	-18.3	166	6.86	169	4.15	126	-2.71	9
Mercer Co	41.8	118	36.4	137	-5.4	123	3.27	107	1.41	18	-1.86	21
Metcalfe Co	33.7	153	29.2	161	-4.5	118	5.20	154	5.06	151	-0.14	68
Middlesboro Ind	51.7	69	55.3	54	3.6	57	6.73	168	3.20	90	-3.53	4
Model Lab	94.6	1	65.4	21	-29.2	173	0.98	9	2.09	44	1.11	122
Monroe Co	35.7	144	38.6	129	2.9	65	1.19	15	2.89	77	1.70	152
Montgomery Co	51.6	72	51.2	75	-0.4	91	2.86	84	3.59	106	0.73	110
Monticello Ind	43.9	107	58.8	36	14.9	14	3.43	115	3.03	80	-0.40	55
Morgan Co	47.5	89	44.8	103	-2.7	108	3.56	120	4.84	143	1.28	132
Muhlenberg Co	49.5	78	52.6	64	3.1	63	2.52	62	4.38	132	1.86	157
Murray Ind	79.0	6	73.0	8	-6.0	127	0.55	4	1.72	24	1.17	126
Nelson Co	44.7	103	32.5	153	-12.2	158	3.42	113	5.08	153	1.66	148
Newport Ind	32.6	158	20.8	171	-11.8	157	5.20	155	5.07	152	-0.13	71
Nicholas Co	42.9	115	27.1	165	-15.8	164	3.65	123	3.47	104	-0.18	66
Ohio Co	39.8	129	42.1	116	2.3	70	3.16	102	4.85	144	1.69	150
Oldham Co	57.9	35	71.6	11	13.7	15	1.31	17	1.43	19	0.12	86
Owen Co	48.3	84	40.4	121	-7.9	140	4.42	146	3.32	96	-1.10	31
Owensboro Ind	27.1	166	36.2	138	9.1	24	2.70	72	1.75	27	-0.95	34
Owsley Co	40.4	126	56.9	46	16.5	11	6.17	166	5.41	161	-0.76	37
Paducah Ind	61.7	27	63.4	23	1.7	74	2.90	86	3.11	83	0.21	91
Paintsville Ind	78.2	8	81.6	3	3.4	60	0.50	3	0.25	3	-0.25	60
Paris Ind	61.4	29	40.9	120	-20.5	168	1.54	19	1.84	31	0.30	97

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	Percent Attending College						Dropout Rate, 7th-12th Grades					
	1993	Rank	1997	Rank	1993-97 Change	Rank	1991- 92	Rank	1995- 96	Rank	1991-95 Change	Rank
Pendleton Co	50.5%	75	39.5%	123	-11.0%	154	1.84%	32	3.68%	111	1.84%	156
Perry Co	39.3	132	44.1	108	4.8	49	3.31	109	5.12	155	1.81	155
Pike Co	49.4	80	48.2	89	-1.2	99	3.93	130	3.93	119	0.00	79
Pikeville Ind	84.6	3	81.6	4	-3.0	110	2.85	82	3.14	87	0.29	96
Pineville Ind	64.9	20	52.6	63	-12.3	159	3.07	96	3.28	94	0.21	92
Powell Co	37.4	140	35.9	140	-1.5	100	5.14	153	7.04	171	1.90	158
Providence Ind	22.2	170	32.0	156	9.8	21	0.89	8	3.26	92	2.37	163
Pulaski Co	45.1	101	51.7	70	6.6	36	3.14	100	3.73	113	0.59	105
Raceland Ind	78.7	7	50.0	77	-28.7	172	0.82	7	1.05	15	0.23	95
Robertson Co	25.0	169	18.8	172	-6.2	128	5.52	159	6.63	169	1.11	124
Rockcastle Co	40.2	127	51.5	73	11.3	17	2.45	60	3.77	115	1.32	137
Rowan Co	52.1	64	58.3	37	6.2	38	1.77	30	3.20	89	1.43	144
Russell Co	43.5	110	35.9	139	-7.6	138	1.01	10	4.69	138	3.68	173
Russell Ind	74.5	10	66.1	18	-8.4	143	1.56	20	0.96	13	-0.60	43
Russellville Ind	54.0	52	58.3	38	4.3	52	2.62	65	2.45	60	-0.17	67
Scott Co	53.0	57	34.3	144	-18.7	167	3.04	94	4.73	140	1.69	151
Shelby Co	55.9	44	49.4	83	-6.5	132	3.85	128	4.17	127	0.32	98
Silver Grove Ind	10.0	172	38.9	127	28.9	2	0.00	1	0.00	1	0.00	77
Simpson Co	46.0	94	45.6	99	-0.4	92	2.59	64	3.47	102	0.88	114
Somerset Ind	68.7	16	68.4	15	-0.3	89	6.96	170	3.92	118	-3.04	6
Spencer Co	26.1	168	43.3	115	17.2	8	5.83	165	0.28	4	-5.55	2
Taylor Co	39.7	130	56.9	45	17.2	7	1.87	35	1.98	37	0.11	84
Todd Co	48.4	83	31.0	159	-17.4	165	2.96	92	1.00	14	-1.96	18
Trigg Co	45.7	97	45.4	100	-0.3	90	2.50	61	4.59	137	2.09	159
Trimble Co	37.7	137	38.9	126	1.2	78	3.24	105	4.57	136	1.33	139
Union Co	46.6	93	45.0	102	-1.6	102	2.14	42	1.56	21	-0.58	46
Walton Verona Ind	62.7	25	41.3	119	-21.4	169	0.71	5	0.21	2	-0.50	49
Warren Co	53.7	54	58.0	41	4.3	53	2.40	55	3.67	108	1.27	130
Washington Co	48.2	85	47.4	94	-0.8	96	3.41	112	2.75	72	-0.66	40
Wayne Co	34.8	147	26.8	166	-8.0	141	4.52	150	2.55	61	-1.97	17
Webster Co	40.2	128	27.5	163	-12.7	161	2.70	73	5.90	164	3.20	170
Whitley Co	30.3	161	25.1	170	-5.2	121	10.03	171	4.23	131	-5.80	1
Williamsburg Ind	70.2	15	66.0	19	-4.2	117	2.71	74	2.05	41	-0.66	39
Williamstown Ind	53.1	56	55.6	52	2.5	69	4.20	138	2.19	47	-2.01	16
Wolfe Co	54.8	49	59.7	33	4.9	48	2.87	85	2.81	75	-0.06	75
Woodford Co	57.6	38	63.5	22	5.9	43	2.98	93	4.70	139	1.72	153

Source: National Center of Education Statistics, U.S. Department of Education.

could decrease them the most, this need not happen, and the fact that it has should be considered encouraging.

The relationship between spending on education and educational performance and outcomes is a tenuous one, with many studies finding little or no evidence of the link.⁵ While it is beyond the scope of this study to rigorously and formally analyze the impact of KERA funding on educational performance in Kentucky schools, we did attempt to determine whether the additional spending from 1998-89 to 1994-95 had, without accounting for other factors, any significant impact on changes in planned college enrollment or dropout rates. For college attendance, we found no evidence of any impact of additional spending per student. While we did find there was a negative correlation between the change in dropout rate and change in spending per student, once we controlled for 1991-92 dropout rate, this correlation disappeared. Thus, for these two measures, at least for this short time

period, we have found little evidence of any significant impact of the spending on educational outcomes.

The NAEP results can not be directly used to compare scores in districts in Kentucky because they are derived from a relatively small sample of students who take the test. But the NAEP does report results based on type of location for each state with results given for central cities, urban fringe/large town, and rural/small town. For the results in mathematics, for both the 4th and 8th grades, the scores in rural/small towns were significantly lower than in central cities or the urban fringe/large towns in 1992. While scores did not significantly change between 1992 and 1996 for central cities and the urban fringe/large towns, however, they did change for the rural/small towns. By 1996, there was no significant difference in mathematics scores between the regions. For reading scores in both 1992 and 1994, there were no significant differences between

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regions, nor were there any significant differences between the two years.⁶

Conclusion

The reforms instituted through KERA have dramatically changed the financing of education in Kentucky. Prior to KERA, Kentucky had seen large increases in educational spending and significant state involvement in attempts to equalize spending with spending increases of the order of those in KERA. Perhaps the most dramatic impact of KERA has been its effect on equalizing spending throughout the state. While spending does still vary among districts, this variation no longer bears any relationship to the traditional determinants of educational spending with decentralized educational financing, local income and property wealth. Now districts with low incomes or little property value per student are just as likely to have high educational spending as are wealthy districts.

What is less clear has been how the increased spending from KERA has been spent and how effective this spending has been thus far. Clearly, technology has been a major emphasis on spending. What has not been emphasized has been spending on teachers. Kentucky has increased teacher salaries in real terms and at a faster rate than the national average, and the student-teacher ratio also has fallen. However, the share of current spending allocated to teacher salaries has fallen significantly since the advent of KERA, and Kentucky ranks last in the percentage of its public school staff who are classroom teachers. Given evidence suggesting that teacher quality has significant impacts on student performance, more attention to and funding for improvements in teacher quality might be warranted.

KERA was designed to not only equalize funding but also to equalize educational outcomes. On this score, KERA appears less successful. Kentucky seems to have gained little, if at all, when compared to other states based on test scores or graduation rates. Within Kentucky, while some districts have had significant increases in college attendance by graduates and reductions in dropout rates, there is no evidence suggesting that these gains are related to KERA, or at least not increased funding from KERA.

While the lack of any measurable increase in achievement or performance since KERA might appear discouraging, it should not be surprising. Even if the reforms and spending from KERA will lead to better schooling and performance by students, these changes may take a considerable amount of time. Increased salaries will have only limited impacts on teacher quality if they are received by teachers employed prior to KERA. Only when districts have the opportunity to hire new teachers can we expect to see any benefits from increased spending on teachers. In addition, for some districts the increase in resources has been substantial and now these districts must learn to manage these increased funds. Given that these districts have now had eight years since the initial infusion of KERA funding and the apparent limited spending on teachers, it might now behoove the state to evaluate how this money has been spent.

Endnotes

1. This discussion is adapted from Adams (1993), p. 331.
2. Discussion of fraud in KIRIS testing has even made the front page of the Wall Street Journal (see "Apple Polishing: Kentucky Teachers Get Bonuses, But Some Are Caught Cheating," Wall Street Journal, 9/27/September 27, 1997, p. 1 "Apple Polishing: Kentucky Teachers Get Bonuses, but Some Are Caught Cheating").
3. A more standard measure is the dropout rate. However, only recently have such statistics been compiled for all the states at the National Center for Educational Statistics. For this reason, we use the customary alternative measure of graduation rates that can be compiled from surveys of individuals rather than from information from educational agencies.
4. From information available at the Kentucky Department of Education website, <http://www.kde.state.ky.us>.
5. See Hanushek (1986), *Journal of Economic Literature* 24 (September), pp. 1141-77.
6. These results are from The NAEP 1996 State Assessment in Mathematics: Kentucky and The NAEP 1994 State Assessment in Reading: Kentucky, available at <http://nces.ed.gov/naep/index.html>.

Why Are More Kentuckians Working?

Mark C. Berger and Sharon Kane

Kentucky's female employment increased substantially from 1986 to 1996, from 44.5 percent in 1986 to 52.8 percent in 1996, a larger increase than seen nationwide. At the same time, Kentucky's male employment rate decreased from 68.0 percent to 65.8 percent during this period, while the U.S. rate stayed the same. The most important factor behind the increase in the female employment rate has been the increase in education among Kentucky females from 1986 to 1996, as more education tends to lead to higher employment rates. Also important was the change in industry structure and, to a lesser extent, growth in gross state product and a decrease in average household size. The analysis is less clear for Kentucky males, but nationwide male employment rates have been falling over time.

Introduction

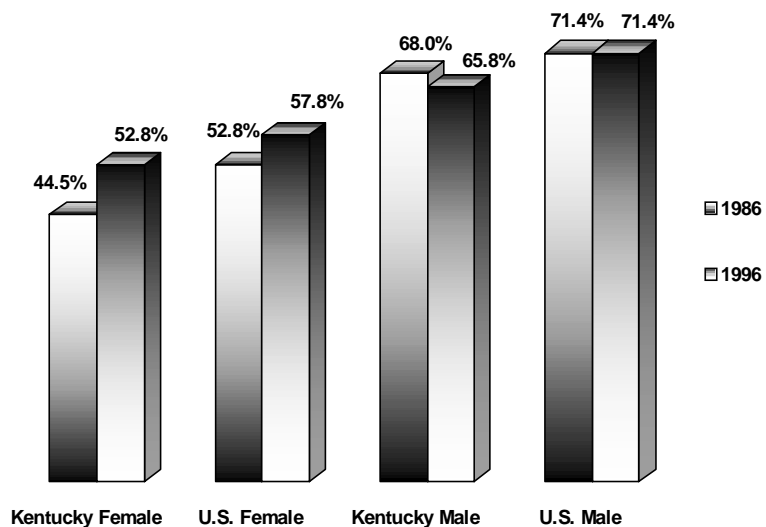
Historically, Kentucky has experienced some of the lowest employment rates in the United States. In 1986, Kentucky's male employment rate ranked 42nd among the 50 states and the District of Columbia, while Kentucky's female employment rate ranked 49th. Since that time, however, Kentucky's female employment rate has experienced a remarkable resurgence. As shown in Figure 1, from 1986 to 1996, Kentucky's female employment rate increased from 44.5 percent to 52.8 percent. At the same time, the average increase in female employment rates across all states was only from 52.8 percent to 57.8 percent. Kentucky's percentage increase in the female employment rate from 1986 to 1996 was the 5th largest across all the states and the District of Columbia.¹ On the other hand, male employment rates in Kentucky fell from 68.0 percent to 65.8 percent, while the average change across all states was nearly zero. The percentage decrease in the Kentucky male employment rate ranked 15th in

the United States. Overall, Kentucky's employment rate increased from 55.6 to 59.0 percent, the 21st largest percentage change. Clearly, the increase in female employment rates has been an important component of the overall increase in Kentucky employment rates over the last ten years.

Greater labor force participation plays a significant role in increasing state per capita income, which is a general measure of a state's economic success. While per capita income has also been

FIGURE 1

Male and Female Employment Rates for Kentucky and the United States, 1986 and 1996



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historically low in Kentucky, it has improved relative to the national average over the last ten years. Governor Paul Patton has made one of his central goals for Kentucky to raise the standard of living of Kentuckians so that per capita income in Kentucky reaches the national average. Berger (1997) finds that lower employment rates in Kentucky relative to the national average are one of the main reasons why Kentucky's per capita income lags behind the national average. Put simply, in states where fewer people are working and earning wages, per capita incomes are lower. Therefore, increasing employment rates may be one of the keys to meeting the challenge of reaching the national average in per capita income. Understanding the forces behind the increases in employment rates during the last ten years will help plan for further increases, which in turn can help assure greater economic prosperity in the state.

Ten years ago in the *Kentucky Annual Economic Report*, Berger (1989) examined the causes behind Kentucky's low employment rates relative to other states in "Why Aren't More Kentuckians Working?" He found that the most important reason why Kentucky's employment rates were below the national average was that Kentuckians had lower levels of education than the rest of the country. Also important, but of smaller magnitude, were differences in industry structure and the level of business activity in Kentucky versus the rest of the country. A similar analysis was performed by Dorsey (1991) for neighboring West Virginia, where employment rates are the lowest in the nation. Instead of education, Dorsey points to the large Appalachian population and to the high rate of federal disability benefits receipt to explain the low employment rates in West Virginia relative to the rest of the country. Examining county-level data in West Virginia and other states, Isserman and Rephann (1993) dispute the existence of a specific "Appalachian effect" on labor force participation.

While these studies are useful in that they examine the reasons for state-to-state variation in employment rates at a point in time, they do not help us to understand the reasons behind changes in employment rates over time. In this paper, we examine changes in male and female employment rates from 1986 to 1996 in Kentucky and other states. We first consider the possible forces behind changes in employment rates over time and then compare

how measures of these forces have changed in Kentucky relative to elsewhere in the country. We then estimate a statistical model explaining changes in female and male employment rates across states. Finally, we use the estimates of this model to determine the quantitative contributions of the various forces behind the observed changes in the proportions of males and females that are working in Kentucky and in the rest of the United States.

Variables Affecting Employment Rates

Many factors affect the state-to-state variation in overall employment rates. Ultimately, the fraction of individuals working in a particular state depends on the interaction of the supply and demand for labor in that state. Increases in demand or supply lead to higher employment rates, while decreases in demand or supply lead to lower employment rates. Some variables are associated with changes in the demand for labor, some are associated with changes in the supply of labor, and some are associated with changes in demand and supply. We discuss some of the variables that may influence the demand and supply of labor below:

Variables Affecting the Supply of Labor:

- **Non-wage Income:** Variation in income from sources other than employment can have an impact on employment rates, since a higher level of non-wage income reduces incentives to work. Therefore, states with higher average amounts of non-wage income, other things being equal, should have lower employment rates.
- **Household Size:** The supply of workers can also be affected by a larger household size, typically meaning more children or greater family responsibilities and thus a lower probability of working, particularly in the case of females. This factor can also work in the opposite direction, since a greater household size can result in a greater need to work. Thus, changes in household size across states have an uncertain effect on employment rates.

Variables Affecting the Demand for Labor:

- **Output:** The economic success of a state as a whole can impact the employment rates by affecting

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employers' demand for workers. In states where aggregate output of goods and services is higher, one would expect a higher demand for labor and, therefore, higher employment rates.

- **Industry Structure:** The industrial mix in the state may also affect employment rates. Some industries have more labor-intensive technology than others, resulting in different demands for labor.

Supply and Demand Factors:

- **Education:** Educational attainment can have an effect on employment rates since those with more schooling are not only more likely to participate in the labor force but also more likely to be in demand by employers. Therefore, states with higher rates of education would have higher rates of employment.
- **Age:** The age distribution of the population can affect the percentage of workers employed. A higher percentage of people over age 65 should lower employment rates since many of these people would be retired. A higher percentage of people that are younger should increase the employment rates. In addition to these labor supply factors, labor demand may also be influenced by the age composition of the labor force.
- **Unionism:** Union coverage of the labor force may affect the demand for workers since firms may hire less workers at a union-negotiated wage above the competitive market wage. On the other hand, higher union-negotiated wages induce a greater supply of workers. At the same time, unions may restrict the supply of workers in union jobs but raise the supply of workers in nonunion jobs. The net effect of all of these forces on the overall employment rate is uncertain.

In addition to these factors, wages also affect the supply and demand for labor. In a standard labor demand and supply model, however, wages and employment are determined simultaneously. We instead focus on the employment relationship as a function of the variables that influence the demand for labor, the supply of labor, or both supply or demand.²

Data

We collected data from the *Statistical Abstract of the United States*, the Regional Economic Information System, and the U.S. Census of Population and Housing to measure each of these factors affecting employment rates. Employment rates are measured as the fraction of the civilian non-institutional population over 16 years of age that is working. Employment rates are calculated separately for males and females. Education is measured using Census data on educational attainment for the population ages 25 and over. Four categories are used: those that did not complete high school, or "dropouts"; high school graduates; those with some college, which includes associate degree recipients; and those with a four-year college degree or higher.

Output in the overall economy is measured by per capita gross state product (GSP), the per person overall value of goods and services produced in the state. Non-wage income is proxied using average Supplemental Security Income (SSI) payments, which are disability payments from the federal government. The impact of age is evaluated by looking at the fraction of the entire state population that is between the ages of 18 and 34, and also the fraction that is over age 65. The effect of unionism is measured by the percentage of workers in the state that are covered by unions. Industry structure is captured using the portion of GSP produced by a particular industry sector. This allows comparisons across states of the fraction of the state's income produced in a particular industry while at the same time holding constant the overall level of GSP.

Kentucky's Ranking Among the States

Table 1 shows the variables included in the model, the average of all the state values, the Kentucky values, and the rankings of Kentucky among the 50 states and the District of Columbia in the 1980s and 1990s. Looking at the changes in Kentucky's state rankings over time may help us to begin to understand the causes behind the changes in Kentucky's female and male employment rates in the last decade.

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TABLE 1

Employment Rates, Demographics, Gross State Product (GSP), and Industry Structure in Kentucky and the United States, 1986 and 1996

	Kentucky 1986	Kentucky 1996	U.S. 1986	U.S. 1996	Ky. 1986 Rank	Ky. 1996 Rank
Males employed (ages 16+)	68.0%	65.8%	71.4%	71.4%	42	48
Females employed (ages 16+)	44.5	52.8	52.8	57.8	49	44
High school dropout	46.9%	35.7%	32.5%	23.8%	1	2
High school graduate	31.3	31.8	35.1	30.9	43	19
Some college	10.7	19.2	16.1	25.3	49	48
Bachelor's degree or higher	11.1	13.6	16.3	20.0	49	49
Per capita gross state product	\$19,760	\$29,670	\$24,420	\$35,350	45	39
Average Supplemental Security Income payments	\$2,001	\$3,933	\$2,103	\$3,954	20	24
Average household size (persons)	2.8	2.6	2.8	2.6	15	31
Ages 18 - 34	29.4%	24.9%	29.5%	24.3%	25	16
Ages 65 and over	12.0	12.6	11.9	12.7	29	27
Covered by a union	18.8%	14.1%	18.9%	15.1%	26	26
Agriculture share of GSP	2.7%	2.2%	2.3%	1.9%	11	12
Mining share of GSP	5.2	3.4	3.2	2.4	10	10
Construction share of GSP	3.9	4.0	4.8	4.1	40	29
Manufacturing share of GSP	27.4	26.9	18.0	17.0	6	7
TCPU share of GSP	8.6	9.6	9.6	9.4	33	20
Wholesale trade share of GSP	5.0	5.5	6.1	6.2	44	40
Retail trade share of GSP	9.3	8.9	9.6	9.1	37	36
FIRE share of GSP	11.8	11.0	16.0	16.9	47	49
Services share of GSP	11.9	14.4	15.5	18.5	45	47
Government share of GSP	13.8	13.7	14.6	14.0	24	21

TCPU = Transportation, Communications, and Public Utilities

FIRE = Finance, Insurance, and Real Estate

Note: 1986 and 1996 employment and age structure data are from the *Statistical Abstract of the United States, 1987 & 1997*. Education data are from the 1980 and 1990 *U.S. Census of Population*. Household size data are for 1980 and 1996 and are from the *Statistical Abstract of the United States, 1984 & 1997*. All other data are from the *Regional Economic Information System, 1969-1996*, U.S. Dept. of Commerce, Economics and Statistics Administration, Bureau of Economic Analysis. Industry shares of GSP and per capita gross state product are for 1986 and 1994.

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Kentucky's educational attainment increased substantially relative to the rest of the country between 1980 and 1990. While Kentucky's dropout rate remained very high (ranked 2nd in 1990), and the proportion of the population with some college or college graduates remained very low (48th and 49th, respectively, in 1990), the fraction of Kentuckians with a high school education improved markedly relative to the rest of the country. In 1980, Kentucky rated 43rd in the fraction of its population with a high school education, and by 1990 Kentucky's ranking had increased to 19th. This increase in educational attainment may be partly responsible for the increase in female employment rates observed in Kentucky.

Output per person rose faster in Kentucky than in the rest of the country, so that Kentucky's GSP per capita ranking improved from 45th to 39th. This increase in output per capita is consistent with an increase in employment rates. Also consistent with an increase in employment rates, especially for females, is the reduction in household size in Kentucky and the drop in ranking among the states

from 15th to 31st. In other words, while household size fell nationally as well, the decrease was larger in Kentucky.

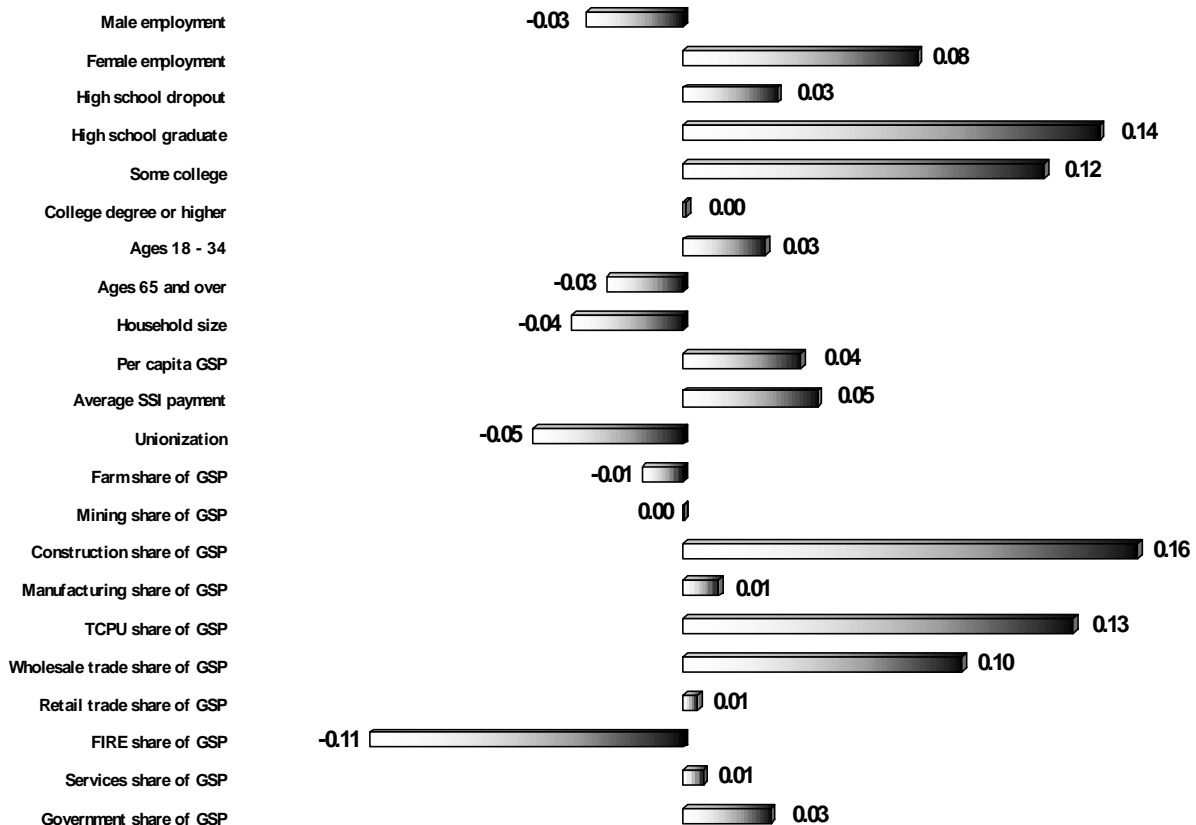
Looking at Table 1, perhaps the other potential cause for the observed changes in Kentucky's employment rates is a change in industry structure. The rankings of Kentucky's share of GSP produced in construction; transportation, communications, and public utilities; wholesale trade; and government increased, while Kentucky's ranking in finance, insurance, and real estate and services decreased. The ranking of the share produced in the other sectors remained constant or nearly so. For example, the ranking of Kentucky's manufacturing sector was high in both the 1980s and the 1990s (6th and 7th, respectively). The net effect of these changes in industry mix on employment rates is not immediately apparent.

Statistical Analysis

We use a statistical model to provide quantitative estimates of the contributions of the

FIGURE 2

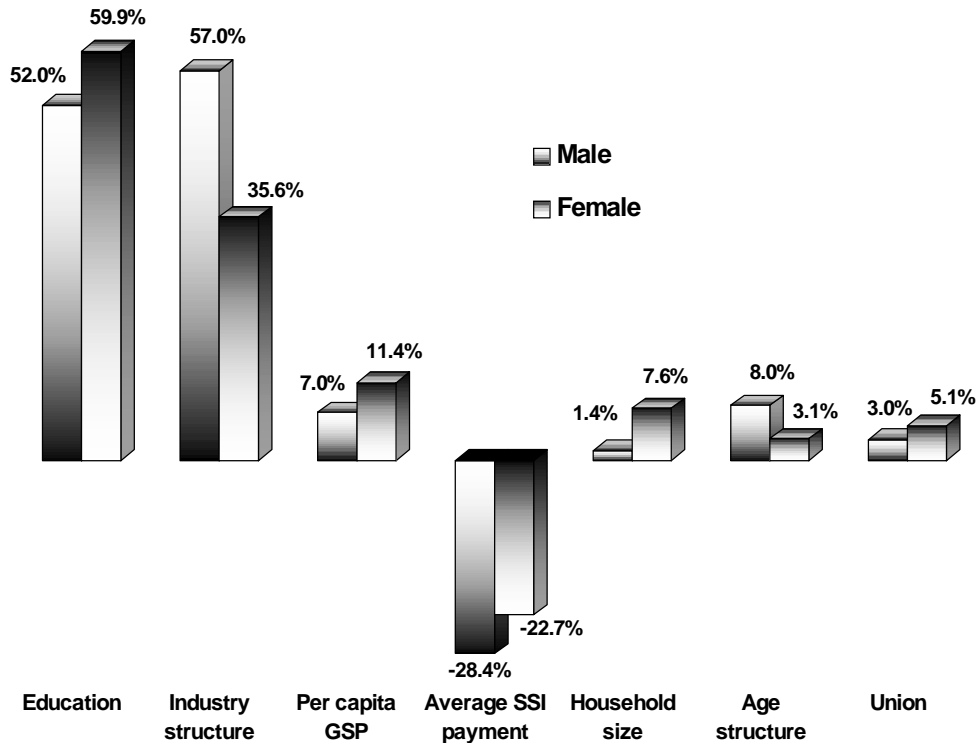
Percentage Changes in Variables Determining Employment Rates in Kentucky versus the United States, 1986 - 1996



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FIGURE 3

Explaining the Predicted Gap in Employment Growth between Kentucky and the United States, 1986 - 1996



various factors to the changes in employment rates observed over time in Kentucky. We use a multiple regression model in which the change in employment rates in each state between 1986 and 1996 is a function of changes in the variables shown in Table 1. Thus, the change in employment rates in each state depends on factors such as the change in educational attainment, state GSP, SSI payments, and industry structure.³ The regression model gives us estimates of the effects of each of the variables in the model, holding constant the effects of all of the other variables. We use these estimates and the observed changes in each of the variables in Kentucky and the rest of the country to calculate the contributions of each of the variables to the change in employment rates in Kentucky relative to the rest of the country.

The first step is to calculate changes in the variables determining employment rates in both Kentucky and in the rest of the country. Figure 2 shows the percentage change in each of the variables in Kentucky minus the U.S. percentage change, as measured by the average of the 50 states and the

District of Columbia. The bars on the right side of Figure 2 represent variables that have changed by a greater amount in Kentucky than in the rest of the country while the bars on the left side show variables for which the change in Kentucky was less than in the rest of the country. This figure shows that there have been relatively large differences in the change in industry structure in Kentucky versus the rest of the country. Figure 2 also clearly shows the increase in educational attainment in Kentucky relative to other

states. Smaller differences in the observed changes in Kentucky versus the rest of the country are observed for age composition, unionization, household size, SSI payments, and per capita GSP.⁴

These differences in percentage changes are multiplied by the estimates of the regression model to obtain the contribution of each variable to the difference in the employment rate change in Kentucky versus the average change in employment rates across all states. In the case of females, employment rates in Kentucky increased faster than in the rest of the country. Figure 3 shows the contributing factors to the faster female employment growth in Kentucky relative to the rest of the country. Consistent with the Berger (1989) study, the most important factor contributing to Kentucky's faster female employment growth was the increase in educational attainment in Kentucky. In other words, as Kentucky women have become more educated, their employment rates have also increased.

Also important has been the change in Kentucky's industry structure over time, and, to a lesser extent, the growth in GSP and the decline in

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household size. On the other hand, the relative increase in average SSI payments in Kentucky pulled down female employment rates. The contributions of age composition and unionization were negligible. Overall, the model accounts for approximately 85 percent of the actual difference in the female employment growth rates in Kentucky and the rest of the country.⁵

The story for males is not as straightforward. The male employment rate in Kentucky decreased more than in the rest of the country. And while the decrease in the male employment rate in Kentucky ranked 15th in the nation, the magnitude of the decrease was small, especially compared to the increase for women. It is fairly difficult for a statistical model to account for such small changes. This is the case for our male regression model. Our model predicts that the male employment rate in Kentucky should have increased by 2.8 percent more than the average of the states, when in fact the Kentucky male employment rate decreased by 3.3 percent more than did the state average rate. As for females, changes in education and industry structure were the major factors pulling up predicted employment rates for men, while changes in average SSI payments worked to pull down employment rates. Other variables in the model made only minor contributions to the predicted difference in the Kentucky and state average male employment rate changes from 1986 to 1996.

Conclusion

Why are more Kentuckians working now than were working ten years ago? The overall employment rate in Kentucky is higher because of the rapid increase in the employment rate of women, which occurred despite a decrease in the employment rate of men. Why are a greater fraction of women working now than ten years ago? Our analysis suggests that the main reason is that the education levels of Kentuckians have increased over the last ten years faster than in the rest of the country. Those with more education are likely to find jobs and thus contribute to overall economic activity. These higher employment rates have the added benefit of helping raise per capita income and narrow the income gap between Kentucky and the rest of the country.

The other important factors contributing to the increasing female employment rate in Kentucky are overall economic growth and the change in the structure of jobs over time. Not only has Kentucky's economy grown faster than the economies in other states, but its structure has changed over time in ways that have helped foster employment growth.

While both education and economic growth worked to raise employment rates of men in Kentucky, the net effect was still a fall in male employment rates. It appears that this decline was due to factors outside our analysis. The decline in Kentucky mirrors long-term downward trends in male employment rates nationwide, especially among older workers. Perhaps our analysis has not adequately captured the forces determining retirement decisions that have led to early labor force withdrawal of males.

What does the future hold? The key to sustaining the increase in employment rates in Kentucky would appear to be to continue to raise education levels of Kentuckians. Also important is for economic growth and restructuring to continue in the state. However, sustaining economic growth and restructuring will be made easier with a more educated population. In the end, we are faced with yet another economic outcome in Kentucky that depends critically on the education levels of the population. Raising employment rates is one of the important ways to continue to close the income gap between Kentucky and the rest of the country. And the most important way to continue raise employment rates is to increase the education levels of Kentuckians.

Endnotes

1. Consistent with this change, Cox (1998) finds that Kentucky's increase in female labor force participation from 1987 to 1995 was larger than in other southern states such as Georgia, North Carolina, and Tennessee.
2. Thus, we analyze what is known as a "reduced form" employment model, in which the determinants of wages have been substituted for the wage variable.
3. The variables are all expressed in natural logarithmic form so the models are specified in terms of log differences. This has the added convenience of converting the model to one of percentage changes over time in each state.
4. Small differences in percentage changes between Kentucky and the other states can nevertheless lead to a large change in Kentucky's ranking among the

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states, as the case of average household size shows.

5. The model predicts that female employment in Kentucky grew by 6.80 percent more than the average of the states, while the actual difference was 8.04 percent.

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Market Responses to Kentucky's Health Insurance Reforms

Michael Clark and Ginny Wilson

Health insurance reforms in Kentucky in 1994, 1996, and 1998 dramatically changed the nature of health insurance in the state. One part of the legislation limited the ability of insurance companies to charge different premiums based upon individual characteristics such as age, gender, and health status. Because all insured persons would then be charged an average premium based upon the average health status of the entire group, those in better health may have opted to drop their insurance because they would be paying a higher premium than otherwise. Legislation passed by the General Assembly again allowed insurance companies to segment their customers by health status but does not allow them to deny coverage to high-risk people.

Introduction

In 1994, the Kentucky General Assembly began a series of three major revisions to the laws governing health insurance in the state. The first revision was designed to provide relief for policyholders facing unaffordable premiums because they were judged by insurance carriers to pose a greater risk of large claims. One feature of the legislation was to limit the ability of insurance companies to charge different premiums based on individuals' characteristics such as age, gender, and health status. Supporters of the measure generally expected that this change would substantially lower premiums for individuals with a high probability of filing large and numerous claims, and somewhat increase the premiums for those with a low probability of filing large and numerous claims. However, subsequent legislative and executive provisions created an opportunity for policyholders to segment themselves by risk, essentially allowing low-risk individuals to avoid the higher premiums which were intended to offset the lower premiums of high-risk people. This article discusses how the health insurance market has reacted to these changes.

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Legislative History of Health Insurance

There are two "pure" types of rating structures that insurance carriers might use to price policies. These are experience rating and community rating. With experience rating, insurance carriers price policies to reflect the expected claims of the policyholder; those with higher expected claims are charged more than those with lower expected claims. With community rating, the expected claims of the entire covered group is estimated and policyholders pay an average premium sufficient to pay total group claims.

The basic distinction between these two pricing structures is whether risks are pooled or segmented. Under an experience-rated pricing system for health insurance, the health risks associated with particular policyholders are segmented. This means that those with similarly low expected claims are placed in one category and charged a low price, reflecting their low level of risk, while those with higher expected claims are placed in another category and charged a higher price, reflecting their similar level of risk. Thus, those with different risks are segmented into defined categories, with differing prices attached to each category, according to the level of risk the category represents. The risk categorization of any policyholder is only valid for the time period covered by a specific contract, usually a contract

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year. At the time the contract is renewed, the risk expectations for each policyholder are re-evaluated, and a policyholder may be assigned to a new category if his or her risk status has changed.

The other pure form of insurance pricing, community rating, is based on risk pooling. Under community rating everyone pays a premium closer to the average for the whole group and those who move into a different risk category do not see a parallel increase in premiums. In pure community rating, risks are pooled across all individuals in the group. Under this insurance pricing scheme, those with lower expected claims, who tend to be younger and male, generally subsidize the premiums of those with higher expected claims, who tend to be older or female. Community rating yields a price that is more stable across subsequent periods for all individual policyholders but which is higher for those who would benefit from risk segmentation. Modifications to pure community rating, such as allowing adjustments for age, gender, or other factors, simply restrict the risk pooling to categories of individuals who share specified demographic characteristics. Even with modifications for some demographic factors, however, community rating remains essentially different from experience rating, in that health status factors are not used to adjust community rates.

Prior to the initial action by the General Assembly in 1994, insurance carriers in Kentucky had no restrictions on their rating structures. Although rate increases for some carriers were subject to approval by the Kentucky Department of Insurance, the criteria used for approval were that the increases be actuarially justified and that they preserve the financial health of the carrier. Insurance carriers did not have to issue policies to those with high expected claims, waiting periods and pre-existing condition exclusions were set as desired, and most premiums were set through experience rating.

These conditions led to a situation in which some policyholders with high expected claims were being denied coverage or were being priced out of their policies. A rate filing from the Department of Insurance showed that from 1980 to 1993, rates increased by 1,600 percent for one group of policyholders. The increase in the medical care Consumer Price Index (a medical care inflation rate) for the same period was 105 percent. Employers

and individual purchasers of insurance were complaining about large price increases, and those with employer-provided policies were afraid to change jobs for fear that long waiting periods or pre-existing condition exclusions would leave them exposed to both financial and medical catastrophe.

1994 Legislation

In response to these conditions, the 1994 Kentucky General Assembly enacted House Bill 250 (HB 250). HB 250 made many changes in Kentucky's health care market, but the ones pertinent to this discussion were those relating to insurance carriers' underwriting rules and rating structures. Kentuckians who purchased insurance in the small-group and individual markets were the prime targets of changes in these rules because they were believed to be the most negatively affected by experience rating and denial of coverage. Individuals purchasing health insurance in large groups were more insulated from the particular impact their own claims might have on the average costs for the whole group.

HB 250 required guaranteed issue and guaranteed renewal. Guaranteed issue and guaranteed renewal mean that carriers must provide a policy to all applicants willing to pay the premium. In the absence of these requirements, health insurance carriers could refuse to issue or renew policies to those policyholders believed to represent an unacceptable risk of large claims. HB 250 also mandated a modified community rating structure for policies sold to small groups, individuals, and participants in the Kentucky Health Purchasing Alliance. In setting rates for these policyholders, carriers could consider age, geography, family composition (single, couple, parent plus children, family), richness of benefits, and cost-containment restrictions on choice. Age adjustments were allowed only to the extent that the oldest policyholder in the group could be charged no more than three times the amount charged the youngest, and geographic adjustments were limited to a total of 15 percent. Neither gender nor claims experience could be considered in setting rates.

The provisions of HB 250 became effective in July 1995. Around that time, insurance carriers began to withdraw from the Kentucky market. Prior

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to 1994, only health maintenance organization (HMO) products and individual indemnity products had to be reviewed by the Department of Insurance. Therefore, there is no information on the total number of carriers operating in the state at that time. Following the enactment of HB 250, however, 28 carriers notified the Department of their decision to withdraw from Kentucky.

In the period between the enactment of HB 250 (July 1994) and SB 343 (July 1996), three Executive Orders were issued extending coverage issued prior to July 15, 1995, to individuals, small groups, large groups, and trade associations. This extension, which was granted through July 15, 1996, was given, in part, to allow carriers to maintain existing policies until legislative changes anticipated in the 1996 Regular Legislative Session could be evaluated. These extensions were given for individuals, small groups, and small associations at the option of the insured and with no ability for carriers to increase rates. The Executive Order issued for large groups and large associations permitted rate increases, however. The Executive Orders did not prohibit a carrier from terminating all business and withdrawing from the health insurance market. Rather, carriers wishing to remain in the market were required to continue renewing the pre-reform policies.

1996 Legislation

As the General Assembly convened in Regular Session in January 1996, withdrawal of insurance carriers from the Kentucky market was forcing many policyholders to find new coverage. Legislative committees heard evidence that some remaining carriers were conducting mass mailings to policyholders warning of restricted choice and higher premiums. Policyholders who believed they had been harmed by the changes were vocal in expressing their displeasure. In response, the 1996 General Assembly passed Senate Bill 343 (SB 343), which allowed gender to be used as an adjustment factor for community rates. Consideration of past or expected future claims experience was still not allowed. Another change in the reforms was that SB 343 exempted certain trade associations from rating restrictions, allowing the associations to provide health insurance that varied by customers'

characteristics, including health status.

Another Executive Order was issued on June 5, 1997, again permitting coverage under pre-reform policies to be extended, at the option of the insured. Carriers were permitted, however, to file rate increases on that business. In the interim period following the enactment of SB 343 and the Special Legislative Session on Health Insurance in October 1997, an additional 23 carriers withdrew from the insurance market in Kentucky.

No changes were enacted in the Special Legislative Session on health care called by Governor Paul Patton in October 1997. Although it was anticipated that amendments to SB 343 would be made by the 1998 General Assembly, the Patton administration did not issue an additional Executive Order to extend coverage under pre-reform health benefit plans through the end of the Regular Session. Rather, an Executive Order was issued prohibiting the renewal of pre-reform health benefit plans after December 1, 1997. During the time that the freeze was in place, premiums for these policies did not increase. This extension was made to allow carriers time to complete any necessary internal administrative and filing issues with the Department of Insurance. Following the end of the Special Legislative Session, six more carriers notified the Department of their withdrawal from the state insurance market.

1998 Legislation

Thus, between 1994 and the end of 1997, a total of 57 carriers ceased selling policies in Kentucky. Many of those that remained reported major losses. In the individual market, only Anthem and Kentucky Kare, the plan created to be a self-insured plan for state government employees, continued to offer policies.

To address the loss of carriers to the market, the 1998 General Assembly passed HB 315. This legislation essentially returned the market to experience rating, with a few exceptions. HB 315 stipulated that, for any demographic characteristics except health status, the highest rate charged can be no more than five times the lowest rate. For individuals with the same demographic characteristics, those with higher expected claims because of a health condition can be charged an

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additional 135 percent of the index rate (the median rate for the covered group for that carrier). HB 315 also designated a list of health conditions, such as juvenile diabetes and leukemia, as high-cost conditions. Because people diagnosed with these high-cost conditions were likely to have higher claims, insurance companies were permitted to charge people with these conditions that did not have prior coverage up to 150 percent of the index rate. For those without one of the high-cost conditions listed, these rules essentially returned the market to the rate spread that existed in 1994, where the highest non-high-risk premium can be 11 times greater than the lowest premium. Those who would have been denied coverage prior to 1994 could purchase coverage at these rates. Once issued, all policies are guaranteed renewable.

Premiums Under Risk Segmenting and Risk Pooling

In the course of completing the analysis requested by the Department of Insurance and the General Assembly, the authors had access to approximately 1.5 million records covering the claims incurred by participants in Kentucky Kare from June 1995 to August 1997. The data included:

- birthdate and gender of the claimant
- date the claim was incurred
- amount Kentucky Kare paid for the claim

Although the file included data for claims processed from June 1995 to August 1997, there was often a lag of several months between when a claim was incurred and when it was processed. Therefore, the decision was to analyze primarily claims incurred in

calendar year 1996. Kentucky Kare paid approximately \$117 million for 590,000 claims incurred in 1996. The average payment per claim was \$199, while the maximum payment was \$190,000. The median payment per claim was \$44. Although Kentucky Kare is not representative of all insured people in Kentucky, these data do provide a useful illustration of the relationship between gender, age, and claims.¹ This relationship provides the basis for risk segmentation in an experience-rated market.

Table 1 shows the breakdown of total claims paid in Kentucky Kare by age and gender. It is apparent that women between the ages of 21 and 60 accounted for a much larger share of total payments than did men of the same ages. The average cost of claims was not substantially different between males and females, except that the average claim for the oldest males was more than double that for females of the same age. The gender difference in total payments is accounted for by the fact that, for ages 21 to 60, women had twice as many claims as men.

To further investigate these differences, we made specific comparisons by gender for those ages 21 and 64. Table 2 shows the covered lives in each age and gender category, along with the total claims paid for that category and the claims paid per covered life. The data indicate that claims paid per covered life for young women were 2.3 times those for young men. This gender ratio declines as age

TABLE 1
Kentucky Kare 1996 Total and Average Annual Claims Paid By Age and Gender

Age	Females			Males		
	Number Paid	Total Claims	Average Claim	Number Paid	Total Claims	Average Claim
0 - 10	2,620	\$2,207,556	\$843	2,740	\$3,132,020	\$1,143
11 - 20	3,785	3,251,673	859	3,757	3,317,518	883
21 - 30	3,169	4,924,887	1,554	1,430	1,576,999	1,103
31 - 40	4,777	9,104,510	1,906	1,948	3,362,796	1,726
41 - 50	8,268	19,655,735	2,377	3,947	9,510,861	2,410
51 - 60	6,349	19,428,310	3,060	3,552	13,762,906	3,875
61 - 70	3,013	12,145,785	4,031	1,888	9,380,535	4,969
70 - 97	234	888,573	3,797	170	1,285,904	7,564
Total	32,215	\$71,607,029	\$2,223	19,432	\$45,329,539	\$2,333

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TABLE 2

Kentucky Kare Claims Incurred in 1996, Gender and Age Ratios

Age	Females			Males			Female-to-Male Gender Ratio
	Covered Lives	Total Claims	Claims per Covered Life	Covered Lives	Total Claims	Claims per Covered Life	
21 - 30	4,065	\$4,924,887	\$1,212	3,004	\$1,576,999	\$525	2.3
31 - 40	6,210	9,104,510	1,466	3,628	3,362,796	927	1.6
41 - 50	10,412	19,655,735	1,888	6,376	9,510,861	1,492	1.3
51 - 60	7,710	19,428,310	2,520	5,094	13,762,906	2,702	0.9
61 - 64	2,497	7,840,572	3,140	1,667	5,863,697	3,518	0.9
Total	30,894	\$60,954,014	\$1,973	19,769	\$34,077,259	\$1,724	1.1
Age Ratio (61-64/21-30)			2.6			6.7	

Source: Kentucky Legislative Research Commission staff analysis of data supplied by Humana, Inc., the claims administrator for Kentucky Kare, and by PlanSource, former data administrator for the Kentucky Health Purchasing Alliance.

increases, until it is nearly equal for those above age 50.

A comparison within genders for the effect of age shows a large difference as well. For women, the claims paid per covered life for those ages 61 – 64 were 2.6 times that of women ages 21 – 30. For men, the oldest category had claims per covered life 6.7 times that of the youngest category.

These data show how the differences in average costs are related to gender and age. These relationships generally hold for sufficiently large numbers of customers, and insurance companies have been able to use the relationships to vary premiums by demographic characteristics. On average, young males are less expensive to cover, so their premiums are relatively low. If insurance companies can also determine the health status of an individual through medical histories or testing, they can use that information to alter premiums further.

Effects of Community Rating on Premiums

Under pure community rating, risk segmenting is not permitted and all insured persons would pay the same rate. For example, Kentucky Kare would have needed to charge an annual premium of

approximately \$1,600 per covered life to equal their total claims in 1996. This would have created a situation where those with low expected health care costs would have subsidized those with high expected health care costs. Alternatively, under modified community rating, Kentucky Kare might have segmented their customers by gender and age. When doing so, young males would be charged relatively low premiums while older males would be charged higher premiums. The subsidization under modified community rating is less than with pure community rating. Within each risk group, however, healthier persons would still be subsidizing less healthy people. Finally, under experience rating Kentucky Kare could have further segmented young males by health status, eliminating the subsidy across health status.

As discussed, the market for health insurance was an experience-rated market prior to the reforms of 1996. With the passage of HB 250 and SB 343, however, insurance carriers were restricted in how they could segment risk, redistributing the cost of health care across demographic groups in the individual and small group markets.

Based on rate filings from the period, an actuary retained by the Department of Insurance estimated that, in 1994, individual health insurance rates for young women were 150 percent of those for young men, rates for older men were 450 percent of those

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TABLE 3

Simulated Premiums by Age, Gender, and Health Status

Section 1: 1994 Rating Structure

Age Spread: 4.5 to 1, Gender Spread: 1.5 to 1, Health Status Spread: 2.5 to 1

Age	1.0 (Best)	1.3	1.6	1.9	2.2	2.5 (Worst)
Males						
20 - 29	\$68	\$88	\$109	\$129	\$150	\$170
30 - 39	85	111	137	162	188	214
40 - 49	122	159	195	232	269	305
50 - 59	194	252	310	368	426	484
60 - 64	307	399	491	584	676	768
Females						
20 - 29	\$97	\$126	\$155	\$184	\$213	\$242
30 - 39	98	127	156	185	215	244
40 - 49	132	171	211	250	290	329
50 - 59	190	247	304	361	418	475
60 - 64	276	359	442	525	608	691

Section 2: HB 250 Rating Structure

Age Spread: 3 to 1, Gender Spread: 1 to 1, Health Status Spread: 1 to 1

Age	1.0 (Best)	1.3	1.6	1.9	2.2	2.5 (Worst)
Males						
20 - 29	\$122	\$122	\$122	\$122	\$122	\$122
30 - 39	138	138	138	138	138	138
40 - 49	179	179	179	179	179	179
50 - 59	257	257	256	256	256	256
60 - 64	377	377	377	377	377	377
Females						
20 - 29	\$122	\$122	\$122	\$122	\$122	\$122
30 - 39	137	137	137	137	137	137
40 - 49	182	182	182	182	182	182
50 - 59	258	258	258	258	258	258
60 - 64	377	377	377	377	377	377

Section 3: SB 343 Rating Structure on Individual

Age Spread: 4 to 1, Gender Spread: 1.5 to 1, Health Status Spread: 1 to 1

Age	1.0 (Best)	1.3	1.6	1.9	2.2	2.5 (Worst)
Males						
20 - 29	\$101	\$101	\$101	\$101	\$101	\$101
30 - 39	123	123	123	123	123	123
40 - 49	171	171	171	171	171	171
50 - 59	264	264	264	264	264	264
60 - 64	409	409	409	409	409	409
Females						
20 - 29	\$144	\$144	\$144	\$144	\$144	\$144
30 - 39	141	141	141	141	141	141
40 - 49	184	184	184	184	184	184
50 - 59	258	258	258	258	258	258
60 - 64	368	368	368	368	368	368

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for young men, and rates for those with the highest expected claims (and who were still allowed to purchase a policy) were 250 percent of those with the lowest expected claims. This meant that, for those allowed to purchase a policy, the highest rates could be 11 times more than the lowest rates. Given a rate of \$68 per month for the youngest, healthiest males and the rating spread above, rates for a comparable policy for others can be calculated, holding all other factors constant. These rates are shown in Section 1 of Table 3. These rates did not reflect coverage for those with very high expected claims, who were denied coverage.

Starting with the actuarial assumptions, and using the age, gender, and health status distributions of those in the Kentucky individual insurance market, the Legislative Research Commission made simulations of the effect of changes in pricing rules on the distribution of rates under HB 250 and SB 343.² The effect of the demographic factors on the distribution of rates among policyholders under the various pricing schemes is quite clear. Under experience rating, young, healthy males faced a relatively lower premium, while those who were female, older, or had poorer health status faced higher premiums. The effect of changes in the rules of issue and pricing enacted in HB 250 on this distribution of rates is shown in Section 2 of Table 3. Compared to experience rating, the new rules would have required those who were younger and healthier to subsidize the purchase of insurance by those who were older and less healthy. Also, young men would have subsidized the purchase of insurance by young women.

One point to be made is that, all else held constant (a major assumption), the changes contained in HB 250 only addressed the problems of those who could not afford health insurance because of high premiums. Those unable to purchase insurance because of low incomes would not have been helped. To the extent that the young are more likely to be healthy but have low incomes, they would have been less likely to be able to afford health insurance under these rules. SB 343 somewhat softened these effects by allowing greater consideration of age and by allowing gender differences in pricing (Table 3, Section 3). Since health status could not be considered, however, those with good health continued to subsidize those with poor health, and those with low incomes might

still be priced out of the market.

HB 315 largely eliminated the subsidization of premiums for those with large expected claims costs. Only to the extent that claims of those with medical conditions not defined as high-cost exceed 135 percent of the median for those of the same age and gender, and those with high-cost conditions exceed 150 percent of the median for those of the same age and gender, will there be cross-subsidization by those with lower expected claims. The provisions established in HB 315 essentially returned the distribution of rates to that existing in the unregulated market of 1994, except that those with high cost conditions now have a price ceiling.

Expected Claims and Adverse Selection

As shown in the previous section, moving from an experience-rated market to a modified community-rated market redistributes the cost of health care by making premiums for all people the same, regardless of their health risk. This makes health insurance more affordable for the high-risk individuals but also raises the premiums for low-risk individuals. Because low-risk individuals are paying the higher premiums that reflect the risk of the community, they have an incentive to separate themselves from the high-risk individuals. This is an example of "adverse selection," which can have substantial impacts on the market for health insurance.

The classic prediction of adverse selection is that the healthiest individuals will separate themselves from the rest of the market by dropping their health insurance. Those remaining in the market will be generally in poorer health than those who dropped out. Therefore, premiums must increase to reflect that expected average costs per person would be higher. This increase would then force more people out of the market and raise premiums even higher. Eventually, this cycle of rising premiums would eliminate the insurance market.

This was not likely to be the result in Kentucky, however. The combination of legislative changes and the executive order freezing pre-reform insurance policies gave low-risk individuals options for separating themselves from high-risk individuals without having to drop coverage. Although HB 250

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established modified community rating (MCR), the executive order freezing policies in effect prior to the implementation of HB 250 allowed people to keep policies priced under experience rating. For the healthy, the pre-reform policies were likely less expensive than policies rated under MCR, providing them with an incentive to keep their old policies. Unhealthy individuals, however, could potentially receive lower premiums under MCR.

In addition, SB 343 exempted associations from the MCR restrictions, allowing them to set premiums based on health status. Individuals purchasing health insurance through an association could be charged a lower premium if they were healthy, or a higher premium if they were unhealthy, than they would pay if they purchased a non-association policy. Under this pricing structure, people who are healthier than average had an incentive to seek out the lower premiums charged by the associations, while those who are in poorer health would prefer to be insured under MCR. Both the freeze of pre-reform policies and the exemption of associations from MCR provided an avenue for the healthiest individuals to pay lower rates than they would under MCR.

Theory suggests that those in poorer health, therefore, would have been more likely to obtain health insurance under MCR and those in better health would have been more likely to be covered under a pre-reform plan or an association plan. Since the premium charged under MCR reflects the average risk of those insured under MCR, the healthiest individuals would always be able to find a cheaper premium through an association. Eventually only those in very poor health would continue to purchase coverage under MCR. The premiums they would be charged would reflect their high risk.

To determine whether adverse selection did occur in the individual market, we estimated the effect that health status had on whether an individual was covered under a modified community-rated policy (reform policy) or under an experienced-rated policy (pre-reform or association policy) using data from the 1997 Kentucky Health Insurance Survey. This survey interviewed Kentucky households about various aspects of their health insurance. To simplify the analysis, only single coverage policies were considered. Although those purchasing family plans

face the same situation, it is difficult to analyze insurance decisions of families because of the interaction of family members with different characteristics. Analysis was also restricted to adults under age 65, because Medicare should provide coverage for those 65 and over. There were 155 individuals under 65 with private single coverage. Of those, 85 were covered under a pre-reform or association plan. That is, they either kept coverage that was in effect prior to HB 250 or they purchased coverage through an association. Table 4 summarizes the data.

Whether an individual purchases an MCR policy or an experienced-rated policy depends on a number of factors. As discussed, the difference in premium is a key determinant when deciding the type of policy to purchase. Under reform policies in Kentucky, premiums were based on gender, age, and geographic location. In addition to these factors, health status could be considered in the pricing of pre-reform and association policies. For the reasons noted above, poor health status is predicted to increase the probability that an individual would

TABLE 4

Characteristics of Respondents with Single Individually Purchased Health Insurance

Plan Type		
Experienced rated (pre-reform)		55%
Modified community rated (reform)		45%
Gender		
Male		35%
Female		65%
Health Status		
Excellent		36%
Very good		32%
Good		23%
Fair		7%
Poor		3%
Age	Mean=46	s.d.=13.8
Sample Size		155

Source: 1997 Kentucky Health Insurance Survey

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have purchased a reform policy. Respondents were asked if their health in general was excellent, very good, good, fair, or poor. Those with fair or poor health were defined as being “unhealthy.” It is uncertain whether age would have had an effect on price differences, because under both community rating and experience rating, age could be used as a rating factor. However, MCR restricted carriers’ use of age so that the premium they charged the oldest person could only be three times greater than the premium they charged the youngest person. If this restriction was a binding constraint, then younger individuals might have been able to find lower premiums through experience-rated policies. The effect of gender on premium difference is uncertain. While HB 250 prevented rating based on gender, SB 343 lifted the restriction.

In addition, because of the complexity of setting premiums under reforms, some people may not have accurately understood how the different rating mechanisms affect them. Therefore, people who are better informed are expected to make better decisions. Those who are in poor health and better informed are more likely to purchase coverage under MCR. Those who are in good health and better informed are more likely to be covered under an experience-rated policy. Although it was not possible to determine each respondent’s level of understanding of health reforms, their highest level of education was used as a substitute measure for this understanding.

Analysis of the data showed that health status did have a statistically significant effect on the probability that a person was covered by a reform policy. The probability that those with excellent, very good, or good health status would be covered through an experience-rated policy was 59 percent. The probability for those with only fair or poor health was 26 percent. This suggests that adverse selection did exist in the Kentucky market for individual health insurance. The large difference can be partially explained by the fact that people who were previously priced out of the market because of health conditions were able to purchase health insurance at lower prices after reforms. This probably resulted in a surge of unhealthy people purchasing reform plans. Even without an increase of unhealthy people entering the market, there was still evidence of adverse selection. Analysis of only those who had coverage prior to reforms yielded

similar results. Healthy people were more likely to be covered under pre-reform or association plans.

The results also show that older insured persons were more likely to purchase experience-rated coverage. This finding was somewhat unexpected, because reforms limited the rating spread on age. This limit should have increased the subsidy to older individuals. It may be that older people were more likely to have health insurance prior to the reforms and may have been less willing to change their coverage. Even though they might have found lower premiums by switching plans, they may have been reluctant to drop the coverage they had for some time for a new policy. Males were no more likely to be covered by an experience-rated policy than females. This result is not surprising because SB 343 allowed gender rating for all policies, which should have reduced any cross-gender subsidy that may have existed under HB 250. Although it was expected that education would improve a person’s choice, it did not have a significant effect.

It should be noted that the estimates above reflect a point in time when healthy individuals had two avenues for avoiding MCR policies: pre-reform plans and association plans. Eventually, however, the freeze on pre-reform plans ended. After December 1, 1997, all pre-reform plans were supposed to be converted, upon their renewal, to comply with current law. This provision removed one of the ways healthy people were able to avoid MCR plans and may have slowed the effects of adverse selection.

The presence of adverse selection in the Kentucky market could have had major effects on the outcome of health insurance reforms. Adverse selection provides an incentive for the healthiest individuals insured under MCR to seek cheaper coverage through an association, where they are not subsidizing less healthy people. As these people leave the community, those remaining have a higher expected cost per person, and premiums under MCR must rise to reflect these higher costs. As premiums rise, more people will find it beneficial to obtain coverage through associations, further reducing the subsidy to the unhealthy individuals remaining in the community pool. The end result of adverse selection is the Kentucky market’s reverting back to a pure experience-rated market. The market was not allowed to move to this end, however, because

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passage of HB 315 eliminated most of the restrictions on risk segmenting.

Conclusion

Adverse selection occurred in the Kentucky insurance market as a market response to price changes. As health insurance premiums for low-risk insured persons increased under modified community rating, these people looked for alternatives to paying the higher rates. One alternative is for people to drop their coverage and self-insure. The exemption of associations from the restrictions against risk-segmenting and the executive order permitting pre-reform policies to be renewed, however, allowed low-risk people to avoid the higher premiums associated with MCR and still maintain insurance coverage. Low-risk people are therefore always better off with a pre-reform or association policy. Eventually this situation would have returned the market to pure experience rating.

The legislative changes made in HB 315 largely reduced the potential for adverse selection but did not completely eliminate it. Under HB 315 carriers can once again segment their customers according to health status. But carriers cannot deny coverage to high-risk people, and the premium they charge them is capped. Therefore, the subsidy across health status is reduced but not eliminated. Even though there is a subsidy across health status, it is much more difficult for low-risk people to avoid the subsidy. Because pre-reform policies can no longer be renewed and associations have the same rating restrictions as the rest of the market, low-risk people can only avoid the subsidy by dropping coverage, making it much less likely that adverse selection will occur.

Endnotes

1. Because Kentucky Kare provides an indemnity policy, it likely attracts relatively more high-risk people.
2. Age, gender, and health status distributions of those in the individual market were estimated from the 1997 Health Insurance Survey described below.

Medicaid Managed Care and the Tennessee Health Care Industry: Potential Implications for Kentucky

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The 1998 Kentucky General Assembly passed legislation creating a managed care program for Kentucky Medicaid recipients. In 1994, Tennessee introduced a managed care program for its Medicaid recipients called TennCare. The Tennessee program expanded to cover thousands of additional patients without a concurrent increase in medical expenditures. This overall increase in cost may cause some counties to lose health care providers and facilities. TennCare appeared to cause a modest reduction in the number of health care facilities in Tennessee counties located on the border of the state. The analysis shows that about 1 in 34 border counties would have one fewer establishment in each health care industry after TennCare, with losses more likely to occur in counties with smaller populations. As Kentucky moves to a similar managed care system, it seems that the effect of such a program on the number of health care establishments is likely to be small.

Introduction

In the 1998 General Assembly, the Commonwealth of Kentucky moved to establish a managed care program for its Medicaid recipients. Earlier, in 1995, the Commonwealth received approval from the Health Care Financing Administration (HCFA) to establish eight regional Health Care Partnerships to provide Kentucky's Medicaid recipients with health care. These changes will have an effect on the provision of health care in Kentucky. To examine what effect these changes may have, it is instructive to examine the experiences of the neighboring state of Tennessee, which introduced a managed care program for Tennessee Medicaid recipients in 1994 known as TennCare. This comparison is particularly informative because Tennessee and Kentucky both have large numbers of rural Medicaid recipients.

This article examines the impact of the TennCare reform on the provision of health care services in Tennessee. In particular, it addresses the issue of whether the introduction of the TennCare inflicted financial harm on some Tennessee health care providers, and reduced the access of Tennessee resident's to health care services in their home county. This is done by measuring how TennCare

affected the number of establishments providing health care services in Tennessee Counties, and whether some counties lost all of their providers of certain kinds of health care services.

Tennessee's TennCare Program

In January 1994, Tennessee began moving almost 900,000 Medicaid patients from a traditional fee-for-service plan to a managed care plan dubbed TennCare. In the process of moving to the new program, Tennessee moved aggressively to control costs. Using 12 separate medical care organizations (MCO), Tennessee sought to control costs by offering a fixed payment to a MCO for each Medicaid recipient enrolled in the MCO's health plan. To achieve the cost savings, the MCOs in return negotiated discounted prices with hospital, doctors, and other health care providers.

At the same time, Tennessee expanded their Medicaid program to cover over 400,000 additional people. This prompted the *New York Times* to report that "With the possible exception of Hawaii, Tennessee's population has the highest rate of insurance coverage in the country, which has changed hundreds of thousands of lives for the better." Further, because of its aggressive cost containment, the *New York Times* reports, Tennessee accomplished this increase in coverage "with roughly the same money as its [previous] Medicaid program would have cost."¹

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According to the medical community in Tennessee, the increase in the patient load, combined with little to no growth in real expenditures, caused severe strains on the Tennessee medical system. For instance, Warren McPherson, Vice President of the Tennessee Medical Association claimed that TennCare's policies were so coercive that the doctors have become "state employees."² Officials at the Erlanger Medical Center estimated that the hospital gets 56 cents for each dollar of care it provides to TennCare patients, with losses of \$27 million in 1998 alone.³

The strain is presumably felt throughout the system. For instance, in 1993, the final year of Tennessee's old system, Medicaid payments for pharmacy expenditures were approximately \$240,079,482 for 908,943 recipients. In 1996, TennCare pharmacy expenditures were approximately \$300,000,000 for an estimated 1,408,918 recipients.⁴

Impact on Health Care Providers

Movement of a state's Medicaid program away from a fee-for-service approach towards managed care could be expected to have a substantial impact on the state's health care industry and on the number of providers in the industry. As will be seen, however, although the change may appear dramatic, it is by no means clear what it will do to the number of firms in the health care industry. What will prove important is the level of government fee-per-service payments before the change compared to the implicit fee-per-service offered by the HMOs after the change, which (assuming competition among HMOs) will be determined by the fees paid to them by the government.

Before the change, the goods and services were provided at a fixed cost, both set and paid by the government. The recipient of the goods and services only bore one cost: the time cost involved (driving to the health care provider, waiting in line, etc.). The health care providers faced two types of costs: the fixed costs involved with setting up their businesses (i.e., rent), and variable costs associated with the number of patients that they served (i.e., cost of medical supplies, employee costs).

It is quite possible that the prices set by the government were higher than the variable costs faced

by the industry. For example, the price set by the government to fill a given prescription could be higher than the cost of filling it to a pharmacy, regardless of the number of prescriptions filled. This does not imply that the industry will make large profits, however. Because other businesses could enter the health care field relatively easily, any economic profits made would result in new firms entering the market. This competition would continue until all economic profits have been absorbed by the fixed costs associated with entering the industry. In practice, this will mean that the higher the price offered by the government for goods and services, the higher the number of firms in the industry. These firms will compete with one another by minimizing the time costs to the customers. If the price offered to fill prescriptions were high, one might anticipate seeing a large number of pharmacies, each serving relatively few customers. Areas with small populations may well have their own pharmacy.

The change in the regulatory environment would seem to change the incentives faced by the industry dramatically. Now the firms must negotiate prices to win the customers of the various HMOs. This gives the firms a strong incentive to minimize costs; the firm with the lowest total cost for a given level of services will be able to make a lower bid for the provision of the goods and services to the HMO, and could be expected to win the business.

Of great importance to the result of this process is the degree of competition within the insurance industry. Consider the case where the customers have to belong to a given HMO (there is no competition at all). The HMO would then have no incentive to minimize the time costs faced by the consumers. The firm that could offer the lowest combination of fixed and variable costs to provide the level of service required would win the contract. This would, most likely, result in very high time costs to the consumer and very few firms in the industry.

If there is competition among HMOs, however, the time costs of the consumer must be considered. The HMO that demanded a recipient go to a pharmacy with very long lines would ultimately be driven out of business by the HMO that was more consumer-friendly and did not make such demands. If there were free entry in the insurance industry, the result of this process would be insurance companies competing for customers on the one

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margin on which they can compete: service. Again, this will result in the number of firms in the industry being determined by the amount of money per customer paid by the government to the HMOs, and, importantly, the price per service implied by this. If the price is high, the insurance companies will compete away economic profits by providing good service (presumably resulting in a large number of firms). If the number is low, the opposite will take place.

The end result of this is somewhat surprising. Whether the government provides fee-for-service insurance or pays HMOs to provide insurance does not necessarily influence the number of health care providers. What matters is the effective price per service that the government offers. For example, in Tennessee, the change in regulatory environment saw a significant increase in the number of people covered but only a small increase in the total spending on insurance by the government.

Assuming competition among HMOs, there are two possible explanations for this. The first is that the government has effectively cut the amount of money per service that it is offering. That is, the new people covered are getting the same level of service as the people previously covered, and the people previously covered are getting the same amount, but the payment per service has declined. This would be expected to result in a decline in the number of health care providers, and a higher time cost borne by the customer. A second possibility is that the price per service has remained the same, but the HMOs have effectively cut the level of service that the people covered by the insurance are getting. In this case, one would expect to see no change in the number of health care providers. If there is no competition among HMOs, the above analysis would not hold, and one would expect to see customer service effectively ignored, resulting in a sharp drop in the number of health care providers.

To see which of the above explanations is true, ideally we would look at the effective fee per service before and after the change. Given the difficulty in finding such data, we will attempt to measure the impact the change had on the number of firms in the health care industry. A negative impact tells us one of two things. Either there is limited competition in the insurance industry, or the effective fee per service offered to the health care industry has

declined, and the level of service it offers its customers has declined in step.

One factor ignored up to now is the composition of the goods and services provided by the health care industry. HMOs will have an incentive to see that a given level of service or good is provided at the lowest possible cost (for example, substituting generic medication for the name-brand equivalent). It is not clear that anyone would have this incentive under the previous regulatory system. Therefore, it is quite possible that the composition of firms in the industry will change under the new system, regardless of the raw numbers. One would expect to see more low-cost providers of given services.

Impact of Managed Care on the Tennessee Health Care Industry

This analysis will focus on the number of establishments in the pharmacy and health care industries both in Tennessee counties and in counties located in other states bordering Tennessee. Statistical comparisons will be made among counties that are located on either side of the border between Tennessee and the bordering states of Kentucky, Virginia, Mississippi, North Carolina, Georgia, Alabama, Arkansas, and Missouri. Such comparisons between border counties provide an excellent environment to test the effect of state government policies.

The economies of counties on either side of the border often are very similar in economic structure. Some pairs of counties are in the same metropolitan area or rural economic region. They often have similar natural resources, topology, and demography, and they also share the same location advantages or disadvantages within their region of the United States. In fact, one of the primary differences between border counties is that each is located in a different state, and thus, subject to different state policies regarding regulation, taxes, and social insurance. As a consequence, border counties can provide an excellent forum to test the effects of state policies. The divergence in economic activity between border counties after a policy is introduced in a state can be measured to estimate the economic effect of the policy. Such a divergence will be measured in the case of

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TABLE 1

Change in Number of Health Care Establishments in Counties After the Introduction of TennCare

Health Care Industry	Average Establishment Loss or Gain per County	Share of Counties Losing or Gaining an Establishment
Average Industry	-0.030**	1 of 33 Losing
Pharmacies	-0.025	1 of 40 Losing
Doctors Offices	-0.022	1 of 45 Losing
Dentists Offices	-0.042	1 of 24 Losing
Nursing and Personal Care Facilities	-0.126**	1 of 8 Losing
Hospitals	-0.025	1 of 40 Losing
Medical Laboratories	0.009	1 of 111 Gaining
Dental Laboratories	0.025	1 of 40 Gaining
Home Health Care Facilities	0.109	1 of 9 Gaining
Miscellaneous Health Care	-0.249***	1 of 4 Losing

- * Significant at 15% level.
- ** Significant at 10% level.
- *** Significant at 5% level.

Tennessee border counties after the introduction of TennCare in January 1, 1994. Border counties in Tennessee and border counties in adjacent states were defined to include all counties touching the border between Tennessee and the other state, and all counties one county away from that border.

For these border counties, data were gathered on the number of establishments in each year from 1986 to 1995 for nine industries. These industries were pharmacies, physicians' offices, dentists' offices, nursing and personal care facilities, hospitals, medical laboratories, dental laboratories, home health care services, and health and allied services. The source for the establishment data for these industries was the U.S. Department of Commerce publication *County Business Patterns*.⁵ Data also were gathered on population, per capita income, and per capita food stamp receipts in each of the border counties from 1986 to 1995. These data were designed to reflect other factors that would influence the demand for health care services in border counties besides state policies such as TennCare. The source for these data was the U.S. Department of Commerce publication *Regional Economic Information System 1969-1995*.⁶

Statistical tests were conducted to see if the introduction of TennCare on January 1, 1994, was

related to a decline in the number of establishments in the health care industries in Tennessee border counties in 1994 and 1995. This test was conducted for all industries together and for each of the specific industries separately. In addition to examining whether the introduction of TennCare caused counties to lose any establishments, there was also a statistical test to examine whether TennCare caused counties to lose particular types of health care services entirely. For example, we examined if TennCare caused a county to lose *all* of its doctors' offices or its only hospital.

Table 1 shows the results of the statistical analysis. The first finding was that the introduction of TennCare was related to a modest reduction in the number of health care establishments in Tennessee border counties. The introduction of TennCare caused the average border county to have 0.03 fewer establishments in each health care industry in the following years. Put another way, 1 out of 34 border counties would have one fewer establishment in each health care industry due to TennCare. Reductions were more likely in counties with a smaller population.

The impact of TennCare on individual kinds of establishments was more mixed. The introduction of TennCare was found to leave 1 of 4 Tennessee

**Medicaid Managed Care and the Tennessee Health Care Industry:
Potential Implications for Kentucky**

TABLE 2

Change in Probability that a Tennessee County Will Lose All Health Care Establishment in an Industry after the Introduction of TennCare

Health Care Industry	Change in Probability of County's Losing
Nursing and Personal Care Facilities	7.1%
Hospitals	14.1
Medical Laboratories	-11.9
Dental Laboratories	-3.3
Home Health Care Facilities	-22.0 **
Miscellaneous Health Care	15.1 ***

- * Significant at 15% level.
- ** Significant at 10% level.
- *** Significant at 5% level.

counties with one fewer miscellaneous health care establishment, a category that includes kidney dialysis centers and drug and alcohol treatment centers, among others. We also found that 1 of 8 Tennessee counties had one fewer nursing home or personal care facility. These changes most likely occurred in personal care homes, which primarily aid individuals recovering from serious illness, since TennCare did not affect elderly individuals covered by Medicare. TennCare had no statistically significant impact on the number of pharmacies, doctors' and dentists' offices, hospitals, home health care businesses, or medical or dental laboratories in Tennessee border counties.

For some counties, TennCare also tended to lead to the loss of all health care establishments in particular industries. As Table 2 indicates, the introduction of TennCare meant a 15.1 percent increase in the probability that an individual county would lose all of its establishments in the miscellaneous health care industry. On the other hand, the introduction of TennCare decreased the probability that a county would lose all its home health care establishments by 22.0 percent. Statistical tests indicated that TennCare had no statistically significant impact on the likelihood that a county could lose all its nursing home and personal care facilities, hospitals, and medical and dental laboratories.⁷

Implications for Kentucky

Results overall indicated that the introduction of TennCare was related to a modest reduction in the number of health care facilities in Tennessee, although losses were more likely in counties with a smaller population. TennCare also appeared to favor establishments in the low-cost home health care industry, while at the same time hurting specialty facilities such as personal care homes and drug and alcohol treatment centers. This is all consistent with the idea that TennCare has tended to lower the per person costs of health care in Tennessee by pushing the industry towards lower cost basic procedures and away from specialized facilities.

The reforms in Tennessee substantially increased the number of insured recipients without significantly increasing the expenditures of the system. In response to this increased patient burden, many health care providers in Tennessee have complained that the financial pressures from the reforms have threatened their existence. In this paper, we examine how the introduction of the TennCare affected the health care industry in Tennessee. Our findings should be instructive for demonstrating how a movement towards managed care of Medicaid patients may affect health care providers in Kentucky.

Medicaid Managed Care and the Tennessee Health Care Industry: Potential Implications for Kentucky

Contrary to some of the more alarming claims, we find evidence of only a modest impact of the TennCare on the health care industry. Among hospitals, pharmacies, doctor's offices and dentist's offices, we find only small, statistically insignificant evidence of reductions in the number of establishments. We find larger and statistically significant reductions in the number of nursing homes and personal care facilities, but we see a nearly identical growth in the number of home care facilities. In general, impacts were greater in smaller counties than in larger counties.

In our view, the lesson that Kentucky can draw from TennCare experience is simple. Kentucky reforms are likely to have a negligible impact on the Kentucky health care industry. This is particularly true if Kentucky reforms are less aggressive in cost cutting than Tennessee reforms, which appears likely given that the Kentucky reforms will not significantly expand the number of recipients while holding expenditures virtually unchanged.

Endnotes

1. *New York Times* (145:50,201) Sunday October 1, 1995, page 1.
2. Stuart Schear, "A Medicaid Miracle?" *National Journal*, February 4, 1995, pages 294-98.
3. *Chattanooga Times*, Saturday, February 28, 1998.
4. We thank Billy Moates of TennCare for providing the expenditure data.
5. U. S. Department of Commerce, Bureau of Census, *County Business Patterns 1986-1995*. Available on CD ROMs released through 1998.
6. U. S. Department of Commerce, Bureau of Census, *Regional Economic Information System 1969-1995*. Available on CD ROM, 1997 (June).
7. Nearly all counties had at least one pharmacy, doctor's office, or dentist's office during the 1986 to 1995 period. With very few counties changing status from having an establishment to not having an establishment in these industries, or *vice versa*, it was not appropriate to attempt a statistical analysis.

Computer and Internet Usage at Businesses in Kentucky

Steven N. Allen

Virtually all businesses in Kentucky use computers in some way. Many businesses are also beginning to use the Internet as a communications medium and sales and marketing platform for their goods and services. Results of a recent survey of large Kentucky businesses show that almost 70 percent of businesses use the Internet for electronic mail and information searches while smaller numbers use it for marketing and promotion of products and online commerce. Kentucky businesses also indicated that they place a good deal of importance on the computer skills of prospective employees, even though many firms still provide computer and Internet training to their employees. Finally, most businesses using the Internet consider it a productive tool for their business.

Introduction

The use of computers in the workplace has been a common sight for many years. Businesses have been using large mainframe computers for decades and since the personal computer revolution of the 1980s, more and more businesses are putting computers at the reach of their employees. In general, businesses believe that computers will make their workers more productive – eliminating repetitive tasks, shortening times to do complex calculations, and facilitating communication and collaboration among workers, just to name a few. With computer technology advancing and prices for this technology falling, the prevalence of computers in the workplace will only continue to grow.

In the 1990s, an extension of computers has again revolutionized the workplace. The explosive use of the Internet has opened new avenues for businesses to communicate and even market and sell their products. Now many businesses can reach millions of potential consumers through the use of Internet technologies such as electronic mail and web sites. As more people in the United States bring computers into their homes, the potential for businesses to reach potential customers through the Internet will only continue to expand. The rapid growth and predicted future gains in the use of commerce conducted over the Internet is an obvious sign of the significance of this technology to the entire business community.

This article summarizes results of a survey of Kentucky businesses on computer and Internet usage at their businesses. The first section provides an overview of computer and Internet usage at businesses in the United States and briefly describes results of other studies that have documented the use of this technology in Kentucky. The next section provides an overview of the survey and data used for this study. I then present the results of the survey for all businesses and for selected subsets of our survey sample. The final section provides some concluding remarks.

Overview for Kentucky and the United States

Since the introduction of the personal computer in the early 1980s, the number of people using computers has steadily increased. Furthermore, computer use in the workplace has been strong from the inception of computers. Businesses could realize the benefits of computers perhaps more readily than could home users, and have embraced in greater numbers. Few businesses today do not have at least a simple desktop computer in their workplace, and new and improved uses for computer technology are being introduced that promise to bring increased opportunities to businesses who use them.

Only in the past few years has the use of the Internet changed the way business is conducted in

Computer and Internet Usage at Businesses in Kentucky

the U.S. Not only can workers communicate with other workers and access large amounts of information on the Internet, but perhaps more significantly, businesses can use the Internet to reach millions of potential customers. Commerce conducted on the Internet has rapidly expanded in the latter half of the 1990s and will continue to see extremely high growth in the next few years. One source quotes the value of the online commerce market in 1997 at \$9 billion and estimates it will grow to \$26 billion by 2000, representing a 38 percent annual rate of growth.

Few solid numbers exist on computer and Internet usage in Kentucky. A recent study by the Kentucky Long-Term Policy Research Center examined computer and Internet usage in the Commonwealth as well as asked residents about what types of technology they would like to see in the future. The study found that about 65 percent of Kentuckians use or have access to a computer at home, work, or elsewhere, compared to about 50 percent of people nationwide who use a computer. Furthermore, the survey found that about 20 percent of Kentuckians had used the Internet within the last 12 months, compared to about 19 percent of residents nationwide.¹

A poll conducted in 1997 also found that a large number of Kentuckians had experience with computers. The 1997 Kentucky Poll, a statewide survey of Kentucky residents conducted by the University of Kentucky Survey Research Center, asked respondents if they used computers and whether they used them at home, work, or school. About 44 percent of people participating in the survey said they used a computer at work while about 43 percent said they used a computer at work.

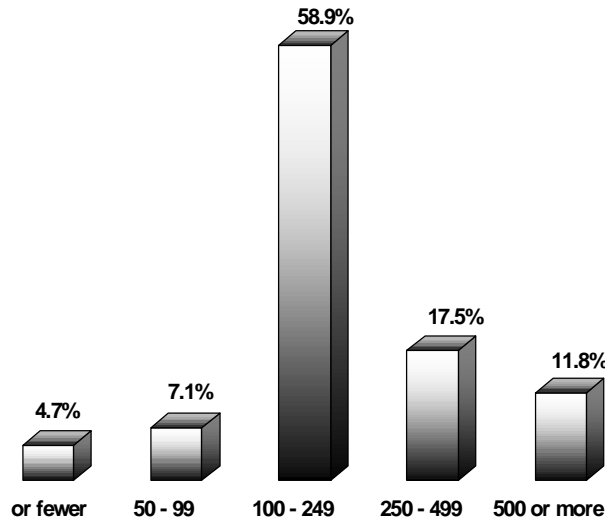
Relatively no information exists on the use of computers at businesses in Kentucky. The following discussion shows the results of a survey of Kentucky businesses in an attempt to understand the prevalence and use of computers at these businesses.

Description of Survey Data

The data used in this article come from a mail survey of businesses in Kentucky conducted by the University of Kentucky Center for Business and Economic Research in May and June of 1998. A total of 1,906 businesses throughout Kentucky were surveyed, and we received 367 responses. After

FIGURE 1

Size of Businesses in Survey by Number of Employees



subtracting surveys that were undeliverable, we achieved a return rate of approximately 20 percent. We asked these businesses a series of questions on computer and Internet usage, in addition to asking them to indicate general business conditions and expectations for their business. Their responses to these questions about business conditions are reported in a separate Center for Business and Economic Research publication.²

One important feature of the survey is that it consists primarily of large businesses with 100 employees or more. Surveying these types of businesses will cover a significant share of the total economy in Kentucky. About 45 percent of all employees in Kentucky work in businesses of these sizes. Figure 1 shows the distribution of businesses in the sample listed by number of employees. As shown, only about 12 percent of businesses respondents had fewer than 100 employees.

Because we surveyed primarily large businesses, some industries will be represented more than others. Larger businesses tend to be concentrated in industries such as manufacturing and services, and Table 1 shows that the respondents in this survey come mainly from those two industries. About 36 percent of the businesses are in the manufacturing industry while about 35 percent of businesses are in the service industry.

Computer and Internet Usage at Businesses in Kentucky

TABLE 1

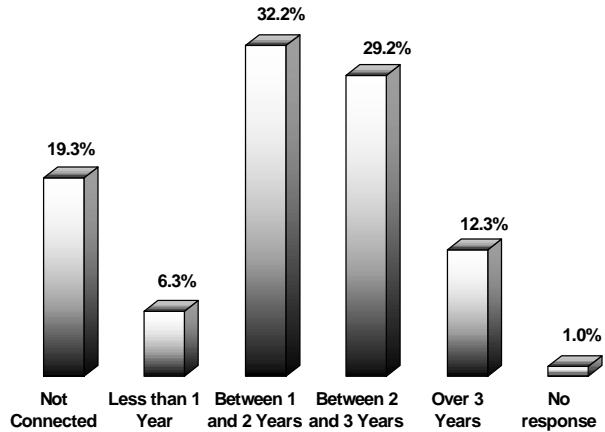
Percentage of Industries in Survey Sample

Agriculture	1.4%
Mining	2.5
Construction	3.0
Manufacturing	36.2
TCPU	5.7
Wholesale trade	1.9
Retail trade	7.6
FIRE	5.5
Services	35.2
No Response	1.1

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

FIGURE 2

Number of Years Business Has Been Connected to the Internet



Computer and Internet Usage at Kentucky Businesses

We first asked businesses in the survey simply to respond if their business used computers at all. Perhaps a little surprisingly, 364 businesses said that they used computers while three businesses did not respond to the question. This means that 100 percent of responding businesses use computers. Clearly, uses for computer technology, combined with the gradual decrease in the real price of computers, has made computers both useful and affordable to virtually all types of businesses.

That most businesses use computers should not be surprising. But the growing importance of the Internet in recent years provides a different way in which to gauge how businesses are using computers. About 80 percent of responding businesses said they were connected to the Internet. We also asked these businesses how long they had been connected to the Internet, and their responses are shown in Figure 2. As depicted, most businesses connected to the Internet have some experience using it. Only about six percent have been connected for less than a year, while about 32 percent of have been connected to the Internet for between one and two years and another 30 percent for between two and three years.

What are the Uses of the Internet?

Perhaps much more important than simply being connected to the Internet is how businesses use the Internet as a resource. Maintaining an Internet connection and upgrading computer hardware and software can be a costly undertaking if those resources are not being put to use. We asked businesses to indicate what uses they made of the Internet and/or their business's Web site on the Internet. Table 2 lists their responses for all firms in the sample, manufacturing firms only, service firms only, and for businesses who had been connected to the Internet for a year or less or for over one year.

As we can see from this table, electronic mail and information/data searches are the two uses most commonly cited by businesses. About 70 percent of all businesses said that they used the Internet for both of these purposes. A smaller percentage, about 43 percent, said they used the Internet or web site for marketing and promotion of their products and services, while a small number of businesses, about 12 percent said they conducted online commerce over the Internet.

These figures change substantially when we look at differences among the type of business and by how long they have been connected to the Internet. Manufacturing firms appear to use all of the different applications more than do service firms. Notably, only about 8 percent of service firms said that they conduct online commerce or sales through

Computer and Internet Usage at Businesses in Kentucky

TABLE 2

Uses of the Internet and/or Business Web Site

	All Firms	Manuf. Firms	Service Firms	On Internet 1 Year or Less	On Internet Over 1 Year
E-mail	68.4%	78.5%	58.9%	53.2%	89.4%
Marketing/promotion of products and services	43.1	47.7	32.6	32.0	58.1
Online commerce/sales	12.3	13.1	7.8	8.4	17.5
Information/data searches	69.2	73.1	67.4	58.1	85.0
Advertised business on Internet (besides on own web site)	10.6	11.3	10.1	9.8	11.7
Total Firms	367	133	129	133	160

Note: Firms could check more than one response.

the Internet. Even more striking is the difference between firms with a longer history on the Internet. Those businesses who have been connected to the Internet for over one year were much more likely to use all the applications of the Internet listed. Almost 90 percent of these businesses use e-mail, 85 percent perform information/data searches, 60 percent market and promote their products, and 18 percent conduct online commerce or sales.

In contrast, businesses who have been connected to the Internet for a year or less were much less likely to use the applications listed. Only 53 percent of these types of businesses use electronic mail, 32 percent market or promote their products on the Internet, 8 percent conduct online sales or commerce, and 58 percent use the Internet for information or data searches. These figures show that those businesses who have been connected to the Internet for a longer period can perhaps realize more benefits by using the Internet for more applications.

Use of the Internet for online commerce or sales promises to be one of the most promising areas for future growth in the use of computer technology at businesses. Although it is somewhat difficult to obtain accurate figures, estimates on the total value of the U.S. electronic commerce market ranged anywhere from \$5 billion to about \$10 billion dollars in 1997 and 1998. Projections for the future call for the electronic commerce to grow exponentially in size, with an expected value of \$26 billion by 2000.³ Moreover, a vast number of retail areas are ideally

suited for commerce on the Internet. Many types of consumer goods have already enjoyed substantial growth in online sales, including clothing, computers, books, music, and the like.

The above figures show a limited number of Kentucky businesses who use the Internet for online sales and commerce, or only about 12 percent of all businesses in the survey. Moreover, survey results also show that of those Kentucky businesses who do use the Internet for online sales or commerce only have about 2.5 percent of their total sales from the Internet. Businesses with online sales and who have been connected to the Internet for over a year still only saw about 2.8 percent of their total sales come from the Internet. These figures show that online commerce is still a small fraction of total sales activity for Kentucky businesses. But given the robust projections for the future, Kentucky businesses may have substantial room in which to start or expand their online commerce operations.

Importance of Computer Skills and Training

In the current tight labor markets, employers are placing an increasing emphasis on highly skilled workers. Workers with advanced technical and computer skills are finding very attractive job opportunities as countless companies make the transition to computer and other technology. We

Computer and Internet Usage at Businesses in Kentucky

asked Kentucky businesses to indicate how important computer skills are when they hire new employees. Table 3 shows the results of this question and demonstrates that Kentucky businesses indeed place a good deal of importance in new employees' computer skills. About 34 percent of businesses said that computer skills are "very important" when hiring new employees while another 31 percent said they were "somewhat important." About 27 percent said these skills were "good to have, but not necessary" while only 8 percent of all businesses said computer skills were "not important at all." These numbers generally hold up for both manufacturing and service firms, with service firms placing somewhat of a greater emphasis on computer skills. Moreover, about 38 percent of Kentucky businesses who have been using the Internet for over a year said computer skills were very important when hiring, compared to only about 28 percent of Kentucky businesses on the Internet one year or less.

Further evidence of the importance of computer skills is evident in the survey. Even though many businesses said they want new employees to have some computer skills when they are hired, about 81 percent of businesses said that they provide additional training to their employees on computer skills and Internet use. Even about 90 percent of firms who said computer skills were "very important" when hiring provide additional computer and Internet training to employees. Slightly more businesses (84 percent) who have been using the Internet for over a year provide additional training compared to businesses on the Internet for a year or less (78 percent).

Another important issue concerning training of workers is how that training is provided. Whereas a great deal of job training occurs in the workplace, many firms have begun to use outside training facilities to provide computer-related training. In fact, the number of businesses providing computer-related training has increased a great deal in the past few years and is one of the factors behind the rapid growth in the business services industry sector. Indeed, when asked how they provide computer training to their employees, about 57 percent of Kentucky businesses said they sent their employees to outside training facilities for computer instruction while 28 percent said they also use outside computer training that is conducted on-site. But about 84 percent of businesses still use in-house personnel to provide computer, showing the continuing importance of on-the-job training conducted by these businesses. Table 4 shows that these percentages generally remain the same when we look at manufacturing and service businesses and at businesses who have been on the Internet for a year or less or for over a year.

Obviously, businesses in Kentucky and elsewhere will only use computers if they make their business more productive than they had been before using computers. Several studies have documented the increase in the use of computers at businesses and have also shown that workers that use computers at work tend to be more highly paid than workers who do not use computers at work.⁴ Still, some businesses may question how much computers and the Internet actually increase measures such as sales or productivity given the

TABLE 3

Importance of Computer Skills When Hiring New Employees

	All Firms	Manuf. Firms	Service Firms	On Internet 1 Year or Less	On Internet Over 1 Year
Very important	32.6%	30.2%	32.0%	28.2%	38.0%
Good to have, but not necessary	27.8	22.2	33.6	32.3	22.1
Somewhat important	31.4	38.1	28.8	28.7	34.8
Not important at all	8.2	9.5	5.6	10.8	5.1
	100.0%	100.0%	100.0%	100.0%	100.0%

Computer and Internet Usage at Businesses in Kentucky

TABLE 4

Training on Computer Skills at Businesses

	All Firms	Manuf. Firms	Service Firms	On Internet 1 Year or Less	On Internet Over 1 Year
Provide training to employees on computer and Internet use	80.9%	79.0%	82.2%	77.9%	84.7%
<i>How training is provided</i>					
Use in-house personnel for training	84.2%	83.8%	84.9%	83.0%	85.5%
Send employees to outside training facilities	56.9	59.1	52.8	54.7	59.4
Use outside training that is done in-house	28.3	25.7	25.4	26.4	30.4

additional maintenance and upgrade costs and the potential for employees to use computers and the Internet for activities unrelated to work.

To see how businesses viewed the Internet in regard to performance, we asked them whether they considered the Internet a productive tool for their business. The results are shown in Table 5. Approximately 70 percent of all businesses in the survey said that they considered the Internet a productive tool for their business, compared to about 22 percent who did not consider it a productive tool, and another 8 percent who did not respond to the question. These numbers generally hold up when we look at different types of businesses, with about 74 percent of manufacturing firms and 67 percent of service firms calling the Internet productive for their business.

As with other questions, more noticeable differences emerge when we break down responses based upon experience with the Internet. Table 5 also shows the responses for those businesses who said they maintain their own Internet web site. About 85 percent of these businesses said that the Internet was a productive tool for their business, with only about 14 percent saying it was not. When we look at businesses who also conduct online commerce or sales, about 93 percent of them find the Internet a productive tool for their business. Finally, those businesses who have been using the Internet for a longer period of time were more likely to find it a useful tool for their business. Only about 60 percent of businesses who had been using the Internet for one year or less said it was productive for their business, compared to about 83

TABLE 5

Is the Internet a Productive Tool for Your Business?

	All Firms	Manuf. Firms	Service Firms	Has Web Site	Conducts Online Commerce	Using Internet 1 Year or Less	Using Internet Over 1 Year
Yes	70.3%	73.7%	67.4%	85.0%	93.3%	59.8%	83.4%
No	22.1%	19.6%	25.6%	13.6%	4.4%	28.4	14.1%
No Response	7.6%	6.8%	7.0%	1.5%	2.2%	11.8%	2.5%
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Note: Columns may not sum to 100% due to rounding.

Computer and Internet Usage at Businesses in Kentucky

percent of businesses who had been using the Internet for over one year.

Clearly, Kentucky businesses who have been using the Internet for a longer period of time and who use it for more specialized purposes such as online commerce find it a more productive tool. Perhaps businesses with less experience using the Internet may be less able to reap its full benefits from the beginning because of the often substantial startup and training costs required. But results here show that businesses in Kentucky who have maintained their use of the Internet will likely find it a productive tool for their business.

Conclusion

Most businesses in Kentucky are using computers and the Internet in the workplace. Results of a statewide survey show that all businesses who responded use computers in one way or another at their workplace. Furthermore, a large number of Kentucky businesses have embraced the Internet and its promise of greater communication and widespread distribution of information.

What will the future hold for computers and the Internet at Kentucky businesses? Most certainly, the number of businesses using computer and Internet technology will continue to increase, and these businesses will find new and more advanced uses for this technology. Survey results show that the most widespread uses of the Internet now are for electronic mail and for searches of data and information, which are those requiring lesser amounts of training and investment by businesses. But as computer use expands and the Internet matures into a crucial resource of the business community, more and more businesses will begin to use it for more advanced purposes, such as electronic commerce and marketing and promotion of their products. These avenues of future growth hold perhaps the most promise for businesses using computer technology and the Internet.

Of course, implementing and maintaining all of this high technology will require an ever increasing supply of skilled workers in virtually all types of businesses. Our survey has shown that employers place a great importance on employees with computer skills, and as more businesses adopt

Internet technologies and services, these skills will be of even greater importance. The importance of a workforce skilled in these areas cannot be understated for the future. And if Kentucky businesses are to achieve new levels through the use of computers and Internet technology, then they must be able to find and employ such highly skilled workers.

Endnotes

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3. Source: BancAmerica Corp., Robertson, Stephens, and Co. estimates and UBS Securities LLC study, "A Growth Story: Internet-Based Electronic Commerce, PKI, and Smart Cards."
4. Alan B. Kreuger, "How Computers Have Changed the Wage Structure: Evidence from Microdata, 1984 - 1989," *Quarterly Journal of Economics* (February 1993): 33-60.

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