2011

Kentucky Annual Economic Report 2011

Kenneth R. Troske
University of Kentucky, ktroske@uky.edu

Devanathan Sudharshan
University of Kentucky, devanathan.sudharshan@uky.edu

Michael T. Childress
University of Kentucky, michael.childress@uky.edu

KENTUCKY

Annual Economic Report

2011

Center for Business and Economic Research
Gatton College of Business and Economics
University of Kentucky

UK UNIVERSITY OF KENTUCKY

GATTON COLLEGE OF BUSINESS AND ECONOMICS

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Department of Economics

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Dr. Kenneth R. Troske, *Director*
Center for Business and
Economic Research
Dr. Kenneth R. Troske, *Chair*
Department of Economics
Dr. Devanathan Sudharshan, *Dean*
Gatton College of
Business and Economics

Michael T. Childress, *Managing Editor*

Center for Business and Economic Research

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James Saunoris
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Staff Associate:
Jeannie Graves

Department of Economics University of Kentucky

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.

Center for Business and Economic Research
335 BA Gatton Business and Economics Building
University of Kentucky
Lexington, KY 40506-0034

Voice: (859) 257-7675
Fax: (859) 257-7671
E-mail: cber@uky.edu
Web: http://cber.uky.edu

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From the Director . . .

This report is one of the important ways that the Center fulfills its mandated mission as specified in the Kentucky Revised Statutes (KRS 164.738) to examine various aspects of the Kentucky economy. These articles cover a variety of issues that range from an economic forecast for Kentucky in 2011 to a detailed examination of poverty in our state to a look at how narrowing the academic achievement gap could elevate Kentucky's national education rank and improve our economic future. While each is empirically based and grounded in the "here and now," a common theme tying these articles together is their forward-looking perspectives.

Dr. Chris Jepsen, the CBER Associate Director, and I authored an article looking at the national and state economies over the recent period and provide forecasts for 2011. We expect 2011 economic growth—both nationally and locally—to be slightly better than 2010 economic growth, but our predicted growth levels are still too low for a significant reduction in the unemployment rate mainly because of continuing problems in the housing sector.

Looking at some of the implications of the Great Recession, Dr. Richard Fording, Professor of Political Science and Associate Director for the Center for Poverty Research at the University of Kentucky, examines U.S. Census Bureau data and finds that Kentucky's poverty rate has increased faster than nearly every other state in recent years. His analysis suggests that focusing on the poorest regions of Kentucky and devoting resources to improving the health and education of low-income children and adults will be essential for addressing the state's poverty rate.

Similarly, Michael Childress, an analyst with CBER, analyzes Kentucky's performance on the National Assessment of Educational Progress (NAEP), considers where Kentucky could rank in 2020 based on current trends and alternative scenarios, and summarizes the work of Karin Chenoweth, a senior writer with The Education Trust, on effective strategies used by schools across the country to help students overcome the barriers of poverty.

Clearly, educational advancements will be crucial for elevating Kentucky's future prosperity, a key finding in previous studies done at the Center. Along these lines, Dr. Heidi Hiemstra with the Council on Postsecondary Education, Dr. Tim Shaughnessy with the Kentucky Community and Technical College System, and Dr. Amy Watts with the Foundation for a Healthy Kentucky (and previously with the Kentucky Long-Term Policy Research Center), consider the impact of dual enrollment programs, which enable high school students to take college-level classes, on the state's overall goal to increase the number of degree holders and income.

Education, however, is not the only factor that will affect Kentucky's economic future. The health of our citizens has far-reaching consequences for the academic performance of our students, the productivity of our workers, and the solvency of government budgets. Increasingly, research is revealing the interplay between oral and overall health. Michael Childress and Michal Smith-Mello, formerly with the Kentucky Long-Term Policy Research Center, examine data on the oral health of Kentucky adults. They find that trends in Kentucky's oral health are improving, but we still trail neighboring states and the U.S. averages.

Debra Miller, the Director of Health Policy at the Council of State Governments, authored a chapter on the Affordable Care Act of 2010 and its implications for Kentucky. The Act is designed to extend health insurance to an estimated 32 million of the nation's 51 million uninsured citizens. However, recent court challenges to the law create considerable uncertainty about the future of the legislation and its impact on Kentucky's estimated 626,000 uninsured citizens. Whether the goals of reducing costs and improving access will be achieved, of course, is an ongoing public policy issue that our nation will likely face for a number of years.

Finally, Michael Childress analyzes Kentucky's digital divide—specifically looking at the social, economic, and demographic factors associated with having broadband access in the home. This is a cross-cutting technology that affects whether one has ready access to online education and training, health information, and employment opportunities. He concludes his article by offering broad approaches for bridging the divide.

We have worked on a number of important projects at the Center recently, including an examination of Kentucky's educational outcomes and an analysis of how to increase our state's per capita income. In the coming year we anticipate completing several new projects that will address some of the important public policy issues facing Kentucky.

Authors

Michael T. Childress

Michael T. Childress works in the University of Kentucky, College of Communications and Information Studies and the Center for Business and Economic Research, Gatton College of Business and Economics. From 1993 to 2010 he served as the executive director of the Kentucky Long-Term Policy Research Center, a state government agency created by the Kentucky General Assembly in 1992 to bring a future-oriented perspective to decision making in the Commonwealth. From 1988 to 1993, he was an analyst at the RAND Corporation in Santa Monica, California. Mr. Childress received his B.A. from the University of Kentucky with honors and as a member of Phi Beta Kappa in 1984, and an M.A. from the University of California, Los Angeles, in 1986—both in political science.

Dr. Richard C. Fording

Richard C. Fording is Professor of Political Science at the University of Kentucky. He earned his B.A. at the University of Florida (1986), and his Ph.D. from Florida State University (1998). His primary teaching and research interests include public policy, race and politics, state politics, social movements, and quantitative methodology. He is the author or co-author of articles appearing in a variety of journals, including *American Political Science Review*, *American Sociological Review*, *American Journal of Political Science* and *Journal of Politics*. He has a joint appointment in the Martin School of Public Policy and Administration and is currently serving as Associate Director for the Center for Poverty Research, University of Kentucky.

Dr. Heidi Hiemstra

Heidi Hiemstra, Ph.D., is Assistant Vice President for Policy Research and Planning at the Council for Postsecondary Education, Kentucky's higher education coordinating board. Dr. Hiemstra received her Ph.D. in sociology from the University of Pennsylvania in 2004. She has worked at the Council for six years in a progression of analytical and managerial positions, and has authored white papers on college readiness, developmental education, dual enrollment and student retention.

Dr. Christopher Jepsen

Dr. Christopher Jepsen is the Associate Director of the Center for Business and Economic Research and an Assistant Professor of Economics at the University of Kentucky. Dr. Jepsen received his Ph.D. in Economics from Northwestern University in 2000. Prior to his appointment at the University of Kentucky, he was a research fellow at the Public Policy Institute of California in San Francisco. His primary research interests are community colleges, English Language Learners, and the economics of education more broadly. He has published in important economic journals such as the *Journal of Human Resources*, *Demography*, the *Journal of Urban Economics*, and the *Economics of Education Review*.

Debra Miller

Debra Miller has served for three years as Director of Health Policy at the Council of State Governments (CSG). CSG is a region-based forum that fosters the exchange of insights and ideas to help state officials shape public policy. Before coming to CSG, she worked for 23 years for Kentucky Youth Advocates (KYA), a non-profit children's advocacy organization. During her tenure at KYA, Ms. Miller worked closely with members of the Kentucky General Assembly and state executive branch officials on critical health, education and poverty issues. Ms. Miller also worked for the Kentucky Department of Health Services for five years in the field of developmental disabilities. Ms. Miller has a Master's in Social Work from the University of Kentucky and a B.A. from Duke University.

Authors

Dr. Tim Shaughnessy

Tim Shaughnessy, Ed.D., is a *Visiting Scholar in Community College Leadership* at the Kentucky Community and Technical College System. A board member of the Southern Regional Education Board, Dr. Shaughnessy is a frequent presenter at SREB events highlighting strategies to increase college degree attainment. A 20-year veteran of the Kentucky State Senate, Tim has provided sustained leadership to enhance academic programs and research capacity at public universities. A graduate of St. Xavier High School, Tim attended Jefferson Community College and graduated from the University of Louisville, where he was a Dean Scholar. He holds a master's in business administration from Bellarmine University and a doctorate in Leadership Education from Spalding University.

Michal Smith-Mello

Michal Smith-Mello is a retired Senior Policy Analyst who served with the Kentucky Long-Term Policy Research Center for 18 years. In that capacity, she was principal author of the Center's 1994 biennial trends report, The Context of Change, as well as reports on rural development, workforce development, entrepreneurship, and other topics. She created the Center's quarterly publication, Foresight, and served as its editor. Ms. Smith-Mello is the author of numerous articles, reports, and publications. A graduate of the University of Kentucky, she holds a B.A. and M.A. in English.

Dr. Kenneth R. Troske

Dr. Kenneth R. Troske is Director of the Center for Business and Economic Research and William B. Sturgill Dr. Kenneth R. Troske is Director of the Center for Business and Economic Research, Chair of the Economics Department and William B. Sturgill Professor of Economics at the University of Kentucky as well as a Research Fellow with the Institute for the Study of Labor (IZA) in Bonn, Germany. Prior to coming to Kentucky Dr. Troske was an Assistant and an Associate Professor of Economics at the University of Missouri. He received his Ph.D. in economics in 1992 from the University of Chicago and his undergraduate degree in economics from the University of Washington in 1984. His primary research areas are labor and human resource economics. Dr. Troske has authored a number of widely-known papers utilizing employer-employee matched data on topics such as productivity, technology, and discrimination. His most recent work has focused on evaluating various aspects of the Workforce Development System in the U.S., the role of human capital in promoting the economic growth of a region and the impact of tax incentives on the creation of jobs in a region. His papers have appeared in many leading journals in economics including the *Quarterly Journal of Economics, Journal of Labor Economics, Journal of Human Resources, Review of Economics and Statistics, and the American Economic Review.*

Dr. Amy Watts

Amy Watts, Ph.D., is a Senior Program Officer and Policy Analyst for the Foundation for a Healthy Kentucky. She is responsible for the Foundation's primary care initiative and serves as staff support to a statewide committee researching effective policy strategies and best practices in rural health service delivery relevant to Kentucky. Prior to her position with the Foundation, she was a policy analyst with the Kentucky Long-Term Policy Research Center. Over her eleven years with the Center, she authored, coauthored, and contributed to numerous Center reports and publications focusing on issues important to Kentucky's future, including topics in postsecondary education, health care, the aging population, and regional economic growth, among others. Dr. Watts received her Ph.D. in economics from the University of New Mexico in 2001 and her undergraduate degree in economics from the University of Kentucky in 1994.

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The U.S. and Kentucky Economies in 2010: When will the Recovery "Really Start?"

Kenneth R. Troske & Christopher Jepsen

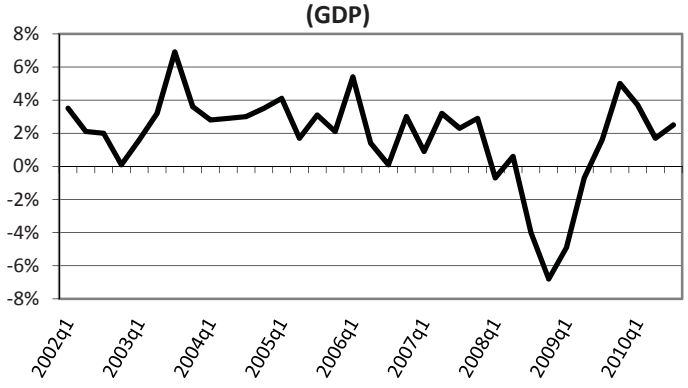
The U.S., Kentucky, Louisville, Lexington, and Cincinnati/Northern Kentucky economies had modest growth in 2010. The Kentucky economy emerged from the recession in better shape than the national economy largely because of two factors. First, Kentucky has a higher share of manufacturing employment compared to the nation, and that sector has shown recent improvements. Second, the housing boom in Kentucky was of much smaller magnitude than the national housing boom. Our economic predictions for 2011 are somewhat pessimistic, largely due to on-going problems in the housing sector. We do predict that 2011 economic growth – both nationally and locally – will be slightly better than 2010 economic growth. Unfortunately, our predicted growth levels are still too low to put a serious dent in the unemployment rate.

The year 2010 will likely go down in history as a year in which the economy largely treaded water, leaving many to wonder whether we will ever return to a world with 4-5 percent gross domestic product (GDP) growth and 3-4 percent unemployment. Unfortunately, for reasons we discuss below, the answer appears to be—*not in 2011*. In this article, we review the performance of the U.S. and Kentucky economies over the past year as well as the economic performance of the three major metropolitan areas in the state: Cincinnati/ Northern Kentucky, Lexington, and Louisville. In this review we also examine parts of the economy that we expect to play a significant role in determining whether we will see significantly higher growth in the coming year: the housing market, the financial market, and the manufacturing sector. Finally, we discuss what we think will occur in 2011. Hopefully, this discussion will provide readers with a better understanding of where the economy has been and some clues about what sectors to focus on when trying to figure out where the economy might be heading.

Gross Domestic Product

Starting in the third quarter of 2008 the economy contracted for four straight quarters (Figure 1), and between the third quarter of 2007 and the second quarter of 2009 the economy contracted in five out of eight quarters. Since 2007, the economy has shrunk by an amount that matches the recessions of the mid-1970s and the early 1980s. Beginning in the third quarter of 2009, the economy has grown for the last five quarters. Because at least some of this growth appears due to a temporary increase in spending by the federal government due to the stimulus plan, there is continued concern about the future growth of the economy.

FIGURE 1
Percent Change in U.S. Gross Domestic Product (GDP)



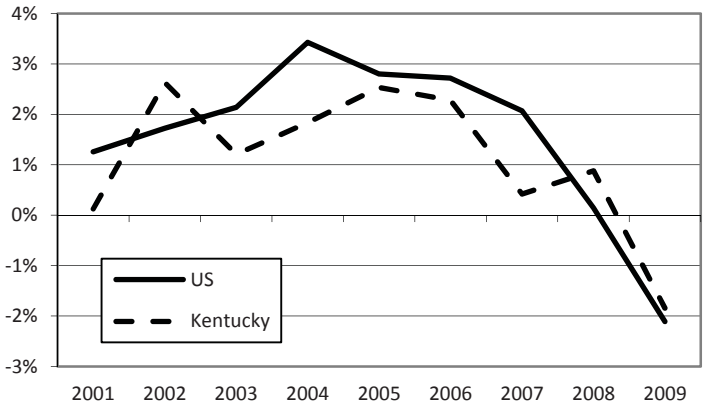
Source: U.S. Department of Commerce, Bureau of Economic Analysis, NIPA Table 1.1.1

Figure 2 illustrates that the Kentucky economy has grown much slower than the U.S. economy for several years, although that trend reversed in 2008 and 2009. The fact that Kentucky has performed

slightly better than the rest of the country during the recession is somewhat unexpected given the information presented later showing that the state has a higher share of employment in the declining manufacturing industry.

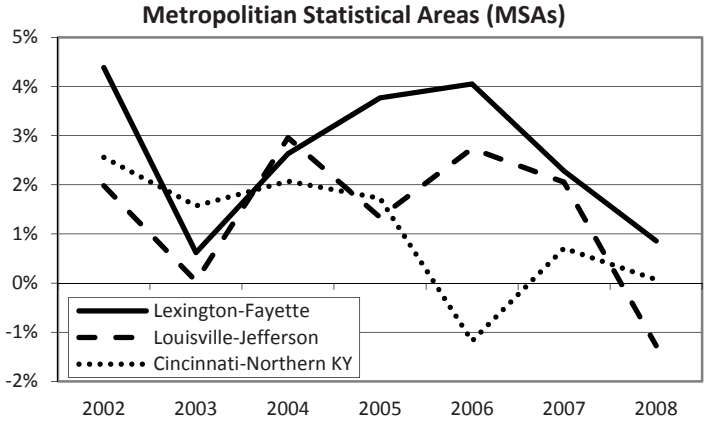
Figure 3 shows that, even though the recession has impacted growth in all three metropolitan areas in Kentucky, there are some important differences. Given the large number of manufacturing firms in the Louisville area, it is not surprising that the recession appears to have had the largest impact in Louisville. Although the recession has had a somewhat smaller impact on the Cincinnati/Northern Kentucky region, as the figure makes clear, this region has experienced fairly low growth for a number of years. Finally, even though the growth in the Lexington area has slowed recently, the Lexington economy continued to grow throughout 2008 and appears to be the most dynamic of the three regions.

FIGURE 2
Percent Change in GDP, US and Kentucky



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

FIGURE 3
Percent Change in GDP in Kentucky's Major Metropolitian Statistical Areas (MSAs)



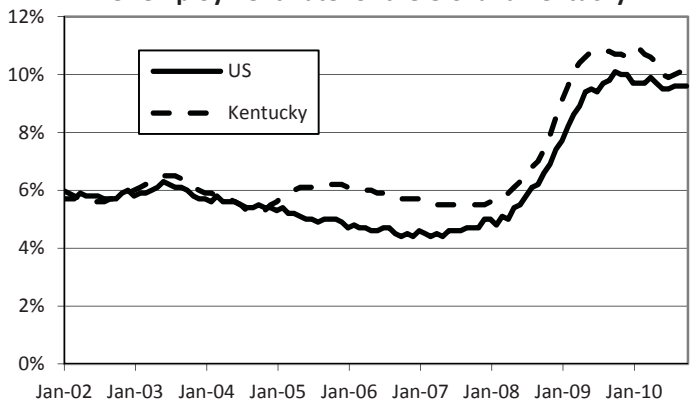
Source: U.S. Department of Commerce, Bureau of Economic Analysis

Unemployment

Despite the increase in GDP that started in third quarter of 2009, the unemployment rate for both the U.S. and Kentucky has only declined slightly from the highest levels seen in the last thirty years (Figure 4). In October 2010 the U.S. unemployment rate stood at 9.6 percent, which was well above the 4.7 percent rate in November 2007 and the 6.8 percent rate in November 2008. The 10.0 percent unemployment rate in Kentucky during the same month is also substantially higher than the rates from just one year earlier. Figure 5 shows that the unemployment rate has also risen substantially in all three metropolitan areas in the state, with the highest rates found in Louisville and Cincinnati/Northern Kentucky and the lowest rates in Lexington.

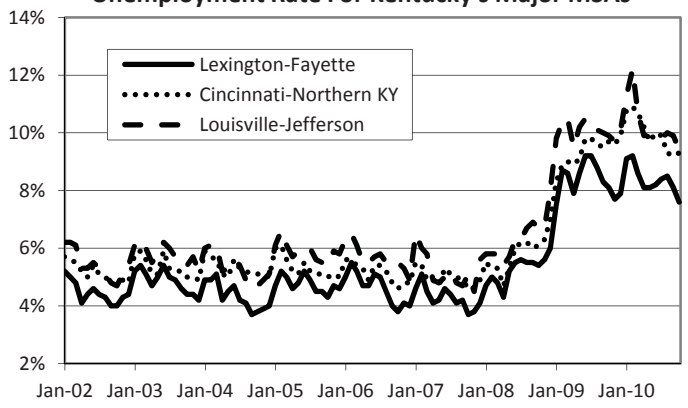
One particularly troubling aspect of the recent increase in unemployment is the fact that many individuals are unemployed for long durations.

FIGURE 4
Unemployment Rate for the U.S. and Kentucky



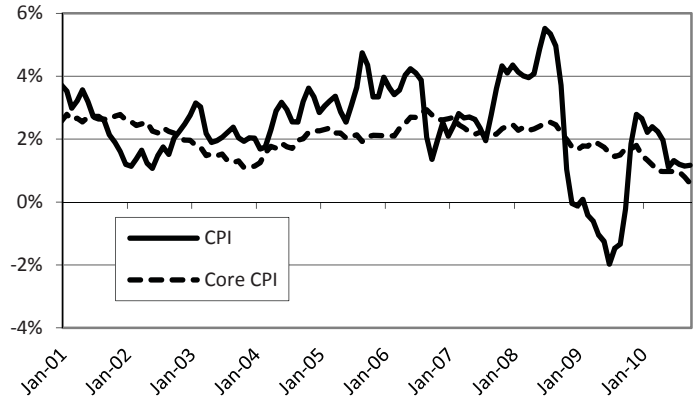
Source: U.S. Department of Labor, Bureau of Labor Statistics

FIGURE 5
Unemployment Rate For Kentucky's Major MSAs



Source: U.S. Department of Labor, Bureau of Labor Statistics

FIGURE 6
Annual Change in CPI and Core CPI



Source: U.S. Department of Labor, Bureau of Labor Statistics

At the national level, the median duration of unemployment is over 21 weeks.[1] Since the government started reporting this statistic in 1967, the previous high was approximately 12 weeks in 1983. Even though Kentucky has higher rates of unemployment, the duration of employment is lower. In 2009 (the most recent state-level data on duration), the median unemployment duration was 13.9 weeks in Kentucky compared with 15.8 weeks nationally. Previously, the gap between Kentucky and the national average has been smaller.

For many people the unemployment rate is a much more important measure of the state of the economy than GDP growth or inflation. This is because the unemployment rate may be a better indicator of the number of individuals in the country who are struggling. Unfortunately, there are three reasons why the unemployment rate is unlikely to return soon to the levels seen even one or two years ago. First, unemployment rates typically remain high for several periods after a recession ends because during a recession businesses cut back on the number of people they hire as well as the number of hours their employees work. Therefore, during the early part of a recovery businesses can expand output by having current workers work more hours before they need to hire additional workers. Second, as the recovery builds, workers who had left the labor market (and therefore were not counted among the unemployed) begin to return to the labor market, which pushes up the unemployment rate. Finally, unlike in previous recessions of this magnitude, during this recession we have seen a significant growth in labor productivity. This means that workers are producing more output for every hour worked. Because of this increase in productivity firms are able to increase output without hiring more workers, lessening the pressure on firms to expand employment as the demand for their product increases. All of these factors together mean that, even if output continues to grow, firms are unlikely to hire many more workers so unemployment will likely remain high for some time to come.

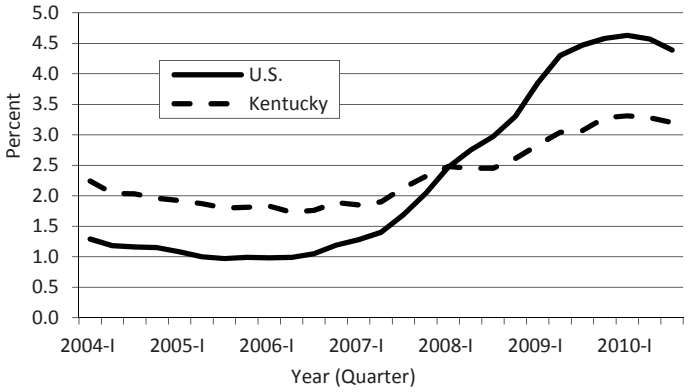
Inflation

Over the past year inflation has remained at very low levels (Figure 6). In fact, inflation has been low enough to spark discussions of possible deflation, or decreases in real prices. The hope is that slowly rising or even falling prices will eventually lead to an increase in consumer demand which will lead to growing output and eventually falling unemployment.

Although inflation is currently quite low, and likely to continue to remain low for the near term, there are several reasons why we continue to be concerned about higher levels of inflation in the future. Currently federal government spending equals 25 percent of total GDP—which is the highest level seen since World War II—and unless something changes soon this number is projected

to continue to rise. In addition, the U.S. Federal Reserve (Fed), in an effort to stem the recent fiscal crisis and jump start the economy, has dramatically increased the value of assets that it holds and has seen a significant shift in the types of assets it holds. In addition, it recently announced plans to conduct further quantitative easing, suggesting that its balance sheet will continue to grow. At some point the Fed will have to sell all these assets and the federal government is going to be forced to reduce its debt. Given the size of the federal deficit and the size of the Federal Reserve's balance sheet, trying to fix these problems has the potential to increase inflation in the next three to five years so both of these efforts are clearly worth watching closely.

FIGURE 7
Foreclosures as a Percentage of All Mortgages



Source: Mortgage Bankers Association

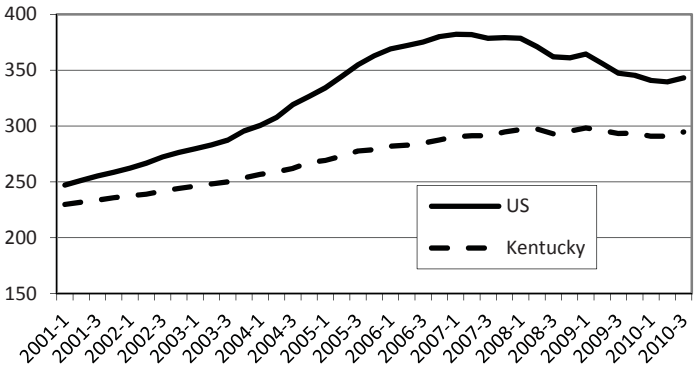
Housing Market

Each recession seems to vary in how it starts: problems in the energy and oil markets were at the heart of the recession in the mid-1970s; continuing problems in oil markets combined with problems in manufacturing lead to the early 1980s recession; and problems in the hi-tech sector contributed to the recession earlier this decade. In this current recession problems in the housing market spread to the financial sector and led to the downturn. Because the recession started with problems in the housing market, a full recovery of the economy will be difficult until the housing market returns to "normal." Thus, this section focuses on recent developments in the housing sector.

As has been extensively discussed in a variety of places, both the federal government and the private sector undertook extensive efforts to increase the number of people who owned a home using methods such as keeping mortgage rates artificially low or by creating new financing options that allowed people to purchase homes with very small, or nonexistent, down payments. Although these efforts succeeded in pushing the homeownership rates up to 69 percent—the highest rate in history—it is now clear that many of these new homeowners could not afford their home, which has led to a significant increase in foreclosures. Figure 7 shows that between the first quarter of 2006 and the first quarter of 2010, the percentage of mortgages that are in foreclosure in the nation has increased from one percent to over 4.5 percent. Although foreclosure rates have stabilized in 2010, they are still well above four percent.

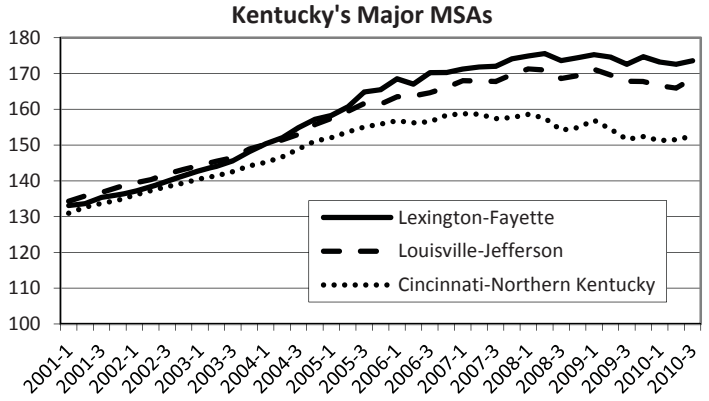
The foreclosure rate is also up in Kentucky, but it has risen much slower than the foreclosure rate for the entire country. The foreclosure rate historically has been higher in Kentucky than in the average state, but Kentucky's foreclosure rate dropped below the average state in 2008. In 2010, the foreclosure rate in Kentucky is 25 percent lower than the rate for the nation as a whole. This lower foreclosure rate in Kentucky is one indication that the housing problems that are plaguing many places in the country are less severe in Kentucky.

FIGURE 8
Quarterly FHFA Housing Price Index for the U.S. and Kentucky



Source: Federal Housing Finance Agency

FIGURE 9
FHFA Housing Price Index for Kentucky's Major MSAs



Source: Federal Housing Finance Agency

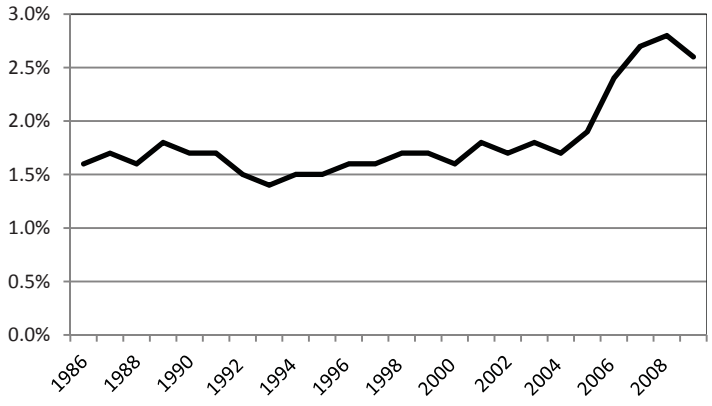
The rising foreclosure rates, earlier efforts to increase homeownership rates, and the recent new housing tax credit have led to an increase in the supply of housing in the country. Because this increase in the supply of houses has not been met by an increase in demand for houses, we have seen a significant fall in housing prices in recent periods. Figure 8 plots the Federal Housing Finance Agency's housing price index for the U.S. and Kentucky. As this figure shows, housing prices in the country have been falling since second quarter 2007. Overall, housing prices in the country have fallen approximately 9 percent since their peak. Although housing prices rose slightly during the third quarter of 2010, it is unclear whether this is a one-time increase or whether housing prices have bottomed out.

In contrast, Kentucky housing prices have remained fairly steady over this period, although they are down slightly in 2010 compared to 2009. Figure 9, which plots the housing price index for Lexington, Louisville, and Cincinnati/Northern Kentucky, shows that housing prices have remained steady in both the Lexington and Louisville markets. In contrast the Cincinnati/Northern Kentucky market has seen a fairly steady fall in housing prices over the last two years. Like the national market, the local markets should be closely watched to see if recent price increases will continue.

Housing prices will only begin to stabilize once the excess supply of housing is eliminated through an increase in housing demand. One measure of the excess number of houses is provided by homeownership vacancy rate, defined as the percentage of single-family homes that are currently empty. Figure 10 shows that between the mid-1980s and the early 2000s, the homeownership vacancy rate remained at around 1.6 percent. Starting in 2005 the vacancy rate skyrocketed and now stands at around 2.6 percent. There are approximately 130 million homes in the U.S., so this increase in the vacancy rate of one percentage point means that there are an extra 1.3 million vacant homes on the market. Until the homeownership vacancy rate returns to around 1.6 percent, it will put downward pressure on housing prices and economic growth will be limited by homeowners' reluctance to spend money.

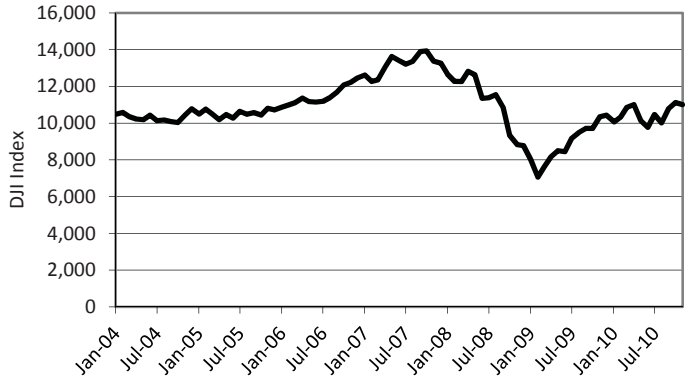
Unfortunately, recent events appear likely to only prolong the problems in the housing market. To begin with, mortgage lenders and servicers are clearly struggling under the crush of the rise in foreclosures and have been sloppy in processing paper work and may have even committed fraud in their efforts to quickly foreclose on borrowers who are delinquent, and fixing these problems is likely to take time. The general consensus is that the government's home buyer tax credit only served to speed up some decisions to buy a house without having any impact on the overall demand for homes. Finally, the federal government's attempts to modify mortgages through their Making Home

FIGURE 10
Homeownership Vacancy Rate for the U.S.



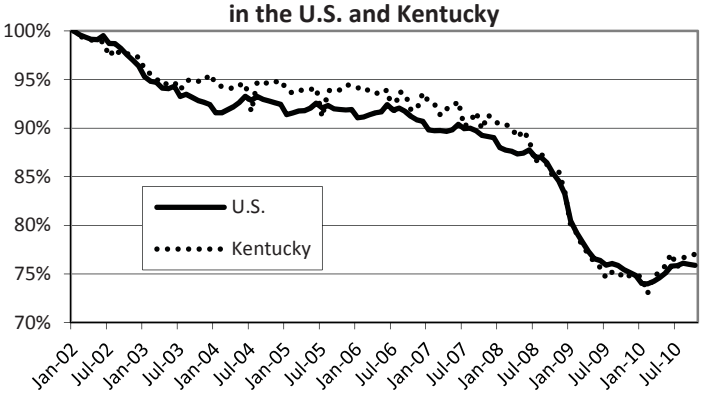
Source: U.S. Census Bureau

FIGURE 11
Dow Jones Industrial Average, Monthly Close



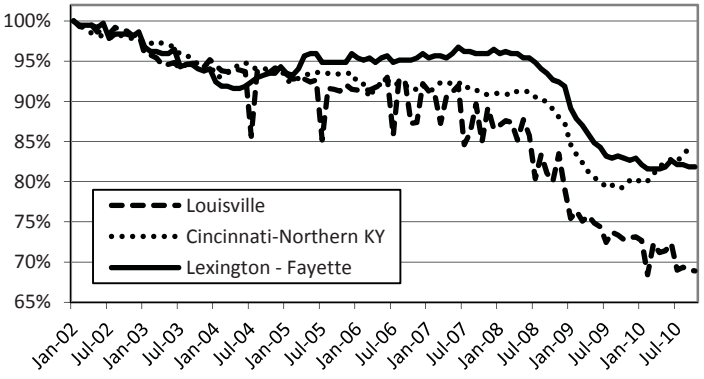
Source: Yahoo Finance

FIGURE 12
Change in Manufacturing Employment in the U.S. and Kentucky



Source: Bureau of Labor Statistics

FIGURE 13
Change in Manufacturing Employment, Kentucky MSAs



Source: Bureau of Labor Statistics

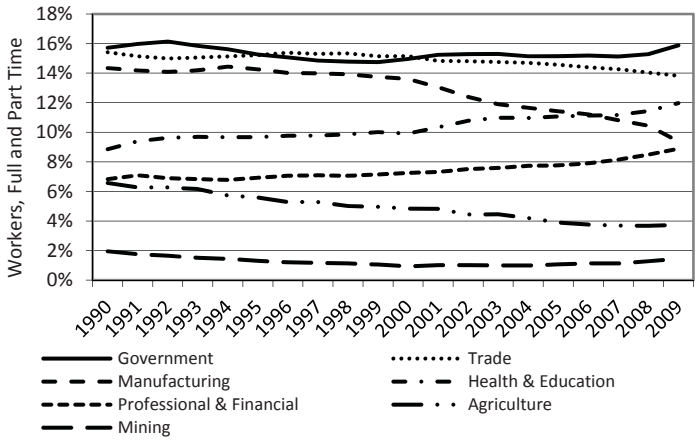
Affordable program will only be available to a small number of borrowers and for those that will be helped, the help will only be temporary, and then they will be back in the same situation they currently find themselves in—living in a house they cannot afford with a mortgage that exceeds the value of their house. In the end the housing market will need to fix itself, through individuals moving into more economically appropriate housing situations and through an increase in the number of people demanding a home. However, until this occurs the housing market will continue to limit the growth of the economy.

Financial Markets

A turnaround in the financial markets is often a harbinger of a recovery in the rest of the economy. As Figure 11 shows, after a precipitous drop that started in late 2007, the Dow Jones Industrial Average (DJIA) bottomed out in March 2009. Aside from a couple of small declines, it has risen steadily since then. In November 2010 it closed at around 11,000, 70 percent above its lowest point in March 2009. The consistent increase in the stock market is a strong signal that the recovery has begun. However, the economy clearly remains weak, and the stock market is still well below its pre-recession values.

Many people wonder how the stock market can continue to rise while unemployment is also rising. The answer is that the unemployment rate is not the only measure, or even the most important measure, of future growth. Prices in the stock market reflect expectations of the future profits of companies. As we have mentioned earlier, there has been a significant increase in worker productivity over the past year. This means that workers now produce more output per hour than they did a year ago, which also means that it costs less for firms to produce output than it did previously.

FIGURE 14
Change in KY Industry Shares of Employment



Source: Regional Economic Information Systems, Bureau of Economic Analysis

These lower costs translate into higher profits for firms. Although the high unemployment rate does affect consumer demand, the effect is not that large because a 10 percent unemployment rate means that 90 percent of people who want a job have one. Therefore, even though the unemployment rate is likely to remain high for several years, the increase in worker productivity is likely to produce higher profits for firms, which is what fuels the increase in the value of the stock market.

The Manufacturing Sector

The manufacturing sector has traditionally employed a large percentage of workers, particularly in Kentucky. As shown in Figure 12, manufacturing employment fell from January of 2002 to January of 2010, and the reduction in employment was particularly large starting in the middle of 2008. In 2010 manufacturing employment has risen slightly, although it is nowhere close to its pre-recession levels. In Kentucky manufacturing employment has fallen by 37,000 jobs since January of 2008, which represents a 15 percent decline in manufacturing employment in the state.

Figure 13 shows that the dramatic fall in manufacturing employment has occurred in all three metropolitan areas in the state. Louisville has experienced by far the largest decline in employment. Lexington's manufacturing employment has remained relatively constant throughout 2010, whereas Cincinnati/Northern Kentucky has been growing since late 2009.

The impact of the current recession has already had a profound, and likely permanent, impact on Kentucky's economy. As seen in Figure 14, the recessions this decade have led to a decline in the manufacturing sector's share of employment from 14 percent in 2000 to 9 percent in 2009. In contrast, the share of the state's employment in health and education has risen from 10 percent in 2000 to 12 percent in 2009 and has surpassed manufacturing in employment share. The professional and financial sector has also seen a growth in its share of employment and appears likely to pass manufacturing in the next few years. As the focus of Kentucky's economy continues its long-run shift away from traditional industries such as manufacturing, agriculture, and mining, the state's future economic growth will be driven by the health and education and professional and financial sectors. It is important that policymakers in the state recognize this on-going shift and change their focus away from the declining sectors towards the sectors holding the greatest potential for future growth.

Outlook for 2011

So what will 2011 hold? Our forecast for the coming year is shown in Table 1. In the first column we present the prior forecast for 2010, while the second column contains the current expectations for what actually happened in 2010. In the third column we present our predictions for 2011.

TABLE 1
Forecast for 2011

	2010 Forecast	2010 Actual or Best Available	2011 Forecast
Real GDP Growth--U.S.	2.0%	2.6%	2.7%
Unemployment Rate--U.S.	10.0%	9.7%	9.4%
Inflation--U.S.	1.7%	1.7%	1.5%
Employment Growth--U.S.	-0.5%	0.7%	1.0%
Growth in Manf. Employment--U.S.	-2.0%	1.4%	2.0%
Real GDP Growth--Kentucky	1.0%	---	2.8%
Unemployment Rate--Kentucky	10.5%	10.3%	9.5%
Employment Growth--Kentucky	-1.0%	0.7%	1.5%
Growth in Manf. Employment--Kentucky	-2.5%	2.8%	3.5%

For the U.S. economy as a whole we believe that the persistent problems in the housing market will continue to limit growth. Although we expect that the U.S. economy will grow throughout the year, our forecast of 2.7 percent growth is well below the growth needed to significantly reduce unemployment, so we expect unemployment to remain at historically high levels for much of the year. Finally, we expect inflation in the next year to remain fairly low, although we believe that in the next three to five years we have an increasing chance for much higher rates of inflation.

We believe that the Kentucky economy will continue to outperform the U.S. economy, although the state will not grow fast enough to significantly reduce the unemployment rate in the state. On the bright side, we think the housing market in the state will continue to be relatively stable with below average foreclosure rates and above average growth in prices. Unfortunately, housing problems in other parts of the country will continue to have a negative effect on Kentucky's manufacturing sector as well as the rest of the state's economy.

In summary, we remain somewhat pessimistic about the performance of the economy in 2011. We do expect that in the coming year the economy will grow at about the same rate as it did this past year, but the growth will remain below the level necessary to put a serious dent in the unemployment rate. Hopefully by 2012 the housing market will begin to show signs of a recovery which will bring faster growth and falling unemployment.

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[1]U.S. Bureau of Labor Statistics.

Poverty in Kentucky: A New Look at an Old Problem

Richard C. Fording

Kentucky's poverty rate began increasing even before the Great Recession and in recent years has increased at a faster rate than nearly every other state. The increased poverty rate has been particularly acute in the Appalachian counties and in areas losing significant numbers of manufacturing jobs. The data suggest that any strategy to reduce poverty in Kentucky will need to target the poorest areas in the state and focus on improving the health, skills, and education of low-income children as well as adults.

On September 16, 2010, the U.S. Census Bureau announced that the national poverty rate increased by 1.2 percentage points, from 13.1 percent in 2008 to 14.3 percent in 2009. Most experts were not surprised, given the fact that 2009 represented the first full calendar year of the Great Recession. Yet, the numbers are still staggering. A record 43.6 million Americans were poor in 2009, and the poverty rate of 14.3 percent was the highest seen in the U.S. since 1994. If the poverty rate increases in 2010 by at least as much as it did in 2009, which many experts believe is quite possible due to the slow recovery, the 2010 poverty rate will be the highest seen in the U.S. since 1965.

Poverty in Kentucky has also been on the rise during the recession, as can be seen in Table 1. Between 2007 and 2009, Kentucky's poverty rate rose by 1.5 percentage points, from 15.5 percent to 17.0 percent. This is similar to the increase of 1.8 percent seen nationally during the same two-year period, although it appears that Kentucky's increase occurred sooner (between 2007 and 2008) compared to the rest of the country. Despite this similarity in recent trends, it would be a mistake to conclude that poverty in Kentucky is typical of the rest of the country. In this article, I take a closer look at the most recent Census data to better understand the poverty problem in Kentucky. The data confirm what most Kentuckians would consider to be the conventional wisdom. Poverty in Kentucky is not only more severe than in most other states, but it is also geographically concentrated and particularly severe in several Appalachian counties.

The data also reveal two additional sets of findings that are less well known. First, Kentucky's poor population differs from the national poor population in several important ways. Kentucky's poor are considerably whiter, less educated, and significantly more likely to suffer from disability and poor health. Second, and perhaps most discouraging, poverty has been on the rise in Kentucky since well before the most recent recession, and in recent years has been increasing at a rate that surpasses nearly every other state. Like the level of poverty more generally, increases in poverty have been unevenly experienced across Kentucky's counties and appear to have been most pronounced in Appalachian counties and in counties experiencing job losses in the manufacturing sector while counties in the state's three largest metropolitan areas seem to have been spared to some degree.

Table 1
Poverty in Kentucky and in the United States, 2007-2009

Year	Kentucky		United States	
	Number Poor	Percentage Poor	Number Poor	Percentage Poor
2007	653,000	15.5	37,276,000	12.5
2008	724,000	17.1	39,829,000	13.2
2009	727,000	17.0	43,569,000	14.3
2007-2009 Change	+74,000	+1.5	+6,293,000	+1.8

Source: U.S. Census Bureau, Income, Poverty and Health Insurance in the United States, (2007-2009)

TABLE 2
The 10 Most Impoverished States in the U.S.
(Percentage of Persons in Poverty, 2009)

All Races		White, Non-Hispanic	
Mississippi	23.1	West Virginia	15.3
Arizona	21.2	Mississippi	14.9
New Mexico	19.3	Arkansas	14.3
Arkansas	18.9	Tennessee	14.3
Georgia	18.4	Kentucky	14.1
Texas	17.3	New Mexico	12.7
Kentucky	17.0	Missouri	12.6
North Carolina	16.9	Alabama	12.3
Alabama	16.5	Indiana	11.7
Tennessee	16.5	Idaho	11.6

Source: U.S. Census Bureau, Income, Poverty and Health Insurance in the United States, 2009, and CPS Table Creator (2009 CPS-ASEC)

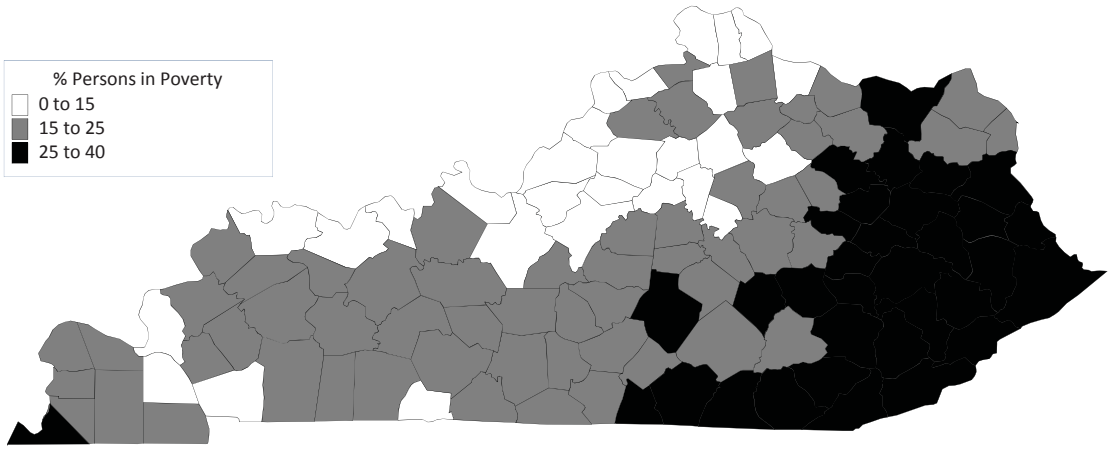
The Scale of Poverty in Kentucky

Most Kentuckians are aware that Kentucky has historically been a poor state. But is this still true today, and if so, how poor is Kentucky relative to the rest of the nation? The answer to this question is provided in Table 2, and as can be seen, the most recent data suggest that Kentucky is indeed one of the poorest states in the country. The first column shows the state ranks by the 2009 poverty rate for persons of all races, and by that measure Kentucky has the seventh highest poverty rate at 17.0 percent. While this is a large number, in some ways these figures understate the relative severity of poverty in Kentucky. It is well known that African Americans and Hispanics earn considerably less than whites for a variety of reasons, including discrimination. If one looks closely at the 6 states ahead of Kentucky in the first column, it would appear that the poverty rate in all of these states may be driven upward due to the fact that these are all states that have relatively large black and Hispanic populations.

The second column of Table 2 presents a revised ranking of states that is based solely on the white, non-Hispanic population of each state, thus removing racial diversity as a source of variation in state poverty rates. After making this adjustment, the variation in the poverty rate across the ten most impoverished states is considerably reduced. Kentucky jumps to number 5 in these rankings, but is now only 1.2 percentage points behind the state with the highest white, non-Hispanic poverty rate (West Virginia).

Although the poverty rate in Kentucky is 17 percent, it is important to remember that this is a statewide figure, and as most Kentuckians are aware, poverty is higher in some regions of the state than others. This fact is documented in the map presented in Figure 1, which displays county-level variation in the 2008 poverty rate. The map paints a familiar picture. Of Kentucky's 120 counties, only 28 counties were estimated to have a poverty rate in 2008 that was below 15 percent. Of the remaining 92 counties, 59 counties had poverty rates between 15 and 24.9 percent, and the remaining 33 counties had poverty rates 25 percent and higher (with the highest poverty rate seen in Clay County at 38.3

FIGURE 1
County Poverty Rates in Kentucky, 2008



Source: U.S. Census Bureau, Small Area and Income Estimates (SAIPE)

percent). As might be anticipated, the counties with the highest poverty rates are clustered in the southern and eastern regions of the state.

The Composition of the Poverty Population

In Table 3, I present a detailed breakdown of the poverty population in Kentucky and in the United States by several different variables that social scientists have found to be related to poverty. These data suggest that Kentucky's poor population mirrors the national poor population to some degree, but it is also different in several important ways that might provide useful information for policymakers seeking strategies to combat poverty. As can be seen in the table, Kentucky's poor population does not appear to differ much from the national poor population with respect to age or family structure. Children and female-headed families comprise highly disproportionate shares of Kentucky's poor, and this is also true of the national poor population. The same is not true for race and ethnicity. Indeed, one of the most striking aspects of Kentucky's poverty population is that it is largely white and non-Hispanic, especially in comparison to the national poor population. Kentucky's poor population is distinct in several other respects as well. Kentucky's poor are significantly less likely to have earned a high school diploma, and they are significantly more likely to suffer from a severe work disability, as well as poor health. To the extent that low education levels and poor health serve to reduce labor market success, the data suggest that policies aimed at improving the education level and health of low-income Kentuckians may go a long way toward reducing poverty in this state.

TABLE 3
The Composition of the Poverty Population: Kentucky and the U.S. Compared, 2009

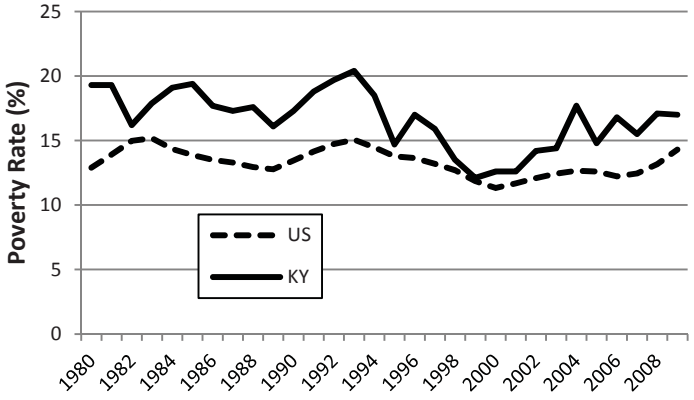
Demographic Category	United States	Kentucky
Race		
White	68.5	80.5
Black or African American	22.8	15.8
Other Races	8.7	3.7
Ethnicity		
Not of Hispanic Origin	71.7	91.5
Hispanic Origin	28.3	8.5
Family Structure		
Husband-Wife	31.4	24.6
Female-Head	49.9	54.7
Male-Head	18.7	20.6
Age		
Less than 18	35.5	31.1
18-64	56.7	61.1
65 or older	7.9	7.7
Education Level (Adults)		
No High School Diploma	35.8	47.8
High School Diploma	32.5	29.1
Some College	22.3	16.6
Bachelor's Degree or Higher	9.4	6.5
Disability Status		
Severe Work Disability	14.4	23.4
Non-severe Work Disability	3.6	4.0
No Work Disability	82.1	72.6
Health Condition		
Excellent or Very Good	52.5	43.0
Good	29.2	27.4
Fair	12.1	18.1
Poor	6.2	11.5

Source: U.S. Census Bureau, CPS Table Creator, based on Current Population Survey, March Supplement, 2009

The Reemergence of Poverty in Kentucky

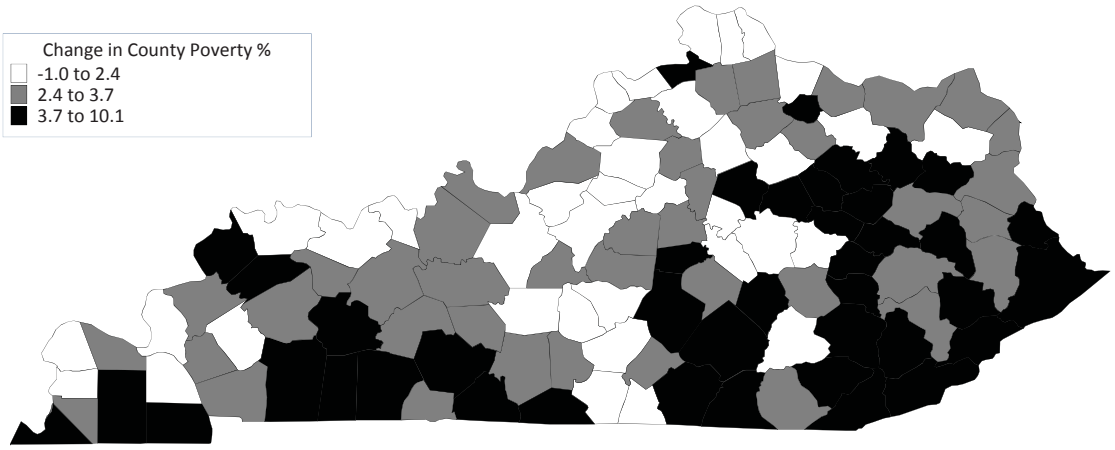
Many people would not be surprised to learn that poverty rates are currently very high in Kentucky, both in absolute and relative terms. Kentucky has had a long history of being a poor state, and most people simply assume that this has always been the case. Yet, this is not true. This fact is documented in Figure 2, which displays poverty rates for Kentucky and the remaining 49 states, for the period 1980-2009. Between 1980 and the early 1990's, the poverty rate in Kentucky was considerably higher than the rest of the country, as most people would have guessed. But beginning in 1993, Kentucky's poverty rate began to decline at a rapid rate and converge toward the national average. Remarkably, by 1999, Kentucky had reduced its poverty rate from 20.4 to 12.1 percent. Kentucky's relative standing among the states also improved dramatically during this period. In 1993, Kentucky's poverty rate was the

FIGURE 2
Poverty Rate in Kentucky and the U.S., 1980-2009



Source: U.S. Census Bureau, Current Population Survey, March Supplement, Various Years

FIGURE 3
Change in County Poverty Rates in Kentucky, 1999-2008



Source: U.S. Census Bureau, Small Area and Income Estimates (SAIPE)

fourth highest of all states, but by 1999 it had fallen to the 20th-highest. In 1999, Kentucky's poverty rate was actually lower than several states that are not traditionally thought of as poor, including California, New York, Oregon and Florida.

Unfortunately, the decline in Kentucky's poverty rate was short-lived. In the 10 years since the record low rate of 12.1 percent in 1999, Kentucky's poverty rate has increased by nearly 5 percentage points to 17 percent. Only three other states – Indiana, Arizona, and South Dakota – have experienced a larger increase in their poverty rate. And as one might expect, the reemergence of poverty in Kentucky has not been experienced equally across the state. This fact is documented in Figure 3, which presents a map of Kentucky's counties displaying the geographic distribution of the change in the county poverty rate from 1999-2008. Although nearly all of Kentucky's counties experienced some increase in poverty, the magnitude of the increase reflects a familiar geographic pattern. For the most part, the largest increases in poverty have occurred in the southern and eastern regions of the state, where poverty rates have historically been the highest.

Why Has Poverty Increased in Kentucky?

A full examination of the causes of Kentucky's recent increase in poverty is beyond the scope of this article. However, I provide an initial look at this question by considering the role of one economic trend that has contributed to the decline in many state economies in recent years – the loss of manufacturing jobs. Kentucky has long relied on its manufacturing sector, along with the mining and agriculture sectors, to drive the state economy. Yet, between 1999 and 2008, the number of manufacturing jobs in Kentucky declined by approximately 45,000. These jobs generally provided good wages and benefits, but were largely replaced by lower-paying jobs in the retail trade and services sectors, and by good-paying jobs that require skills most manufacturing workers are unlikely to possess. Between the direct impact of the loss of wages for

FIGURE 4
Change in the Poverty Rate by Change in Manufacturing Jobs, 1999-2008

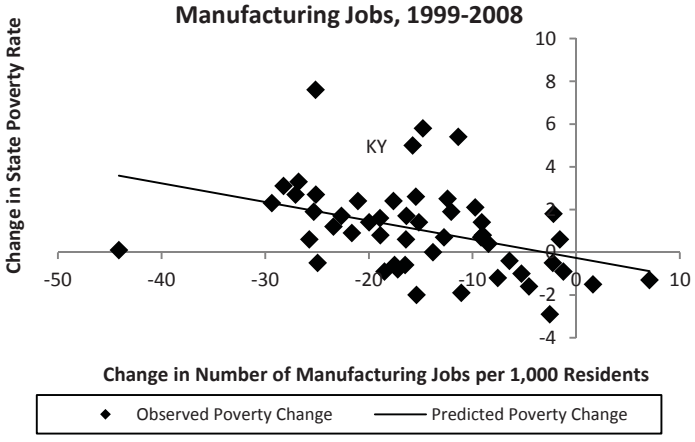
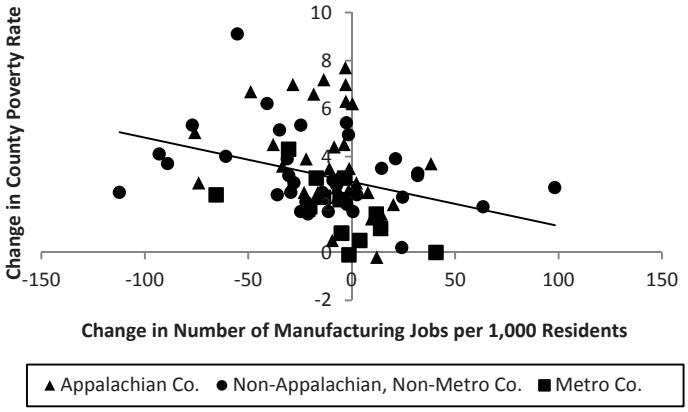


FIGURE 5
Change in the Poverty Rate by Change in Manufacturing Jobs, 1999-2008



former manufacturing workers and the indirect impact that firm closings can have on the local economy, it thus seems plausible that the loss of manufacturing jobs could be an important factor in explaining the increase in poverty since 1999.

Figure 4 presents a first look at this question through an examination of the relationship between the 1999-2008 change in state poverty rates, and the corresponding change in the number of manufacturing jobs in a state (per 1000 state population), for all 50 U.S. states. As can be seen, the relationship is decidedly negative, as anticipated. States with greater job losses experienced higher increases in poverty. The slope of the regression line is -.09 (p=.004), suggesting that for each loss of 10 manufacturing jobs (per 1000 residents) in a state between 1999 and 2008, the state's poverty rate increased by nearly one percentage point, on average. Yet, it is clear from the graph that the magnitude of job loss in the manufacturing sector is far from a perfect predictor of changes in state poverty rates. This is especially true for the states that experienced the largest increases in poverty during this period, including Kentucky. As can be seen in Figure 4, although Kentucky experienced a significant loss of manufacturing jobs, the degree of job loss was far more typical than its observed increase in poverty would suggest. Based on the regression line, which represents the predicted change in state poverty for a given level of job loss, Kentucky experienced close to twice the increase in poverty that would be expected, given the number of manufacturing jobs lost during this period. This suggests that other factors, in addition to the decline in the manufacturing sector, caused poverty to increase in Kentucky.

Figure 5 takes the analysis to the county level in Kentucky to examine the relationship between the change in the county poverty rate and the change in the number of manufacturing jobs (per 1000 residents), over the same period (1999-2008). This graph provides further evidence of the impact of manufacturing job loss on poverty. Although the relationship is far from perfect, the slope of the regression line is negative (-.018) and statistically significant (p=.003). Although this effect is considerably smaller than the effect seen in the state-level analysis above, this is likely due in part to the fact that the county-level analysis fails to account for spill-over effects of job losses in surrounding counties. If this effect were accounted for, as it implicitly is in the state-level analysis, the total effect of manufacturing decline would undoubtedly be higher.

Figure 5 also provides additional information concerning county variation in poverty change. The triangle-shaped markers in the scatter plot represent Appalachian counties (as defined by the Appalachian Regional Commission), while the square-shaped markers represent counties in

TABLE 4
Regression Results for the Effects of Manufacturing Job Loss and County Location on County Poverty Rates

Independent Variables	Change in Total Poverty Rate		Change in Child Poverty Rate	
	Coeff.	SE	Coeff.	SE
Change in Per Capita Manufacturing Jobs	-.018	.005**	-.031	.009**
Appalachian County	.673	.422	1.44	.622*
Metro County	-1.28	.237**	-2.11	.534**
Number of Counties	86		86	
R-squared	0.23		0.30	

Note: Data for manufacturing jobs were obtained from County Business Patterns and reflects the number of employees during the month of March. County poverty data were obtained from the Census Bureau's Small Area and Income Estimates (SAIPE) series. The sample size is reduced due to missing manufacturing data, largely for small counties in 2008.

Kentucky's three largest metropolitan statistical areas (Cincinnati, Lexington and Louisville). Based on the distribution of these two sets of counties in the graph, it would appear that the Appalachian counties experienced a larger increase in poverty than the other counties, while the metro-area counties experienced a somewhat smaller increase. This pattern is consistent with the map in Figure 3, and suggests that it may be wise to control for county location when estimating the impact of manufacturing job loss.

The results of such an analysis are provided in Table 4, which presents regression results for the relationship between the county-level change in poverty (1999-2008), the change in manufacturing jobs, and two dichotomous variables taking on values of 1 for (1) counties located in the Appalachian region, and (2) counties located in a metro area (and values of 0, otherwise). The analysis was conducted for the change in the total poverty rate (all persons), and for the change in the child poverty rate. The addition of child poverty to the analysis is based on the expectation that manufacturing job losses might have a greater impact on child poverty due to the fact that this subpopulation is more vulnerable to slipping into poverty when a parent loses their job. The results for the total poverty rate are presented in the first column of Table 4. The effect of manufacturing job loss is nearly identical to the effect estimated from the bivariate regression model (i.e. the slope represented in Figure 5), and is statistically significant (p=.002). The results also confirm the observation that counties in metropolitan areas experienced a significantly smaller increase in total poverty, even after accounting for manufacturing job losses. Counties in the Appalachian region were somewhat more likely to experience an increase in total poverty (although this effect is not quite statistically significant).

Poverty has been on the rise in Kentucky since well before the most recent recession, and in recent years has been increasing at a rate that surpasses nearly every other state.

The results for child poverty are somewhat stronger across the board. The effect of manufacturing job loss increases in magnitude from -.018 to -.315, and is highly significant (p<.001). The coefficient estimate suggests that for every loss of 32 manufacturing jobs (per 1000 county residents), a county experienced an increase of one percentage point in its child poverty rate. Controlling for manufacturing job loss, counties in metro areas experienced an increase in child poverty that was approximately 2 percentage points less than counties in other areas of the state, while the increase in child poverty was estimated to be about 1.4 percentage points greater in Appalachian counties, all else equal. Both of these geographic effects are now highly statistically significant in the child poverty model as well.

Conclusion

In 2009, approximately 727,000 Kentuckians lived in poverty. This is a large number in both absolute and relative terms. Indeed, only 6 states had a higher poverty rate in 2009. Thus far, the available data suggests that Kentucky's poverty rate has not increased at a faster rate than the national poverty rate during the first part of the Great Recession. However, this does not mean that recent trends are promising. On the contrary, between 1999 and 2009 the increase in Kentucky's poverty rate was the fourth largest in the country, erasing several years of progress in reducing poverty.

In 2009, the Kentucky General Assembly formed a bipartisan, bicameral legislative task force to study poverty in Kentucky. All indications are that the task force will continue to meet during the next legislative session and try to map out a strategy for reducing poverty in Kentucky. Kentucky is not alone in this quest, as state poverty commissions and task forces have been formed all over the country, in many cases issuing bold poverty-reduction goals. Of course, it is much easier to state such goals than it is to actually achieve them, and this is especially true for poverty reduction.

More research is certainly needed on the causes of poverty in Kentucky, yet this brief analysis suggests some broad direction for anti-poverty policies in Kentucky. First, an analysis of Kentucky's poverty population indicates that efforts to increase the education (and skill) levels of low-income children and adults may go a long way toward reducing poverty. Kentucky's poor also appear to suffer from poorer health conditions than the rest of the nation's poor. While poverty is likely a cause

of poor health to some degree, strategies to increase access to health care providers, especially in the rural areas of the state, may help many otherwise poor Kentuckians to be more successful in the labor market. Of course, this assumes that good-paying jobs are available and as this analysis shows, this has increasingly become less likely for many Kentuckians due to the decline in the manufacturing sector. Thus, it is difficult to imagine that any strategy to reduce poverty in Kentucky could be highly successful without an economic development strategy that is geographically targeted to the poorest areas in the state.

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[1]The poverty rate is calculated as the percentage of persons living in households with earnings below the poverty threshold. The poverty thresholds are determined by the Census Bureau, and vary according to household size, as well as the number of adults and children in the household. In 2009, the poverty threshold for a family of 4 with two children was $21,756.

[2]Intercensal county-level poverty estimates are published by the Census Bureau's Small Area and Income Estimates series. Currently, the 2009 estimates were not available. Since the state poverty rate did not increase in Kentucky between 2008 and 2009, it is likely that the 2008 county-level estimates will look very similar to the 2009 estimates as well.

[3]Iceland, John. 2006. *Poverty in America: A Handbook*. Berkeley: University of California Press.

[4]Sanford, Kenneth, and Troske, Kenneth, "Why is Kentucky so Poor?," *Kentucky Annual Economic Report*, CBER (2007):1-10.

Bridging the Achievement Gap: Scenarios and Approaches

Michael T. Childress

An educated population is necessary and vital for Kentucky's future economic success. However, economic disadvantage has a significant negative drag on academic performance, and the sheer number of economically disadvantaged students in Kentucky adversely affects overall performance on both state and national tests. Here we examine alternative scenarios of how closing the academic achievement gap would affect Kentucky's national educational rank. We then summarize the lessons learned from studying schools around the country that have helped students overcome the barrier of poverty.

These 10 states—Massachusetts, New Hampshire, Vermont, Minnesota, New Jersey, Connecticut, Pennsylvania, Montana, Colorado, and North Dakota—belong to an exclusive club.* As illustrated in Table 1, their students post the highest scores on the 2009 National Assessment of Educational Progress (NAEP) Reading and Math exams (Kentucky is ranked 32nd). There are other distinguishing characteristics of this group. They have higher incomes, more entrepreneurial energy, more college graduates, healthier populations, lower disability rates, and, arguably, better opportunities for future prosperity (see Table 2). In this article we present various scenarios of elevating student achievement—especially among less-advantaged students—that would move Kentucky up the ranks of states and closer to joining this group.

TABLE 1
Reading and Math NAEP Exams, Percentage Scoring Proficient or Higher, Selected States, 2009

Rank	State	Proficient
1	Massachusetts	49.7%
2	New Hampshire	44.9%
3	Vermont	44.1%
4	Minnesota	44.1%
5	New Jersey	43.8%
6	Connecticut	42.7%
7	Pennsylvania	40.5%
8	Montana	40.3%
9	Colorado	39.4%
10	North Dakota	39.1%
32	**Kentucky**	**33.3%**
50	Mississippi	19.6%

Source: http://nces.ed.gov/nationsreportcard/
Note: NAEP Proficiency indicates the average of the state's 2009 4th and 8th grade reading and math scores.

Economic disadvantage has a significant negative drag on academic performance, and the sheer number of economically disadvantaged students in Kentucky adversely affects overall performance on both state and national tests. During the 2007-08 school year, Kentucky had the nation's tenth highest percentage of students eligible for free- or reduced-price (51 percent) lunches, a reliable proxy for poverty and need. The different outcomes on the NAEP exams are stark (see Figure 1). The percentage of students scoring at or above proficiency is consistently and markedly lower for less-advantaged students in every subject area. Were we to close the substantial academic gaps associated with inequities, Kentucky students would be performing at dramatically higher levels relative to their national peers and our goals for education would be nearly realized.

Kentucky, however, has a long way to go before achieving this vision. An October 2010 report issued by the Council for Better Education, the Kentucky Association of School Councils, and the Prichard Committee for Academic Excellence found that a number of educational achievement gaps continue to hinder Kentucky's overall educational progress. Their analysis concluded that "Kentucky schools are falling especially short

*The author wishes to acknowledge Karin Chenoweth, a Senior Writer with The Education Trust in Washingon, D.C., for allowing me to summarize the major findings from her critically-acclaimed studies, *It's Being Done: Academic Success in Unexpected Schools* (2007) and *How It's Being Done: Urgent Lessons from Unexpected Schools* (2009), both published by Harvard Education Press.

TABLE 2
Selected Characteristics of the Top 10 NAEP States, Kentucky, and the U.S.

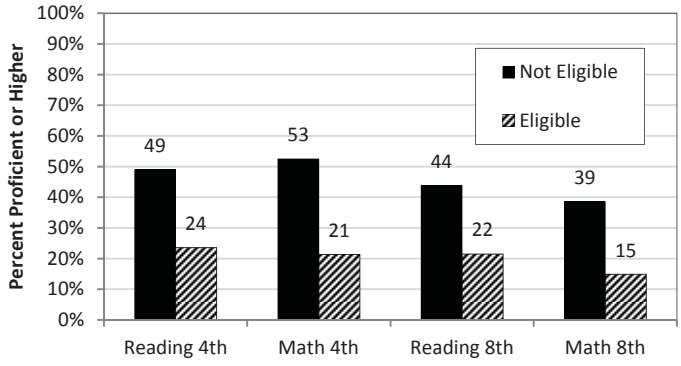
Characteristic	KY	U.S.	NAEP Top Ten
Per Capita Income (2009)	$31,900	$39,100	$44,700
Patents per 1 Million Population (2009)	85	268	355
Bachelor's Degree or Higher (2008)*	19.7%	27.7%	32.2%
Cannot Work Due to Disability (2007)**	11.9%	7.1%	6.4%
Smokers (2009)***	25.6%	17.9%	17.2%
Obesity (2009)***	32.4%	26.9%	24.3

**Percentage of the population 25 years old and over*
***Percentage of the population, 16 to 64, who cannot work because of a physical, mental, or emotional disability*
****Percentage of the population, 18 years old and over*

with students with disabilities, limited English proficiency, and African-American backgrounds… (and) low-income and Hispanic students also scored well below their peers." Some of the specific findings included:

- Of all groups studied, only Asian elementary students and gifted students at all levels have reached proficiency.
- White elementary students are the only other group on track to reach proficiency by 2014. White results are improving too slowly in middle and high school.
- Hispanic students, low-income students, and students with disabilities showed improvement at all levels, but at rates too slow to reach proficiency by 2014.
- African-American student results are flat for middle and high school, with a small improvement at the elementary level.
- Asian student results, though high, declined at all three levels.

FIGURE 1
Kentucky NAEP Results by Free- and Reduced-Lunch Eligibility, 2009



Source: National Center for Education Statistics

- Students with limited English proficiency had declining results in middle and high school levels, with slow elementary improvement.
- On the 0-140 scale used in the analysis, gaps of 17 points or more separate African-American students, students with disabilities, and students with limited English proficiency from their classmates at every level.

Past Performance and Future Goals

Kentucky's national educational rank has improved dramatically since the early 1990s, and educational advocacy groups like the Prichard Committee have challenged Kentuckians to aspire to becoming a top 20 state by 2020. Based on multiple educational attainment and achievement factors, the Kentucky Long-Term Policy Research Center combined multiple factors into a single index, and found that Kentucky climbed to 32nd in 2009. This represents a marked improvement from 43rd in 1992. The index shows that Kentucky has made educational improvements over the years and gained ground on other states. Only two states that were in the bottom ten in 1992 had managed to climb out of that group by 2009—Kentucky and North Carolina.

According to Sam Corbett, the Chairman of the Prichard Committee, to progress further and reach the Top 20, Kentucky citizens, educators, and policymakers will need to focus on these key objectives:

- Implementing new standards, assessments and accountability procedures as mandated under legislation passed in 2009 (Senate Bill 1).
- Expanding preschool funding.
- Strengthening teacher preparation and support.
- Improving the high school completion rate and better preparing students to succeed in college and the workplace.
- Adequately funding education.
- Increasing the number of science, technology, engineering, and math (STEM) graduates.
- Engaging more parents and citizens in support of school improvement.
- Closing achievement gaps between groups of students.

In the sections that follow we focus on one of these objectives: closing achievement gaps between groups of students. Specifically, we examine Kentucky's socioeconomic achievement gap and consider how narrowing it would impact Kentucky's national educational rank.

TABLE 3
Kentucky's Reading and Math NAEP Exams, Percentage Scoring Proficient or Higher, by Subject, Grade, and Year

	1990	1992	1994	1996	1998	2000	2002	2003	2005	2007	2009
Reading 4	-	23	26	-	29	-	30	31	31	33	36
Reading 8	-	-	-	-	30	-	32	34	31	28	33
Math 4	-	13	-	16	-	17	-	22	26	31	37
Math 8	10	14	-	16	-	20	-	24	23	27	27

Source: http://nces.ed.gov/nationsreportcard/

Where is momentum taking us?

The percentage of Kentucky students scoring proficient or higher on the NAEP exams has steadily increased over the years (Table 3). Focusing only on the years from 1998 to 2009, when special accommodations were allowed, also reveals steady gains, especially among the 4th graders. The average of these four NAEP exams for Kentucky in 2009 is 33.3 percent, which ranks our state 32nd among the states (we do not include Washington, D.C. in our analysis).

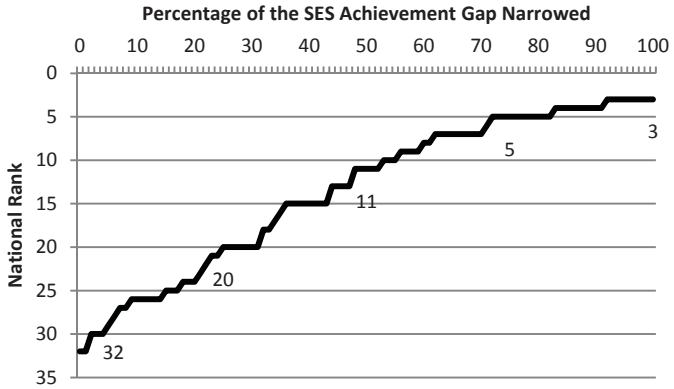
Using bivariate regression on NAEP data from 1990 to 2009, we estimate the percentage of students for each state scoring proficient or higher on each of the four NAEP exams in 2020. We then average these scores to obtain the average NAEP score for each state. For example, extrapolating Kentucky's past NAEP performance to 2020 suggests that the average NAEP score will increase from 33.3 percent in 2009 to 39.8 percent in 2020. It is important to note that this exercise is illustrative rather than predictive. We are not "predicting" that Kentucky's average NAEP score will be roughly 40 percent in 2020. Instead, we are estimating that Kentucky's historical momentum from 1990 to 2009 could result in a 7 percentage point increase by 2020 to about 40 percent. Of course, the trajectory of Kentucky's future NAEP scores could be altered by several different factors between now and 2020.

If Kentucky's historical momentum results in an increase in the average NAEP performance to about 40 percent, then what will Kentucky's rank be in 2020? Despite this increase in NAEP performance Kentucky's rank will still be 32nd—just as it was in 2009. The reason is simple—the other states are not standing still as their historical momentum is leading to improvements just like in Kentucky.

Alternative Scenarios

Using estimated NAEP scores, we generate alternative scenarios of Kentucky's 2020 rank. First, we estimate NAEP scores separately for Kentucky's eligible (less-advantaged) and non-eligible (more-advantaged) students using historical data. For students eligible for free- and reduced-priced lunches we estimate 4th grade math (34 percent proficient) and reading (30), as well as 8th grade math (26) and reading (21) scores. The same estimates for those not eligible for free- and reduced-priced lunches are, 74, 57, 51, and 44 percent respectively. These numbers represent our estimates for the percentage of students scoring proficient or higher on the various NAEP exams in 2020. For the purpose of the analysis, we assume that the percentage of students eligible for free and reduced-priced lunches in 2020 will be the same as it was in 2009—55.8 percent. Averaging the estimates for eligible (27.6 percent) and non-eligible (56.4) students, multiplying by their respective percentages of the student population (55.8 and 44.2 percent respectively), and adding the products is 40.3 percent—the estimated overall percentage

FIGURE 2
Kentucky's Estimated National NAEP Rank in 2020 as the Achievement Gap Narrows



of Kentucky students scoring proficient or higher on the 4th and 8th grade math and reading NAEP exams.

Second, using the historical NAEP scores for the other 49 states we estimated their average NAEP scores for 2020. We assume that the historical trend of the other 49 states will continue along their current paths and regress NAEP scores on the year. We then estimate NAEP scores for 2020 using the regression equation. This assumes, of course, that the other states do not deviate significantly from their own historical momentum.

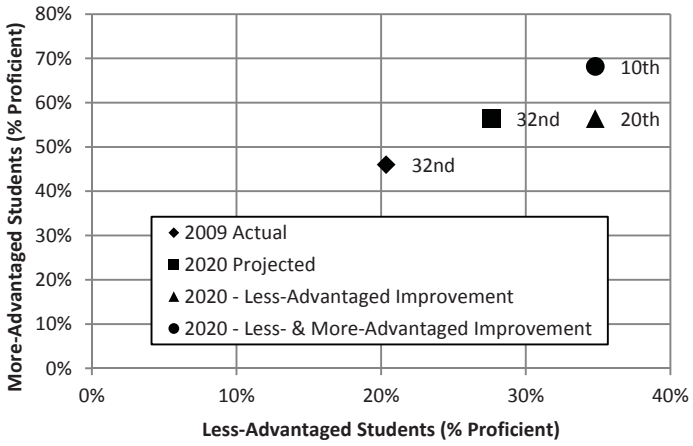
Third, we decreased the socioeconomic achievement gap in Kentucky—but not the other states—by selective amounts to illustrate how Kentucky's rank could change (see Figure 2). As one can see by this figure, improving the performance of less-advantaged students—those eligible for free- and reduced-priced lunches—and decreasing the gap by about one quarter would result in Kentucky's national rank improving from 32nd to 20th. The line represents Kentucky's rank along the full continuum, and the numbers on the figure show Kentucky's rank as the achievement gap narrows.

As one can see, if the achievement of less-advantaged students were to increase and thereby decrease the gap by about one quarter then Kentucky's national rank increases under this simulation from 32nd to 20th. Decreasing the gap by one half in this way would improve Kentucky's national rank to nearly the top ten with a rank of 11th.

Various scenarios of Kentucky's NAEP ranking are illustrated in Figure 3. As a baseline for comparison, Kentucky's actual 2009 rank of 32nd is shown at the intersection of about 20 percent of our less-advantaged students and 46 percent of our more-advantaged students scoring proficient or higher. The next scenario, 2020 Projected, illustrates Kentucky's 32nd ranking at the intersection of 28 and 56 percent, the estimated percentage of Kentucky students scoring proficient or higher in 2020 based on the state's historical momentum.

Next we consider the effect of decreasing the achievement gap by one quarter in the Less-Advantaged Improvement scenario. In this scenario Kentucky's more-advantaged students remain at 56 percent but less-advantaged students increase from the expected 28 percent to 35 percent. Here Kentucky's rank improves to 20th. This would represent a significant increase in the academic performance of Kentucky's less-advantaged students, representing a 15 percentage point improvement in about 11 years, from 20 percent scoring proficient or higher in 2009 to 35 percent in 2020. Both Florida and Massachusetts experienced a similar increase among less-advantaged students over the course of about a dozen years, from the 1996-2000 period to 2009, when their less-advantaged students improved, on average, by 14 percentage points.

FIGURE 3
Various Scenarios of Kentucky NAEP Ranking



Finally, we show in the Less- & More-Advantaged Improvement scenario the effect of increasing the academic performance of all students. While keeping the performance of less-advantaged students at the same level as described above in the Less-Advantaged Improvement scenario, we also increase the percentage of more-advantaged students scoring proficient or higher from the expected 56 percent to 68 percent. This also would represent a significant increase in the academic performance of Kentucky's more-advantaged students, representing a 22 percentage point improvement in about 11 years, from 46 percent scoring proficient or higher in 2009 to 68 percent in 2020. Florida and Massachusetts experienced a similar increase among more-advantaged students over the course of about a dozen years, from the 1996-2000 period to 2009, when their more-advantaged students improved, on average, by about 20 percentage points.

In the next section, a summary of findings is presented from two studies by Karin Chenoweth, a senior writer at The Education Trust. These findings are from her two studies that seek to understand the common threads that characterize schools elevating the academic achievement of students facing huge obstacles. Both volumes, *It's Being Done: Academic Success in Unexpected Schools* (2007) and *How It's Being Done: Urgent Lessons from Unexpected Schools* (2009), are published by Harvard Education Press.

How It's Being Done

She has studied schools that do particularly well by their poor students and students of color for several years. She calls them "It's Being Done" schools because in these schools the work of educating all children is being done. They demonstrate the power that schools have to help students overcome the barriers of poverty and discrimination.

For example, Graham Road Elementary School in Fairfax, Virginia, was one of the lowest-performing schools in the district in 2004. Serving the children of mostly low-income immigrant families, 80 percent of the students meet the requirements for free and reduced-price meals and 80 percent speak a language other than English at home. By 2008 it was one of the top-performing schools in Virginia, with just about every sixth-grade student meeting state standards in reading, math, and social studies. In 2009, sixty percent of sixth-graders exceeded state standards in reading—far above the percentages posted by many much wealthier schools.

Similarly, Ware Elementary on Fort Riley in Kansas is a public school that serves the children of infantry troops. The school is as integrated as the infantry, with about 70 percent of the students qualifying for free and reduced-price meals. In 2001 it was the first school in Kansas to be put "on improvement." Today, just about every student meets or exceeds state standards, making it one of the highest-performing schools in the state.

Those are just two examples of schools that have narrowed or closed achievement gaps among students of different income levels and racial groups. These schools may differ in all their external characteristics—size, location, grade levels, demographics, facilities—but they have done what she calls "inventing the wheel" of making a school run.

The elements of that wheel are:

1) A laser-like focus on what children need to learn
2) Formative assessments
3) Data-driven instruction
4) Teacher collaboration
5) Personal relationship-building

1) A laser-like focus on what children need to learn

To people who don't work in schools, this sounds a bit odd. What else would schools focus on? Actually, most schools focus on many different things. A huge study commissioned by the National Institute of Child Health and Human Development found that a majority of instructional time was spent on low-level worksheet activity, with 17 percent of instructional time spent essentially getting organized—passing out materials, gathering materials, trying to get the overhead projector to work, and so on.

Because children who live in poverty tend to arrive at school with smaller vocabularies than middle-class students, teachers are particularly careful to expose them to a rich vocabulary and work at building their background knowledge.

That doesn't even count what is known in the field as "hobby teaching," which is when teachers teach treasured lessons in dinosaurs or Egyptian mummies not because the lessons fit into the curriculum appropriately but because the teachers love them. Nor does it count the endless district and state mandates to spend time on a variety of topics that can cause schools to lose focus.

High-performing and rapidly improving high-poverty and high-minority schools keep their focus. They think deeply about what children need to learn, have a good idea of where their students are, and plan on how to get them from here to there. For example, first-graders need to be able to read simple picture books independently. So, kindergarteners are carefully taught the sounds of English and how they map onto the alphabet and how to blend those sounds together to make words, and they spend a lot of time on nursery rhymes, singing, and sound games. Because children who live in poverty tend

to arrive at school with smaller vocabularies than middle-class students, teachers are particularly careful to expose them to a rich vocabulary and work at building their background knowledge.

It should be noted that although all these schools spend some time preparing students to take state assessments—they never want students to be blindsided by the format and language of a test—that is not the focus of their instruction. Instead of focusing on tests, they focus on their state's standards. In states with weak or incomplete standards, some schools have had to invent their own standards or look to other states.

The Common Core Standards—which Kentucky recently adopted—should be helpful to educators all over the country by giving teachers a clear sense of when students need to learn to capitalize proper nouns and when they need to know how to multiply fractions. They should be even more helpful to students who move frequently and now have to contend with vastly different standards every time they change schools. Because poor students tend to be highly mobile, this is an important step in helping schools close achievement gaps.

…when teachers are able to say, "Hey, can you come to my classroom to teach my kids so I can watch what you do?" they are well on the way to ensuring that all their students will be learning at a high level.

2) Formative assessments

Many teachers and principals complain that they are drowning in assessments. And, in some places, that is a legitimate complaint. But one thing to remember is that kids have always had to take a lot of tests—most grownups can remember the weekly spelling, math, vocabulary, and chapter tests, not to mention unit tests and annual norm-referenced tests. The difference today is not that kids are taking more tests, necessarily, but that teachers are expected to use those tests to inform their instruction.

Here's an example from Karin Chenoweth:[9] *When I was in school I took what we called the nationally norm-referenced Iowa Test of Basic Skills (ITBS). Every year my results were plotted on a line graph, and for the most part it was a steady line except for the chasm known as "geography." I remember sitting in eighth grade looking at the test thinking, "How should I know the distance Greenland is from the Equator? I don't know where the Equator is. I'm just not very good at geography." The question was accompanied by a map of the world with latitude and longitude marked, and I remember the eureka moment of a dimly remembered half-memory that the Equator was 0 degrees latitude. What is interesting to me about that memory is that no one ever took a look at my scores and said, "Hmm, wonder what's going on with Karin in geography. What information does she need to help her in that area? What is she missing?" The tests I was given were used solely to give me grades and decide what reading group and academic track to assign me to, not to ensure that I was learning what I needed to know.*

Educators in It's Being Done schools ask those kinds of questions all the time. They do it regularly and frequently through the use of what are called "formative assessments," which are assessments used not to assign grades but to see what students have and have not learned during instruction.

Formative assessments are built around the lessons being taught. So, for example, if the seventh-grade math team has decided that this week they are teaching the relationship of decimals, fractions, and percentages, they might together build an assessment that will let them see which of their students have mastered the material and need a new challenge and which need additional instruction and practice.

3) Data-driven instruction

In too many places, educators are unable to make heads or tails of data in order to help their students. In It's Being Done schools, educators are very careful to choose the most telling data and study them carefully for the lessons they hold. So, to use the example of the formative assessment above, teachers will not only use the results of the assessment to see where their students are but also to see patterns of their instruction that would otherwise be invisible to them. So, if 80 percent of the students in one class fully understand the different ways ratios are expressed and only 40 percent of another class has mastered that topic, an important conversation can now begin.

This is very difficult for teachers, who are not used to having what they consider to be their failures publicly discussed. But when teachers are able to

say, "Hey, can you come to my classroom to teach my kids so I can watch what you do?" they are well on the way to ensuring that all their students will be learning at a high level.

For example, first-year kindergarten teacher Laura Robbins at Graham Road Elementary School in Fairfax, Virginia, when looking at the data with her fellow teachers was able to see that her students didn't have as many "sight words"—words readers recognize automatically without having to sound them out—as students in other classrooms. She asked her fellow teachers for help and advice. The following year, they noticed that her students knew more letters than theirs and she did a little letter-recognition workshop for them, complete with shaving cream and Play-Doh.

Similarly, teachers and administrators in It's Being Done Schools use the results on the state assessments to think about how they plan instruction for the year. If 100 percent of their students mastered punctuation but only 20 percent demonstrated that they understood noun-verb correspondence, they might decide to spend less time on the first and more on the second.

These are the crucial interactions that take place in It's Being Done schools to ensure that their students learn at a high level.

Underneath all of these practices of It's Being Done schools is a fundamental understanding that all children can learn, no matter what their background, and that schools have an obligation to helping them.

4) Collaboration

No one teacher can be expected to know all there is to know about the curriculum, how to teach it, and all their students. But in It's Being Done schools, each teacher is expected to bring something to the table and to work together to ensure that each student gets the benefit of that collective wisdom.

It should be noted that this is not how schools have traditionally operated. Traditionally, each teacher has been the commander of his or her classroom. Teachers often expect to be able to shut their doors and be left alone except for an occasional administrator coming in to criticize student deportment or the bulletin boards. In It's Being Done schools, teachers still have enormous authority, but their classroom doors are open and there is a free flow of information among teachers and administrators who continually observe instruction and making sure that a good practice in one classroom is shared among all the classrooms.

Because teachers are often unused to this kind of deep collaboration with their colleagues on standards, curriculum, assignments, assessments, and instruction, it is necessary for It's Being Done principals and assistant principals to teach them. They often need to set agendas for meetings and help teachers talk about their data without being defensive or frightened that failure will be greeted as proof of inadequacy rather than something that needs to be learned from and fixed.

5) Personal relationship-building

Educators know that building personal relationships with students is crucial. For students to trust teachers enough to learn from them, they must feel that the teachers have their best interests at heart and care deeply that they learn. This trust is established by the respect teachers show them. When Deb Gustafson first became principal of Ware Elementary in Kansas, she was taking over a low-performing school with a very disrespectful atmosphere testified to by the hundreds of suspensions that had occurred in the previous years. The first thing she told returning teachers was that the only thing she would discipline them for was speaking disrespectfully to students. Teachers objected, saying that they were responding to disrespectful students, and she told them that it is up to adults to set the tone of a building, not children. Because of the care taken to establish respect, today it is what one teacher calls "a kind place."

But this is not just about being nice. It is about building personal relationships in which everyone is expected to work at high levels and continually improve. She calls it "relentlessly respectful and respectfully relentless," and it plays out throughout the school buildings between teachers and students, teachers and teachers, and administrators and teachers.

Underneath all of these practices of It's Being Done schools is a fundamental understanding that all children can learn, no matter what their background, and that schools have an obligation to help them.

None of what is listed above is wildly innovative. Expert educators have long known that these are the important things to do, and many inexpert educators are at least vaguely aware that they should be doing them. But one thing further characterizes It's Being Done schools, and that is rigor of analysis and quality of execution. They bring a brutal honesty and real-world competence to the work.

In other words, It's Being Done schools do just about everything right. It isn't easy to do everything right, and it takes a great deal of work day in and day out, but if we are to close achievement gaps and help all students learn a great deal more, that is what we need our schools to do.

Conclusion

Clearly, the context of labor market expectations has changed dramatically. Workers, as well as companies, now face global competition. Without a sufficient intellectual foundation to bring ideas to fruition in the marketplace, many fear that our nation's standard of living will decline. To avoid continued economic stagnation, incomes that year after year lag the national average, Kentucky must continue to vigorously pursue its ascent in educational status. This analysis has illustrated the potential and considerable leverage offered by focusing on less-advantaged students. In some areas, research might suggest the need for new investment, but a more informed, focused use of the significant resources we now deploy to public education may yield gains in the classroom, the workplace, and our larger economy.

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[1]The National Assessment of Educational Progress (NAEP) is a nationally representative assessment in various subjects. Here we focus on reading and math. For more information on NAEP, refer to <http://nces.ed.gov/nationsreportcard/>.

[2]National Center for Education Statistics, Table A-25-3. Number of public elementary and secondary school students and percentage of students in school eligible for free or reduced-price lunch, by school level, region, and state: School year 2007-08 <http://nces.ed.gov/programs/coe/2010/section4/table-csp-3.asp>.

[3]We use the terms "eligible for free- and reduced-price lunches" and "less-advantaged" students interchangeably throughout this article. Likewise, we also refer to those students not eligible for free- and reduced-price lunches as more-advantaged students.

[4]Press Release, October 13, 2010, "Achievement Gaps Remain Severe, Education Groups Report."

[5]Achieving the Top 20 by 2020: An Update (Prichard Committee for Academic Excellence, Oct. 2010), <http://prichardcommittee.org/>.

[6]Amy Watts, "Kentucky Ranks 32nd on Educational Index," *Policy Notes*, Kentucky Long-Term Policy Research Center, 34 (May 2010), <http://www.kltprc.info/policynotes/pn0034_education_index.pdf>.

[7]Sam Corbett, "Reach for excellence in education latest report shows gains, challenges," *Lexington Herald-Leader*, October 10, 2010.

[8]Division of Nutrition and Health Services, "FY 2010 Qualifying Data (Oct 2009), "available at <http://scn.ky.gov/octdataout/rptlist.htm>.

[9]E-mail to the author, December 2010.

Dual Enrollment in Kentucky: Building Paths to Higher Prosperity

Heidi Hiemstra, Tim Shaughnessy, & Amy Watts

Whether Kentucky is successful in increasing the number of college graduates will be a determining factor in expanding economic prosperity and increasing per capita incomes. As part of the state's multifaceted approach, dual enrollment programs, which offer college-level courses to high school students, offer the promise of improving academic outcomes. Here we discuss findings from studies that have assessed the academic impact of dual enrollment programs and examine whether Kentucky's efforts are sufficiently large to make a significant difference in the state's overall strategy to increase the number of four-year degree holders.

Increasing the number of college graduates in Kentucky will be a determining factor in whether the state's per capita income increases relative to the U.S. average in the future.[1] Dual enrollment, a program which allows high school students to take college courses for credit, provides students with a head start on college and could help the state with its overall goal to increase the number of degree holders. Dual enrollment advocates suggest that the socialization benefits of early exposure to both the college atmosphere and the rigor of a collegiate education along with the pre-college earned credits can improve the high school-to-college transition, thereby improving a student's chances of success, including graduating in a reasonable timeframe. This article briefly discusses some of the literature assessing the impact of dual enrollment on academic outcomes and presents data on the scope of dual enrollment in Kentucky. Two questions are addressed:

1) *How does participation in dual enrollment classes while in high school affect one's decision to enter college, remain in college (persistence), academic performance (college GPA), and likelihood of graduating in four years?*

2) *How many students are taking dual enrollment classes in Kentucky and is it enough to make a meaningful difference in the state's overall strategy to increase the number of four-year degree holders?*

Academic Outcomes

Research on the relationship between dual enrollment and college success is somewhat mixed but generally positive. While a 1999 study[2] found that dual enrollment significantly influenced students' ability to persist and graduate—even after controlling for ACT scores—a more recent 2008 study found that dual enrollment alone did not improve their likelihood to earn a degree as compared to non-participants, but did shorten the time to degree.[3] However, this same study found that dual enrollment promotes immediate entry and persistence which could improve students' chances at acquiring postsecondary credentials as compared to non-participants. Regardless, both studies tout the positive advantages dual enrollment students have over their non-participatory counterparts. Along these lines, in 2008 the Community College Research Center (CCRC) published the results of an analysis of postsecondary education outcomes resulting from dual enrollment programs in Florida and New York City.[4] Generally the results were quite positive, showing statistically significant differences between dual enrollment participation and a number of postsecondary education outcomes for students in Florida, such as an increased probability to enter college, persist beyond the first term, have higher grades, and earn more course credits, but somewhat less definitive results for students in New York City.

A common theme in the literature is that academically prepared high school students do better in college than others. Two studies from

TABLE 1
Summary of Literature Review Findings

Study	*Controlled for ACT?*	*Was there a statistically significant improvement in these outcomes for dual enrollment students compared to non-dual enrollment students?*			
		Persistence	GPA	Graduation Rates	Time to Degree
Council on Postsecondary Education, 2006	Yes	No	Yes	n.a.	n.a.
Shaughnessy, 2008	No	Yes	n.a.	Yes	Yes
Swanson, 2008	No	Yes	n.a.	No	Yes
Delicath, 1999	Yes	Yes	n.a.	Yes	No
CCRC (Florida) 2008	Yes	Yes	Yes	n.a.	n.a.
CCRC (New York City) 2008	No	No	Yes/No*	n.a.	n.a.

NOTE: "na" indicates the study did not analyze this particular outcome, therefore it is not applicable.
**Here the results were mixed, with a statistically significant difference in first term GPA (significant at 10%), but not by the fourth term.*

the U.S. Department of Education followed two different cohorts of high school graduates to explore the determinants of college persistence and, ultimately, graduation.[5] The author concludes that "[t]wo national longitudinal studies, a decade apart, have told similar stories." Each study found that the academic intensity of the student's high school curriculum still counts more than anything else in precollegiate history in providing momentum toward completing a bachelor's degree. Both studies also tell the story that less than 20 credits by the end of the first calendar year of enrollment is a serious drag on degree completion. The groundwork laid by this research points to the potential for dual enrollment to complement or enhance the benefits of a rigorous high school curriculum and give students a head start on college by entering with credits already earned.

In recent years two Kentucky-specific reports examine the relationship between dual enrollment participation in high school on student performance at the postsecondary level. In 2006, the Council on Postsecondary Education (CPE) published a report analyzing the effects of dual enrollment on matriculation to college, persistence, and GPA.[6] In 2008, a study by Tim Shaughnessy analyzed the effects of dual enrollment on persistence and bachelor's degree attainment rates within four years.[7] The two Kentucky studies focus on those students attending four-year institutions, and they both provide evidence of academic success related to dual enrollment participation.[8] The CPE study concluded that the 2002 cohort students participating in dual enrollment classes achieved slightly higher GPA's, but they could not determine that dual enrollment alone had an effect on matriculation and retention by the sophomore year when controlling for ACT score. However, 41 percent of the students included in this study took technical and occupational courses while dually enrolled, not courses that would have necessarily prepared them for success in a Bachelor's degree program. Shaughnessy's study concluded that for the 2004 college cohort, students who took college preparatory courses in a high school dual enrollment program had statistically significant higher rates of freshman-to-sophomore retention and bachelor's degree attainment than did students who did not participate in dual enrollment. The conflicting findings on higher persistence rates suggest that the inclusion of students who took technical, occupational and other non-college-preparatory dual enrollment courses "washes out" the positive impact of academic dual enrollment on later college performance, but that college-preparatory course taking through dual enrollment has a positive effect on students' later college success.

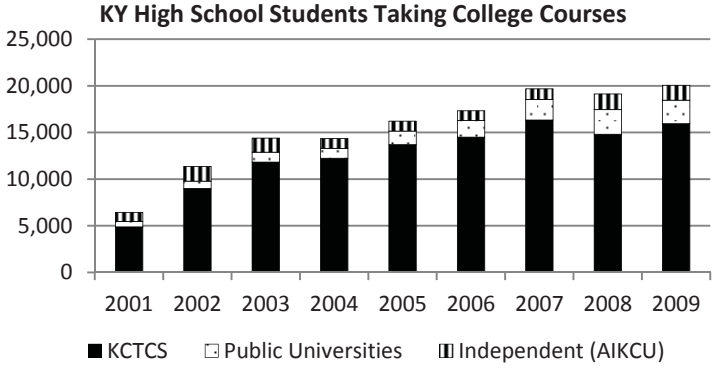
Summary results of these studies are shown in Table 1. In general, dual enrollment is associated with positive postsecondary education outcomes. Because students choose to take these academically-challenging classes, self-selection bias could contribute to some of these positive outcomes. With this in mind, we include a column in Table 1 to indicate whether an attempt was made in the study to control for the student's academic qualities, such as their ACT sore. In the next section we examine the number of Kentucky students participating in dual enrollment programs.

Dual Enrollment Participation

Participation in dual enrollment has grown over the years for all institution types in Kentucky (see Figure 1).[9] Most of the growth occurred at the

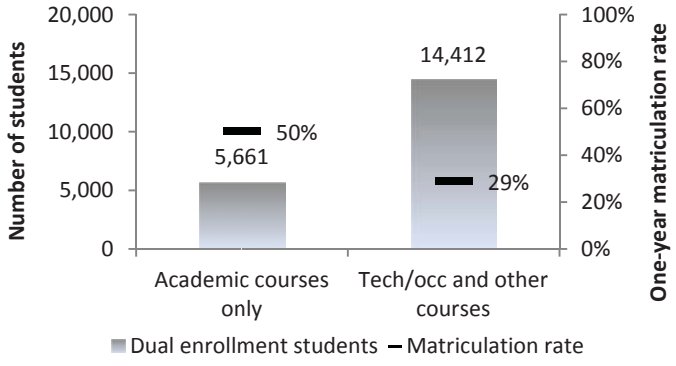
Kentucky Community and Technical College System (KCTCS), which is by far the largest provider of dual enrollment courses. Nearly 80 percent of all dual enrollers in the fall of 2009 dually enrolled through the KCTCS. While dual enrollment students take a wide range of courses through the KCTCS, Figure 2 shows one outcome of the growth of dual enrollment at KCTCS: the majority of students (72 percent) does not just take college preparatory courses, but take technical, occupational, business and other courses as well. Figure 2 also shows the difference in the rate at which dual enrollers matriculated into college after high school when those who took college preparatory courses are compared with students who took other types of courses. Fifty percent of dual enrollment students who took college preparatory courses went to college after high school, compared to 29 percent of those taking other courses. The data suggest that Kentucky's current dual enrollment program serves more as an accelerated vocational and technical school program that allows high school students to graduate with marketable workplace skills, a valuable and important outcome, rather than a way to promote college matriculation after high school and bachelor degree attainment.

FIGURE 1
KY High School Students Taking College Courses



Note: Fall semester headcount enrollment, including dual credit students and those receiving only college-level credit
Source: CPE KPEDS

FIGURE 2
College Matriculation by Type of Dual Enrollment Courses Taken, 2009



Source: CPE KPEDS

Future Public Policy Issues

Getting more students through a Bachelor's degree program in a reasonable timeframe is a priority for Kentucky given the necessity to increase the number of bachelor's degree holders in the state and its limited resources for funding postsecondary education. Research suggests that dual enrollment programs are a possible route to achieving this goal in a low-cost fashion, given the infrastructure already in place to provide them. Giving every student the opportunity to earn college credits in high school is one of the priorities voiced by Governor Beshear to his recently-formed task force on transforming education in Kentucky.[10] Dual enrollment may be a potential portal to improving postsecondary outcomes that lead to higher bachelor degree attainment rates, but the focus of the current system would need to change to better reflect this goal. Specifically, the program would need to target more students pursuing postsecondary academic tracks.

The Kentucky Council on Postsecondary Education and the Kentucky Department of Education are advocating the expansion of dual credit as a strategy to increase college and career readiness and achieve the mandated 50 percent reduction in college remediation by the General Assembly.[11] The Kentucky Community and Technical College System has identified dual credit as a transformational strategy and is exploring the development of a consistent, statewide program using the standards of the National Alliance of Concurrent Enrollment

Partnerships as a framework. KCTCS is moving towards establishing and coordinating dual credit programs from a system perspective; offering rigorous college coursework, taught by SACS (Southern Association of Colleges and Schools) credentialed faculty, with student expectation and assessment at the same standards as those courses taught on campus. Dual credit curriculum will be targeted to university transfer and high-wage, high-demand careers that require postsecondary education as an entry point. Students will receive intrusive advising, and program leadership will emphasize extensive communication with students, parents, and partner institutions.[12]

Although studies suggest that dual enrollment programs may be a means of improving student outcomes, like other educational programs, several issues have emerged including maintaining access for low-income and low-achieving students, maintenance of academic quality, and inconsistent policies regarding dual enrollment funding and acceptance of credits. Fortunately, the state has taken steps to address some of these issues through legislation or oversight. Currently, students must meet entrance requirements set by postsecondary institutions in Kentucky to earn college credit in dual enrollment programs. Legislation directs the CPE, collaborating with the Kentucky Board of Education and the Education Professional Standards Board, to develop guidelines for content knowledge and teacher training in dual enrollment and dual credit programs. However, when it comes to funding and credits, Kentucky does not address the issue of tuition for dual enrollment programs in either legislation or rules, leaving the programs vulnerable to changing market conditions. KCTCS, the largest provider of dual enrollment courses, has historically waived tuition for the majority of their dual enrollment students, which has greatly expanded student access to these courses. However, the institutional funds which support these programs have been reduced in reaction to state budget cuts, and can be seen in the drop in dual enrollment in KCTCS between fall 2007 and fall 2008. Without clear state support, the financial burden will increasingly rest on students and their families to pay the full cost of these classes.[13]

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[2]Delicath, Timothy A., 1999, "The Influence of Dual Credit Programs on College Students' Integration and Goal Attainment," *Journal of College Student Retention*, Vol. 1(4) 377-389.

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[6]Kentucky Council on Postsecondary Education, 2006.

[7]Shaughnessy, Timothy, *An Investigation of High School Dual Enrollment Participation, Year-to-Year Retention Levels, and Bachelor's Degree Attainment within Four Years in the Commonwealth of Kentucky*, a dissertation submitted to the Faculty of the College of Education, Spalding University, Louisville, KY, April 2009.

[8]Kentucky Council on Postsecondary Education, 2006, pp. 24. The Council study limited the sample to dual enrollment students at four-year public institutions only, while the Shaughnessy study included dual enrollment students at both four-year public and independent institutions.

[9]These data refer to both dual enrollment and dual credit students. Dual credit students are a subset of dual enrollment students and earn both high school and college credit for the classes they take.

[10]Kocher, Greg, "Beshear discusses vision for new education task force," *The Lexington Herald-Leader*, February 3, 2010 <www.kentucky.com/>

[11]Kentucky Department of Education (KDE), & Kentucky Council on Postsecondary Education [KCPE], (2010). *Unified Strategy for College and Career Readiness Senate Bill 1 (2009), May 25, 2010*. CPE/KDE: OTL: AP May 11, 2010 Draft.

[12]Kentucky Community and Technical College System [KCTCS], (2010). *President's Leadership Team Report; Dual Credit Strategy Recommendation*, October 26, 2010.

[13]Education Commission of the State, High School Database, accessed online, Feb 25, 2010 <http://www.ecs.org>. There is no specific policy for dual enrollment credits, but all of Kentucky's public four-year institutions accept all KCTCS credit whether they are earned while in high school or not.

Oral Health in Kentucky: Current Status and Future Trends

Michael T. Childress & Michal Smith-Mello

Good oral health can be viewed as a public good since it affects a state's capacity to realize economic development and increase overall prosperity. Researchers are increasingly drawing connections between oral health and a number of other health factors, ranging from diabetes to heart disease. Trends in Kentucky's oral health have been improving, but still trail the competitive state and U.S. averages. Moreover, there are a number of potential obstacles that could forestall improvements in Kentucky's future oral health. Creative thinking around the issue of improving oral health will be needed to help many Kentuckians become healthier, more productive members of society.

The oral health of our citizens is important for several reasons.* First, it is important as a quality-of-life issue; healthy teeth and gums can translate into a better appearance, higher self-esteem, and more self-confidence, which are key to a better quality of life. Second, missing and decayed teeth or diseased gums can make it difficult to find employment and perform well on the job, adversely affecting the pocketbooks of individuals and families as well as the state's capacity to realize economic development and increase prosperity. Third, and perhaps most important, missing teeth, inflamed gums, and cavities often make it difficult to eat a balanced diet, and increasingly research links poor oral health to illness, chronic disease, and even early mortality. Though the proverbial chicken-or-the-egg question has yet to be definitively answered, the connection is clear: poor oral health routinely coexists with heart disease, cancer, diabetes, and other illnesses. Behavioral factors such as smoking and poor diets have clearly established causal links to poor oral health. While real public health gains have been made in oral health here, Kentucky's overall status can best be termed as below average.

Nationally, Kentucky had the fourth highest percentage of edentate persons, those who have lost all their natural teeth due to tooth decay or gum disease,[1] among working-age adults (age 18 to 64) in 2008, and the seventh highest percentage of older adults (age 65 and older).[2] Also, as shown in Table 1, Kentucky had the seventh highest percentage of edentate adults aged 18 and older.[3] Kentucky ranks ninth for adults who have lost at least one permanent tooth due to tooth decay or gum disease and fifth for adults who have lost 6 or more teeth.[4] Across the board Kentucky's oral health indicators are worse than the U.S. and competitive state averages,[5] including the percentage of Kentucky adults who have visited a dentist or dental clinic within the past 12 months.[6]

TABLE 1
Oral Health Indicators, U.S., Competitive States, and Kentucky, 2008

Adults, 18 and Older	US (%)	CS (%)	KY (%)	KY (rank)†
Missing at least one permanent tooth	45*	47*	51	9
Missing 6 or more teeth	15*	18*	22	5
Missing all teeth	5*	6*	8	7
Visited dentist in last 12 months	70*	69*	64	44
Working Age, 18 to 64				
Missing at least one permanent tooth	39*	41*	44	8
Missing 6 or more teeth	10*	12*	16	5
Missing all teeth	3*	3*	5	4
Visited dentist in last 12 months	70*	70*	66	44

Source: Author's analysis of data from Centers for Disease Control and Prevention (CDC), Behavioral Risk Factor Surveillance System Survey Data, Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2008
Note: The competitive states are AL, AR, FL, GA, IL, IN, LA, MI, MO, MS, NC, OH, SC, TN, VA, & WV.
**These percentages are statistically different from the Kentucky percentages (alpha=.05).*
†Frequently there is not a statistically significant difference between the states ranked close to each other. For example, at 50.7% (shown above as 51%) Kentucky is ranked 9th for adults missing at least one permanent tooth, but Kentucky is not statistically different (alpha=.05) from the states ranked 6th through 11th.

*The authors would like to acknowledge Dr. Jim Cecil, Dr. Raynor Mullins, and Dr. Pam Stein for their comments on an earlier draft of this article.

TABLE 2
Indicators of Oral Health in Kentucky, 1996 and 2008 (Percentage of Adults, Age 18 and Older)*

	At Least One Permanent Tooth Removed Due to Decay or Disease		Visited Dentist Within the last 12 Months	
	1996	2008	1996	2008
Total Population	63	51	62	64
Income				
Less Than $15,000	77	70	36	39
$15,000 to $24,999	68	72	52	45
$25,000 to $34,999	67	60	63	58
$35,000 to $49,999	52	51	73	63
$50,000 and Over	54	35	82	79
Education*				
Less than HS	90	85	33	34
HS Diploma	74	69	62	55
Some College	64	52	66	67
College Graduate	41	32	78	81
Race				
White (non-Hispanic)	64	50	61	65
Black (non-Hispanic)	64	54	69	61
Residence**				
Non-Metro	62	59	67	58
Metro	55	44	67	70
Age				
18 to 24	26	14	77	71
25 to 34	38	31	63	65
35 to 44	62	41	72	66
45 to 54	77	57	60	65
55 to 64	87	71	57	63
65 and Older	90	83	41	58
Gender				
Female	64	53	62	68
Male	63	48	60	61

Source: Author's analysis of data from Centers for Disease Control and Prevention (CDC). Behavioral Risk Factor Surveillance System Survey Data. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 1996 and 2004.
**Educational attainment percentages are for adults 25 years old and older.*
***County classification of metro is based on the 2003 urban influence code.*

While dental health has improved markedly here as water fluoridation, one of the nation's highest rates at 96 percent,[7] has helped reduce cavities and extractions, the findings of a 2001 state survey of children suggest that a high percentage of even very young children in Kentucky may be in pain every day, a circumstance that could affect overall health as well as the capacity to learn. Among other things, the survey found disturbingly high levels of cavities among two- to four-year-olds (47 percent), and visible, untreated tooth decay among 29 percent of third and sixth graders.[8] As we describe below, these conditions could be precursors to serious illness and disease.

The Oral-Health, Whole-Body-Health Link

A growing body of research confirms an association between poor oral health and a number of poor health outcomes. From pre-term births[9] to evidence from Harvard researchers of a dramatically higher incidence of deadly pancreatic cancer among men with periodontal (gum) disease,[10] the associations between poor oral health and disease or chronic illness are extensive and well documented. Multiple studies in the last several years have begun to describe a bi-directional relationship between diabetes and periodontal disease. In other words, not only does diabetes impair healing and thus increase the risk of periodontal disease but many studies point to periodontal disease impacting diabetic outcomes. For instance, one longitudinal study looked at 9,296 participants with no diabetes, but 20 years later those with intermediate periodontal disease at the beginning of the study were twice as likely to develop diabetes as healthy subjects.[11] Other studies have found that diabetic patients with severe periodontal disease have 6 times the risk of worsening glycemic control compared to those without periodontitis,[12] that treating periodontal disease improved glycemic control,[13] and that diabetes patients with severe gum disease have been found to be more likely to die from complications.[14] Finally, researchers have found an association between the severity of diabetic retinopathy and the severity of periodontal disease.[15]

Associations have also been found between periodontal disease and the incidence of heart disease and stroke,[16] and tooth loss has been linked to heart disease.[17] In one large-scale study, markers of inflammation in the mouth were linked to coronary heart disease in both men and women.[18] Nevertheless, the American Heart Association cautions as would most researchers that "no substantial evidence" yet shows that oral bacteria causes heart disease or causes or worsens cardiovascular events. As AHA President Augustus O. Grant observes, people who are poor, under- or uninsured, or simply have poor health habits also tend to have poor dental health.[19] And researchers are also drawing connections between oral health and dementia. Researchers at the University of Kentucky have found that subjects with 9 or fewer teeth had significantly increased risk for becoming demented during 12 years of follow up.[20]

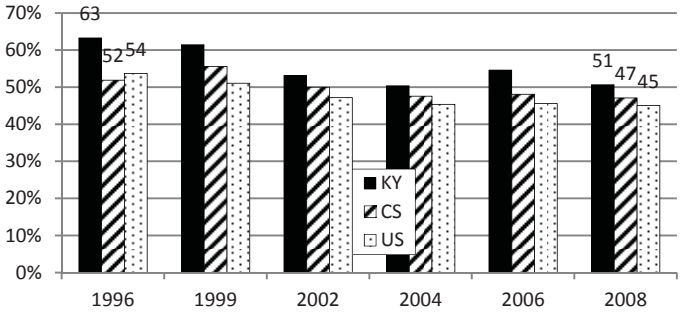
Whether poor oral health causes or contributes to poor health outcomes, the web of associations appears strong in Kentucky where poor oral health coexists with high rates of chronic disease. In 2000, the American Heart Association ranked the mortality rate for cardiovascular disease (CVD) in Kentucky among the worst in the nation at 48th; 73 of Kentucky counties had CVD mortality rates higher than the national average at the time.[21] More recently, a 2005 survey conducted for the Centers for Disease Control and Prevention found that Kentucky ranked behind only West Virginia in the prevalence of heart disease, the percentage of the population who are either heart attack survivors or have angina (chest pain)/coronary heart disease.[22]

Not coincidentally, Kentucky, along with West Virginia, led the nation in smoking rates at 25.6 percent of the population in 2009.[23] Smoking, observes Dr. James Cecil, who led Kentucky's Oral Health Program for the Department of Public Health from 2001 to 2007, prevents healing in the mouth, increasing the likelihood of periodontal disease and any disease it may cause or exacerbate. Further, diabetes and poor oral health often coexist because diabetes also retards the healing process. Because obesity is linked to diabetes, the sixth leading cause of death in the United States, the relatively high portion of Kentuckians who report being overweight (34.7 percent) and obese (32.4 percent) may be indicative of high rates of poor oral health and, possibly, other diseases and illnesses.[24]

Income, Costs Discourage Care

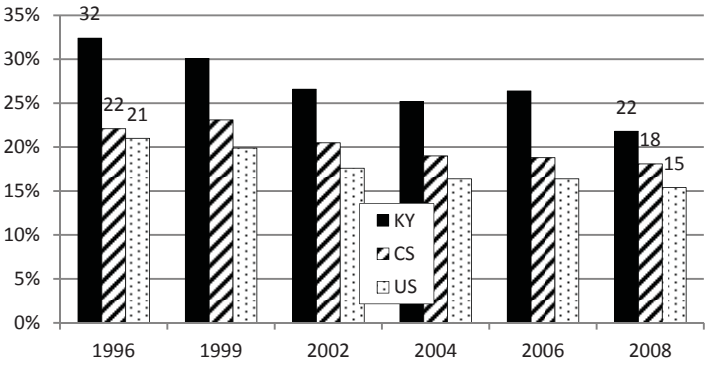
While dental care exacts high out-of-pocket costs at all income levels, that share is clearly more burdensome for lower-income families and households. National data show that the uninsured in Kentucky and the state's disproportionately poor older population likely face significant economic disadvantage in their ability to afford dental care. In 2007, the uninsured shouldered 76 percent of the cost of dental care compared with 41 percent for those with any private coverage, and 23 percent for those with public coverage only.

FIGURE 1
Percent of Adults with at Least One Permanent Tooth Removed Due to Tooth Decay or Gum Disease, KY, Competitive States, and the U.S.



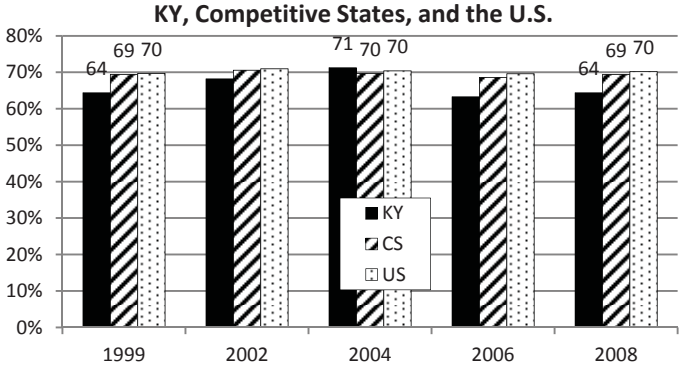
Source: Behavioral Risk Factor Surveillance System estimates derived by the authors.

FIGURE 2
Percent of Adults, Age 18 and Older, Missing 6 or More Teeth, KY, Competitive States, and the U.S.



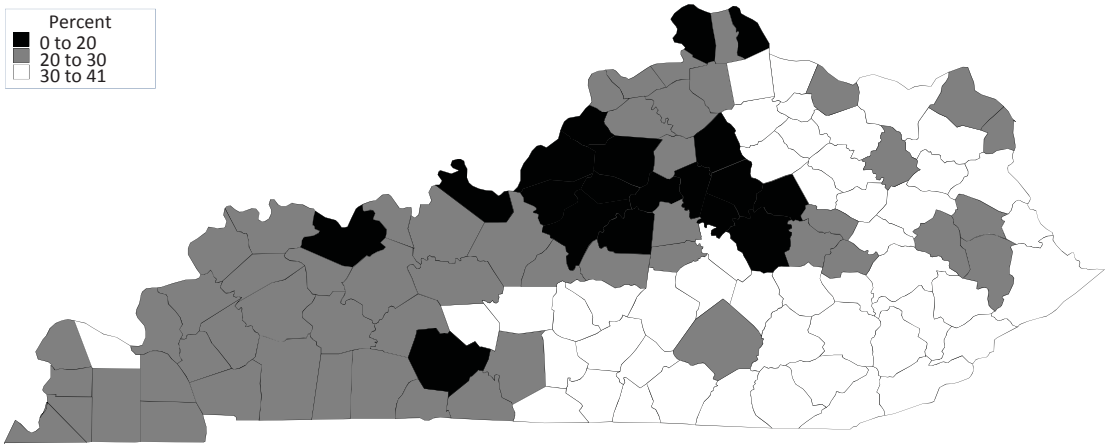
Source: Behavioral Risk Factor Surveillance System estimates derived by the authors.

FIGURE 3
Percent of Adults Who Visited a Dentist, Hygientist, or Dental Clinic in the Last Year, KY, Competitive States, and the U.S.



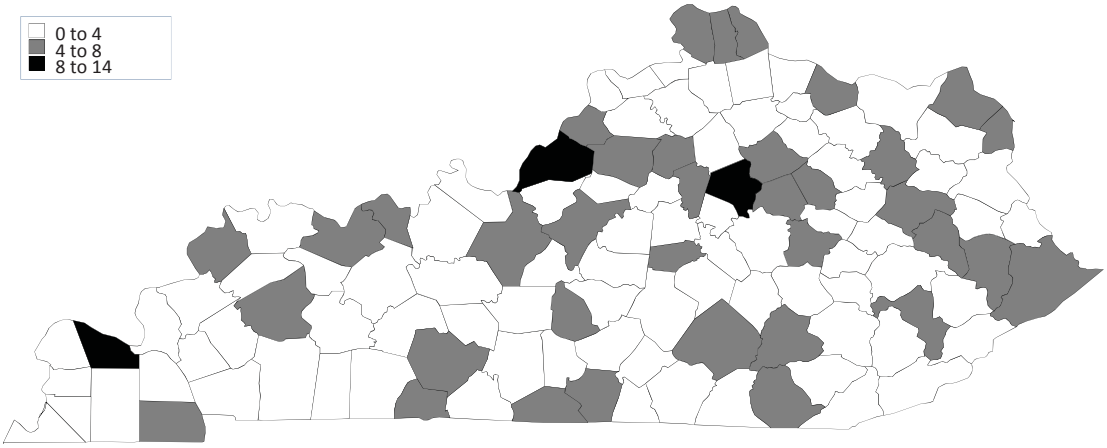
Source: Behavioral Risk Factor Surveillance System estimates derived by the authors.

FIGURE 4
Percentage of Adults Missing 6 or More Teeth



Source: Centers for Disease Control and Prevention (CDC). Behavioral Risk Factor Surveillance System Survey Data. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2002-2008

FIGURE 5
Licensed Dentists per 10,000 Population



Source: U.S. Census Bureau and the Kentucky Board of Dentistry

Older individuals, specifically those aged 45 to 64 and 65 and older, also had higher cost burdens, 49 percent and 70 percent, respectively, compared with an average of 42 percent for all individuals under age 65. Likewise, those who report fair or poor health status assume higher cost burdens.[25] Consequently, Kentucky's relative poverty, particularly the disproportionate poverty of its older citizens, and its generally poor health status are likely strong contributors to the state's poor oral health profile.

In effect, higher out-of-pocket costs for health care discourage people of all ages from seeking care due to the cost.[26] A 2005 survey for the Kentucky Health Insurance Study found that 30 percent of working-age Kentuckians (18 to 64) had a dental problem in the past year but did not see a dentist because of the cost. Further, 20 percent of respondents reported that either their spouse or their children had not gotten dental care when they needed it due to the cost. Despite 56 percent of Kentuckians having some type of dental insurance

in 2005, 20 percent of the insured reported not seeking care for a dental problem due to cost.[27] Thus, high cost burdens for care and a large population of people with no dental insurance likely discourage many from seeking dental care they need.

Trends Show Improving Oral Health, But Challenges Remain

While national rankings form a discouraging picture, indicators of oral health among Kentucky adults generally improved between 1996 and 2008.[28] We find an across-the-board improvement for virtually all social, economic, and demographic groups for being at risk for permanent tooth extraction,[29] but the likelihood of visiting the dentist decreased for many between 1996 and 2008 (see Table 2).

Over this time period, the percentage at risk for permanent tooth extraction decreased from 63 to 51 percent (see Figure 1), the percentage missing six or more teeth declined from 32 to 22 percent (see Figure 2), but the percentage who visited a dentist in the prior year remained unchanged after improving to around 70 percent in 2004 (see Figure 3). While Kentucky lags both the U.S. and the competitive states on each of these indicators of oral health, the gap has narrowed considerably. For example, in 1996 one third of Kentucky adults were missing six or more teeth, compared to about one fifth in 2008—a larger decrease than either the competitive states or the U.S. experienced.

Creative incentives that will help ensure the replenishment of a comprehensive and accessible oral health care workforce will likely be needed if gaps in care are to be avoided.

If these trends continue, Kentucky's oral health picture should brighten in the future. However, there are many potential obstacles, such as changes in the health insurance market, high rates of smoking, rising obesity rates, and persistently poor oral health coupled with shortages of dentists in some regions of the state.[30] Indeed, the trend line of improving dental health could be affected by the supply of dentists in some regions of the state, especially in those regions with poor oral health. As illustrated in Figure 4, the percentage of adults missing 6 or more teeth exceeds 30 percent for vast areas of eastern and south central Kentucky.[31] Coupled with low numbers of dentists and an aging dental workforce, it will be difficult to improve oral health in the future. Nationally, the American Dental Association has projected a 12 percent decline in the dentist-to-population ratio from 2001 to 2015.[32] In 2006, a Kentucky Dental Provider Workforce Analysis (1998-2006) estimated Kentucky would lose 286 practicing dentists by 2016.[33] By 2010, this trend had started in Appalachia, with a net loss of 15 practicing dentists from 2006-2010.[34] Statewide in 2010, Kentucky had around 5.8 dentists per 10,000 population[35] compared to 5.4 nationally in 2006,[36] but the vast majority of Kentucky's counties have fewer than 4 dentists per 10,000 people (see Figure 2).[37] Moreover, about 40 percent of Kentucky's practicing dentists are 55 years old and older.[38] Consequently, with declining numbers of dentists due to an aging workforce, it will most likely be felt in rural counties that can least afford it.

Conclusion

While the state's Oral Health Program has adopted a multipronged approach that successfully reaches thousands of people throughout the state, much more will be needed to achieve real gains in oral health. The goal of improving oral health is clearly intertwined with the state's leading health goals: reducing smoking and obesity rates. Indeed, a public health campaign that sensitizes providers from the dental and medical professions to the interrelated nature of infection and disease of the mouth and body could heighten detection and improve treatment.

The dearth of Kentucky's practicing dentists who participate in the Medicaid program also makes dental care difficult to access for the poor who qualify for coverage. Reimbursement rates that lag the going market are believed to be the primary reason why less than a third of the state's dentists participate in the program.[39] Moreover, while Kentucky's income-eligible population, even single adults, can access basic emergency services through the Medicaid program, awareness of the option may be low. Effective outreach programs could alleviate suffering, increase productivity, and prevent more tooth loss. But the Medicaid program's effectiveness ultimately rests with the accessibility of services, which will require the participation of

more dentists, and, most agree, new investment in the program.

Creative incentives that will help ensure the replenishment of a comprehensive and accessible oral health care workforce will likely be needed if gaps in care are to be avoided. From loan forgiveness in exchange for practice in an underserved area or for a public health clinic, to the authorization and use of new dental auxiliary members for the oral health workforce to provide basic primary dental care, new thinking will be needed to substantially improve Kentucky's oral health. Given the social and economic consequences of missing teeth, improved oral health will be needed to help many Kentuckians become healthier, more productive members of society. While it may require significant public investment, improved oral health may reduce public costs over the long run as significant social, educational, economic, and health benefits are likely to be realized.

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[1]These data are from the Centers for Disease Control and Prevention (CDC), Behavioral Risk Factor Surveillance System Survey Data (BRFSS). The survey question is: *How many of your permanent teeth have been removed because of tooth decay or gum disease? Do not include teeth lost for other reasons, such as injury or orthodontics. [Include teeth lost due to "infection."].*

[2]Centers for Disease Control and Prevention (CDC), *Behavioral Risk Factor Surveillance System Survey Data, 2004*, 25 Nov. 2010 <http://apps.nccd.cdc.gov/brfss/>.

[3]Authors' calculations from 2008 Behavioral Risk Factor Surveillance System (BRFSS) data.

[4]Authors, BRFSS.

[5]The so-called "competitive states" have been traditionally viewed by state government as Kentucky's competitors for economic development (e.g., industrial recruitment). As shown in Table 1, these states are AL, AR, FL, GA, IL, IN, LA, MI, MO, MS, NC, OH, SC, TN, VA, and WV.

[6]The BRFSS survey question is: *How long has it been since you last visited a dentist or a dental clinic for any reason?* The 64 or 66 percent represents those who answered "Within the past year (< 12 months ago)."

[7]Kentucky Oral Health Program Brochure <http://chfs.ky.gov>.

[8]Jim Cecil, "An Overview of Selected Kentucky Oral Health Issues," Kentucky Department for Public Health, Oral Health Program, 26 Jan. 2004.

[9]Robert L. Goldenberg, J.C. Hauth, and W.W. Andrews, "Intrauterine Infection and Preterm Delivery," *New England Journal of Medicine* 342 (2000): 1500-7.

[10]Dominique S. Michaud, Kaumudi Joshipura, Edward Giovannucci, Charles S. Fuchs, "A Prospective Study of Periodontal Disease and Pancreatic Cancer in U.S. Male Health Professionals," *Journal of the National Cancer Institute* 99 (2007): 1-5.

[11]We should note that this study controlled for diabetes risk factors. See Demmer R.T., Jacobs D.R., Desvarieux M., "Periodontal disease and incident type 2 diabetes: results from the First National Health and Nutrition Examination Survey and its epidemiologic follow-up study," *Diabetes Care* 7 (2008): 1373-9.

[12]Taylor et al., "Severe periodontal disease and risk for poor glycemic control in patients with Non-insulin dependent diabetes mellitus," *J Periodontol* 67 (1996).

[13]See for example: Miller, et al., "The relationship between reduction in periodontal inflammation and diabetes control," *J Periodontol* 63 (1992):843-8; Grossi et al., "Response to periodontal therapy in diabetics and smokers," *J Periodontol* 67 (1996):1094-102; Promsudthi, et al., "The effect of periodontal therapy on uncontrolled type 2 diabetes mellitus in older subjects," *Oral Diseases* 11 (2005):293-8; and Stewart JE, Wager KA, "The effect of periodontal treatment on glycemic control in patients with type 2 diabetes mellitus," *J Clin Periodontol* 28 (2001):306-310.

[14]In an 11 year longitudinal study of 628 subject, controlling for other risk factors (age, HbA1c, serum cholesterol, hypertension, smoking) subjects with severe periodontal disease had 3.2 times the risk of death from heart disease and/or renal disease compared to controls. See Saremi, et al., "Periodontal disease and mortality in Type 2 diabetes," *Diabetes Care* 28 (2005):27-32.

[15]Mechanism thought to be IL-6 in periodontal disease which contributes to vitreous fluid levels. See Noma H., Sakamoto I., Mochizuki H., Tsukamoto H., Minamoto A., Funatsu H., et al., "Relationship between periodontal disease and diabetic retinopathy" [letter], *Diabetes Care* 27 (2004):615.

[16]See, for example, T. Wu et al., "Periodontal Disease and Risk of Cerebrovascular Disease: the First National Health and Nutrition Examination Survey and Its Follow-up Study," *Archives of Internal Medicine* 160.18 (2000): 2749-55.

[17]See, for example, H.C. Hung et al., "The Association between Tooth Loss and Coronary Heart Disease in Men and Women," *Journal of Public Health Dentistry* 64.4 (2004): 209-15.

[18]Jennifer K. Pai et al., "Inflammatory Markers and the Risk of Coronary Heart Disease in Men and Women," *The New England Journal of Medicine* 351.25 (2004): 3599-2610.

[19]American Heart Association, "Poor Oral Health Associated with Coronary Heart Disease," *Journal Report*, 17 Feb. 2004, 29 Nov. 2006 <http://www.americanheart.org/presenter.jhtml?identifier=3019173>.

[20]Stein PS, Desrosiers M, Donegan SJ, Kryscio R, Yepes J. Tooth loss, dementia, and neuropathology in the Nun Study. *Journal of the American Dental Association* October 2007, 38:1314-22.

[21]National Center for Health Statistics, CDC, "Fast Stats A to Z," 6 Oct. 2006, 29 Nov. 2006 <http://www.cdc.gov/nchs/fastats/map_page.htm>.

[22]CDC, "Prevalence of Heart Disease—United States, 2005," *Morbidity and Mortality Weekly Report* U.S. Department of Health and Human Services 16 Feb. 2007, 19 Feb. 2007 <www.cdc.gov/mmwr/preview/mmwrhtml/mm5606a2.htm>.

[23]Centers for Disease Control and Prevention (CDC). *Behavioral Risk Factor Surveillance System Survey Data*. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2009, <http://apps.nccd.cdc.gov/brfss/index.asp>.

[24]Ibid.

[25]Medical Expenditure Panel Survey (MEPS), "Dental Services—Median and Mean Expenses per Person with Expense and Distribution of Expenses by Source of Payment: United States, 2007, General Dental Visits Only," Agency for Healthcare Research and Quality, U.S. Department of Health and Human Services, 2010, 22 Nov. 2010 <www.meps.ahrq.gov>.

[26]Jessica S. Banthin and Didem M. Bernard, "Changes in Financial Burdens for Health Care: National Estimates for the Population Younger than 65 Years, 1996 to 2003," *Journal of the American Medical Association* (JAMA) 296.22 (2006): 2712-2718.

[27]These survey results are from the Kentucky Health Insurance Research Project, a joint effort between the Kentucky Long-Term Policy Research Center, the University of Kentucky Center for Rural Health, and the University of Louisville. The data presented here are from a 2005 telephone survey conducted by the University of Kentucky Survey Research Center between May 27 and September 12. Households were selected using random-digit dialing, which gives each telephone line in Kentucky an equal probability of being called. A total of 2,068 surveys were completed for a response rate of 38.3%. The margin of error is approximately ± 2.16% at the 95% confidence level.

[28]There is a well-documented national trend of improving oral health over the last few decades. Refer to Stephen A. Eklund, et al., "Trends in Dental Care Among Insured Americans: 1980 to 1995," *The Journal of the American Dental Association* 128 (1997): 171-8.

[29]An individual is considered "at risk" if at least one permanent tooth has been removed because of decay or disease (RMVTEETH=1 or 2 or 3, where 1 equals "1 to 5;" 2 equals "6 or more, but not all;" and 3 equals "all").

[30]Michael T. Childress and Michal Smith Mello, "Kentucky's Oral Health Poses Challenges," *Foresight* 50 (2007):2-4.

[31]We pooled the BRFSS data for four separate years (2002, 2004, 2006, and 2008) and combined the counties into 39 groups, although 14 counties have sample sizes sufficiently large to produce stable estimates. The county groups were developed by researchers at the University of Kentucky Markey Cancer Control Program and College of Public Health under the direction of the Kentucky Department of Public Health.

[32]Tryfon Beazoglou, et al., "The dental work force in Wisconsin: Ten-year projections," *The Journal of the American Dental Association* 133 (2002): 1097-1104 < http://jada.ada.org/cgi/content/full/133/8/1097>. They cite the following study for the national numbers: American Dental Association, Dentist workforce model: 1998–2020 (Chicago: American Dental Association: 2000).

[33]Peterson, M.R.; Williams, J.N.; and Mundt, C. Kentucky Dental Provider Workforce Analysis: 1998-2006. University of Louisville health Sciences Center, Kentucky Cabinet for Health Services, Dr. James Cecil, Administrator, state Oral Health Program, Kentucky Department for Public Health, 2006.

[34]Mullins, M.R.; et al. Numbers and age of practicing dentists in Kentucky, by region. Dental Policy Brief, Center for Oral Health Research, University of Kentucky, April 1, 2006.

[35]We derived this ratio from data on practicing dentists who are licensed in Kentucky. The data is collected by the Kentucky Board of Dentistry. Lisa A. Turner, Kentucky Board of Dentistry, e-mail, 19 Oct. 2010.

[36]Karen Fox, "Forum looks at increasing diversity in dental profession," *ADA News*, 26 May 2006, 12 Feb. 2007 <http://www.ada.org/prof/resources/pubs/adanews/adanewsarticle.asp?articleid=1928>.

[37]Of Kentucky's 120 counties, 80 have fewer than 4 dentists per 10,000 population. According to the American Dental Association Health Policy Resource Center, the states with the highest dentist-to-population ratios have about 7.4 dentists per 10,000 population, while those with the lowest ratios have 3.5 to 4.0 per 10,000 population. We use these ratios to illustrate the distribution of dentists in Kentucky as a point of comparison (i.e., 0 to 4, 5 to 8, and 9 and above). See Fox, "Forum looks at increasing diversity in dental profession," *ADA News*. The Kentucky data from the Kentucky Board of Dentistry indicate the dentist's office location.

[38]University of Kentucky Center for Oral Health Research, November 2010.

[39]Ibid.

Federal Health Reform: Implications for Kentucky

Debra Miller

The Affordable Care Act of 2010 will likely have a major impact on Kentucky. Individuals, businesses, and governments will be challenged as the various provisions of the new law unfold. The increased coverage promised by the new federal law will both provide and require new resources. Federal-state relationships will be tested. Whether the cost curve of rising health care costs can be bent for Kentucky's residents as well as the state's budget will be tested. Improving the quality of health care – and health – is another desired outcome to be measured over time. Court challenges to major provisions of the law create even more uncertainty over the future contours of Kentucky's (un)insured population.

Called federal health care reform, the Affordable Care Act of 2010 passed by Congress and signed by President Obama on March 23, 2010, in fact calls on Kentucky to take action in at least four major areas. The Kentucky General Assembly, Governor Beshear and his cabinet, and state officials across the country have already made some crucial implementation decisions. However, the biggest building blocks of ensuring health insurance coverage for all legal citizens are yet to come. Health insurance exchanges, a marketplace for uninsured Kentuckians to compare and purchase health insurance with financial subsidies available to guarantee affordability, and expanded Medicaid coverage for low-income Kentuckians are currently slated for full implementation on January 1, 2014.

TABLE 1
Health Reform Benefits to Kentucky

920,000	Health plans prohibited from denying coverage to persons with pre-existing health conditions
261,000	Number covered with Medicaid eligibility expansion to 133% of the federal poverty level
16,800	Number of young adults covered until age 26 on parent's health insurance
51,500	Number of small businesses receiving tax credits to purchase coverage for employees
221,000	Number of families receiving tax credits to purchase health insurance

Source: "The New Health Reform Law: What It Means for Kentuckians," Kentucky Voices for Health, July 2010, http://www.kyvoicesforhealth.org/

The wide ranging federal law will have a huge impact in Kentucky. Current estimates are that 626,000 Kentuckians have no health insurance – 14.8 percent of the state's total population. The provisions of the law will extend coverage to persons previously uninsured and make health insurance more affordable to many others struggling to remain insured.

Pre-Existing Condition Insurance Plans Play a Short-Term Role: Kentucky Opts for Federally Administered Plan

The federal law called for states to set up a temporary high-risk pool—an option for people with a pre-existing medical condition who have been uninsured for at least six months to secure health insurance. (The law requiring insurers to cover people with pre-existing conditions does not take effect until 2014; only children with pre-existing conditions are required to be covered in 2010, just six months after passage.)

Federal regulations allowed states to establish their own plans or to opt into the federally administered plan. Kentucky was one of 23 states and the District of Columbia that opted into the federal program. The states made their decisions by July 1 and federal coverage began August 1. In November the U.S. Department of Health and Human Services (DHHS) reported that only 23 Kentuckians had enrolled in the pre-existing condition insurance pool. Across the nation, over 8,000 individuals had purchased insurance through this new provision of the law.

In November, DHHS announced it would lower premiums overall by 20 percent in 2011 and offer

three different premium plans to facilitate greater participation. DHHS also will offer a new category of premiums for children with pre-existing conditions. In several states, including Kentucky, private insurers stopped offering individual coverage to children rather than comply with the new federal requirement that went into effect September 23, 2010, to cover all children regardless of their health condition.

The legislation provides $5 billion to subsidize the plan premiums until 2014. After 2014, the plans will not be necessary when insurance companies are prohibited from using pre-existing conditions to exclude persons from coverage. Two states, Massachusetts and Vermont, already had guaranteed issue state laws and did not need this stop-gap insurance measure.

Many states had already established high-risk pools, some as early as 1975. At least 1 million Americans have been insured through this mechanism. Enrollment figures for 2007, however, place the annualized numbers of people in state high-risk pools at about 210,000. Kentucky's pool was established in 2001 with tobacco settlement funds and had enrollment of 4,158 in 2007. Some states expanded their pools to meet the federal reform requirements; other states did not for fear that federal funding would not be sufficient to cover expenses until 2014.

Current estimates are that 626,000 Kentuckians have no health insurance – 14.8 percent of the state's total population. The provisions of the law will extend coverage to persons previously uninsured and make health insurance more affordable to many others struggling to remain insured.

States to Oversee New Insurance Regulations: New Kentucky Laws Needed

The new federal law also makes changes to the way private health insurance plans must be structured. Kentucky's Department of Insurance will be in charge of enforcing these new regulations, reviewing rates and the solvency of plans, and overseeing various other requirements.

For example, beginning on September 23, 2010, existing insurance plans will be prohibited from imposing lifetime dollar limits on benefits and cannot rescind coverage except in cases of fraud. Individuals up to age 26 will be permitted to stay on their parents' health plans unless they have access to employer-based coverage.

Kentucky Insurance Commissioner Sharon P. Clark ordered insurers selling in the state's individual insurance market to offer an open enrollment period in January 2011 for residents under age 19. This followed insurers' decisions to drop child-only plans in Kentucky rather than comply with the new federal requirement prohibiting excluding children with pre-existing conditions from coverage. Allowing an open enrollment period was a compromise with insurers but nevertheless represented new enforcement activity by Kentucky under the federal law.

Beginning in 2014, when all individuals must have health insurance or face a financial penalty (with some exceptions), private insurance plans will be prohibited from denying coverage to people for any reason—including pre-existing conditions. Insurers will not be able to impose annual benefit limits or charge people more based on their health status or gender. Rates will vary only based on age (limited to a 3-to-1 ratio), geographic area, family composition and tobacco use (limited to a 1.5-to-1 ratio).

States must create a consumer assistance office or ombudsman's program to help people in the individual and small-group markets navigate the new system. In addition, the federal legislation directs states to report on trends in insurance premiums and identify plans that have had unjustified premium increases.

Kentucky's Department of Insurance reported to the General Assembly earlier in 2010 that it has compared Kentucky's existing laws and administrative regulations with the consumer protections in the federal health insurance laws and that it will be making recommendations for legislative changes needed to conform Kentucky's specific insurance laws to these federal provisions. The areas where new authority is needed include limitations on rescissions, restrictions on annual and lifetime limits, and the prohibition on pre-existing

condition exclusions for children under 19. Other areas for new law include coverage of preventive and other services, annual reporting by insurers, and the rate review process.

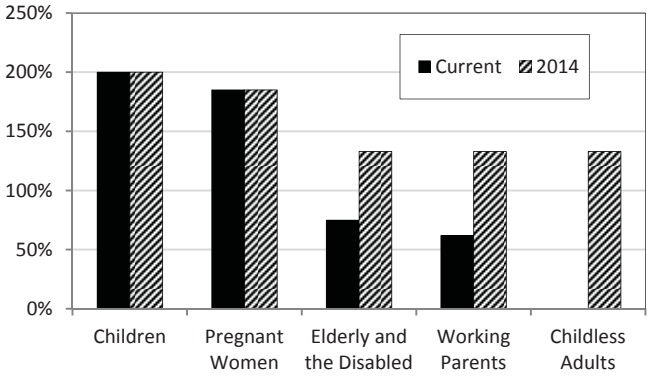
Law will Overhaul Medicaid: Over 260,000 Persons to Benefit from Expanded Eligibility

Medicaid will be expanded in 2014 to cover all citizens and legal immigrants under age 65 who earn up to 133 percent of the federal poverty level—$14,404 for an individual and $29,327 for a family of four in 2009.

The new population to be covered in Medicaid will be largely made up of childless adults, who typically have not been eligible for the state-federal program. Kentucky is among the majority of states that do not provide any health insurance coverage for those people.

An estimated 17 million adults—or 37 percent of the nation's uninsured population—could gain coverage through the mandated Medicaid expansion, according to the Kaiser Family Foundation. Kentucky Voices for Health has estimated that up to 261,000 persons will secure health coverage through the expanded Medicaid program.

FIGURE 1
Kentucky Medicaid Eligibility as a Percent of the Federal Poverty Level, Current and in 2014



States will have some help from the federal government to pay for services for the newly eligible population. The federal government will cover 100 percent of the cost of insuring newly eligible people from 2014 through 2016, but the federal share drops to 95 percent in 2017, 94 percent in 2018, 93 percent in 2019, and 90 percent in 2020 and beyond. These federal percentages for Kentucky compare to current levels of 71 percent before the federal stimulus enhancement and 80 percent at the height of the extra federal match. One administrative complication of the higher match rate for the newly eligible population is that states will have to administratively separate the expenses of newly eligible and currently eligible (before 2014) persons and calculate applicable match rates for federal reimbursement.

But there are other anticipated expenses with this expansion. State Medicaid administrators know that outreach efforts for the newly eligible populations will also bring into the program individuals who were previously eligible but didn't know it. States will receive only their traditional Medicaid match rates for those people—even though Congress intended to minimize states' new financial obligations. In addition, the increased administrative expenses of outreach and claims processing for a larger population will continue to be matched at regular rates. So for Kentucky budget writers the federal promise of minimal state expenses due to new mandates may seem hollow.

Until 2014, states must maintain their current eligibility levels for Medicaid using the current federal-state funding agreement. Kentucky's budget deficit was last estimated to be $470 million by Governor Beshear in September, 2010. This deficit comes on top of $584 million in cuts ordered by the General Assembly when it met in 2010.

Under another provision of the law, Medicaid reimbursements to primary care providers will be increased to match Medicare rates in 2013 and 2014, an increase that will be fully funded by the federal government in those years. After that, states likely will be responsible for setting, and funding, their own reimbursement rates.

The increase in rates is viewed as critical to having enough doctors to treat the millions of people who will be added to Medicaid rolls. Increasing reimbursement levels will not only keep current Medicaid providers from leaving the system, but also might entice more providers to join it.

Workforce shortages in healthcare will also become more pronounced. The bill attempts to address this problem through expanding scholarships and loans for primary care practitioners, increasing the number of graduate medical education training positions and supporting the development of primary care models such as

medical homes and team management of chronic disease. A multi-stakeholder Workforce Advisory Committee will be appointed to develop a national work force strategy.

State Health Insurance Exchanges to Fill Coverage Gaps: Kentucky Has Many Decisions

While the Medicaid expansion will help cover uninsured Kentuckians, there will still be people without access to employer-sponsored plans whose incomes are too high to quality for the public health insurance program. To fill this coverage gap, state-based health insurance exchanges will be created. States will also be allowed to form multi-state exchanges to take advantage of administrative efficiencies.

The exchanges will virtually replace the states' individual and small-group health insurance markets. States must have in place a plan for operating exchanges by January 1, 2013, or the federal government will operate the exchange for the state. Kentucky has applied for and received a $1 million federal planning grant for its health insurance exchange, to be cooperatively administered by the Department of Insurance and the Cabinet for Health and Family Services.

Beginning in 2014, when all individuals must have health insurance or face a financial penalty (with some exceptions), private insurance plans will be prohibited from denying coverage to people for any reason, including pre-existing conditions. Insurers will not be able to impose annual benefit limits or charge people more based on their health status or gender.

For the small-group market, state-based exchanges will be set up to serve small businesses with up to 100 employees. Meanwhile, individuals will use the exchanges to choose from a variety of health plans that meet criteria set by the federal government, such as guaranteed issue and renewal.

States will be allowed to extend exchange coverage to employers with more than 100 employees beginning in 2017.

Perhaps the most similar model of an insurance exchange was established in Massachusetts when that state moved to universal health care insurance. Utah also has a more limited insurance exchange. Kentucky will be making a number of decisions about the governance, structure and role, and funding of its exchange.

People whose incomes are between 133 percent and 400 percent of the federal poverty level will be eligible for subsidies. Premium credits will be offered on a sliding scale and will ensure that premium contributions do not exceed a certain percentage of income. In order to receive the subsidies, individuals must purchase insurance through the exchanges.

The new federal law lays out standards for the plans offered by the exchanges. Four benefit categories of plans, plus a catastrophic plan, will be offered through the exchanges. State governments may administer these exchanges or set up a nonprofit association to do so.

The state exchanges will provide oversight of health plans with regard to the new insurance market regulations, consumer protections, rate reviews, solvency, reserve fund requirements and premium taxes. They shall also define rating areas. These duties may overlap with state insurance departments and require new role definitions.

In 2016 states also will have the authority to create interstate health care compacts. Under these arrangements, insurers can sell policies in any state that belongs to the compact. Coverage under compacts must be at least as comprehensive and affordable as coverage provided through the state exchanges.

In Kentucky and other states, the exchanges are geared toward administrative simplicity. The exchange becomes a single online access point for individuals seeking information on different insurance options. This online access point must, for example, allow individuals to determine whether they are eligible for Medicaid or for a subsidy through the state-based exchange.

The Individual Mandate: Court Challenges

Kentucky has not joined the various court challenges to the Affordable Care Act. According to press reports, over two dozen lawsuits have been filed challenging the law.

Three federal district judges have ruled on the constitutionality of the law's requirement that individuals must purchase health insurance beginning in 2014 or face a tax penalty. The December 2010 ruling of Judge Henry Hudson of federal District Court in Richmond found the "individual mandate" unconstitutional, but declined to grant an injunction—which was requested by the state of Virginia—to block the government's implementation of the law.

That challenge was filed by Virginia Attorney General Kenneth T. Cuccinelli on behalf of his state on the day the federal law was signed into law by President Obama. Earlier in 2010, two other federal district judges in Detroit and Lynchburg, Virginia found the law constitutional. These cases are already before appeals courts in Detroit and Richmond. Judge Hudson's decision would also be appealed to the Richmond Fourth Circuit. Still pending is the challenge in Pensacola, Florida filed by 20 states' attorneys general or governors. Neither Kentucky Governor Steve Beshear nor Attorney General Jack Conway joined the lawsuit.

One of the primary arguments at the core of the court cases is whether the law's mandate that individuals purchase insurance exceeds the regulatory authority granted to Congress under the constitution's Commerce Clause. Plaintiffs argue that the Commerce Clause does not justify compelling individuals to purchase a commodity in the private marketplace. The government has argued that the individual mandate is central to the law's mission of covering the uninsured. Without the mandate, people could wait to purchase insurance only when they need it, negating the risk pooling that is the key to health insurance's financial viability. Lawyers argue that the act of not purchasing insurance is an active decision that can shift billions of dollars of uncompensated care to hospitals, other insured persons and the government, and thus can be regulated under the Commerce Clause. The case filed in Florida on behalf of 20 states also challenges the law's expansion of Medicaid to include those at or below 133 percent of the federal poverty level.

Most legal scholars believe that ultimately the Supreme Court will settle the issue. The case could be fast-tracked to the Supreme Court for a decision in 2011. Without being expedited, it is unlikely the Supreme Court would hear the case until 2012.

Conclusion

In the coming years, Kentucky will face a myriad of new challenges in the health care arena. The increased coverage promised by the new federal law will both provide and require new resources. Federal-state relationships will be tested. Whether the cost curve of rising health care costs can be bent for Kentucky's residents as well as the state's budget is uncertain. Improving the quality of health care—and health—is another desired outcome to be measured over time. Finally, legal challenges to the law, in particular the individual mandate to purchase insurance, are making their way through the courts and appear to be headed to the Supreme Court.

Bridging Kentucky's Digital Divide: Points of Leverage

Michael T. Childress

Increasingly policymakers fear that the digital divide will exclude many from easy access to educational, health, and economic opportunities. While Kentucky has progressed steadily over the years in the percentage of households with broadband, it has consistently lagged behind the surrounding states and the U.S. Using Current Population Survey data we examine the marginal effect of various demographic and educational factors behind Kentucky's digital divide compared to surrounding states and the U.S. We conclude by considering what the results imply for bridging the divide.

A key driver that has accelerated globalization of the economy has been the emergence of nearly instantaneous data transfers enabled by broadband Internet. Whether it is corporations doing business with one another, workers telecommuting, or consumers shopping for the latest bestselling book, high-speed Internet increasingly underpins 21st century commerce. Consequently, broadband access is becoming the *sine qua non* of economic prosperity.

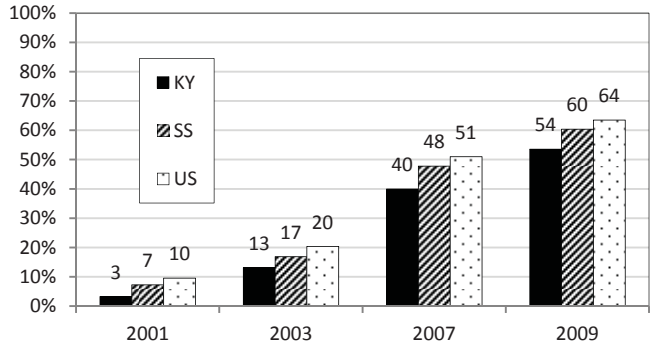
Labor economists have long recognized the importance of technology use to individual wages,[1] and more recently begun to understand the economic impact of broadband at the community level. Researchers at the Massachusetts Institute of Technology, for example, identified specific economic gains in communities directly attributed to the availability of broadband, including higher property values, more information-technology business establishments, and higher employment.[2] Other economists have written about economic benefits besides wages, "such as increased convenience, a wider range of choices, and the opportunity to acquire products customized to their specifications."[3]

Since broadband permeates so many aspects of our lives, access to and use of it appear to be increasingly important for anyone becoming politically informed, socially integrated, and economically successful in today's digitally dependent world. The U.S. Congressional Research Services notes that concerns over the digital divide have arisen because "some policymakers (believe) that disparities in broadband access across American society could have adverse economic and social consequences on those left behind…"[4] The digital divide not only excludes many from ready access to education, work, and entrepreneurial opportunities, low-cost global communications, competitively priced products and services, and a vast wealth of empowering information, it effectively excludes them from the social and economic mainstream of the nation and, increasingly, the world. In short, Kentucky's economic progress could be muted if the digital divide is not narrowed. With these concerns in mind, we examine the contours of Kentucky's digital divide, compare it to those in other states as well as the U.S., and consider possible broad approaches for bridging it.

Steady Progress

While Kentucky has progressed steadily over the years in the percentage of households with broadband, it has consistently lagged behind the surrounding states and the U.S. (see Figure 1).[5] In 2009, about 64 percent of U.S. households had broadband access, which was somewhat higher than the surrounding states' 60 percent but significantly higher than Kentucky's 54 percent.[6] In a 2009 ranking of all states and Washington, D.C., Kentucky was ranked 46th.[7] Nonetheless, Kentucky has been making consistent progress, as evidenced by the increase from 3 percent in 2001 to 54 percent in 2009.

FIGURE 1
Households with Broadband, Kentucky, Surrounding States, and the U.S.



Source: Author's analysis of Current Population Survey (CPS) data

These broadband data are from a special October 2009 supplement to the Census Bureau's Current Population Survey (CPS), which asked questions about broadband Internet use of more than 50,000 households in the United States. Throughout this article we use the terms broadband access, adoption, and usage interchangeably to indicate the presence of broadband Internet in the home.

Room to Grow

There are vast differences in home broadband access or adoption across the states, ranging from 73 percent in Utah to 42 percent in Mississippi.[8] These differences are not surprising. One would expect a state with high education and income levels, like Utah, to have a significantly higher level of broadband usage than a state like Mississippi, whose population is disproportionately poor and undereducated. At a ranking of 46th, Kentucky would appear to have considerable room to grow in expanding broadband access and creating more digitally inclusive communities. Nonetheless, we would not necessarily expect Kentucky, a state with modest levels of wealth and education, to be a leader with respect to home broadband use. So how does Kentucky compare to where it should be? Focusing on high-performing states is useful, but not the only approach for determining whether states have room to grow. In addition to comparing a state to the high-performing states, those with high broadband access and adoption, we can also study a state's broadband performance relative to expectations as a way of determining whether it is under- or over performing.

Conducting multiple regression analysis on broadband and other data enables us to statistically control for factors like income, education, race, and urbanity, to name a few variables, and estimate what a state's broadband percentage should be based on these factors. While there are always factors not accounted for in a regression model, we can determine how states are performing relative to expectations by comparing the estimated to actual broadband usage. We present two models below of how a state-level analysis can be used to determine whether a state is meeting expectations with respect to broadband adoption. And while our focus here is on broadband in the home—since these are the data available from the Census Bureau (2009)—we believe these numbers are indicative of a state's overall level of digital inclusion, either from home, work, or at a community-based organization.

Model 1: A Socioeconomic Model – There are a number of socioeconomic factors that affect broadband usage. Traditionally, the digital divide has cut along income, education, race, age, and urban-rural lines. While we have collected significant state-level data on various social, economic, and demographic factors that are associated with broadband access, many of the variables are highly correlated and therefore cannot be used together in a single regression equation. In this model, we use only three variables to predict a state's home broadband percentage—the percentage of the state population living in rural areas, the state's per capita income, and the state's score on the Milken Institute State Technology and Science Index.[9] We would expect

TABLE 1
Selected Results from Two Models, Ranking of Selected States Based on the Difference Between Actual and Predicted Home Broadband Percentages

Model 1			Model 2		
Rank	State	Difference	Rank	State	Difference
1.	AK	11.0	1.	UT	9.2
2.	UT	9.2	2.	ID	9.0
3.	ID	8.1	3.	WY	8.7
4.	NH	7.9	4.	OR	7.1
5.	OR	6.7	5.	DE	6.5
31.	**KY**	**-1.6**	**39.**	**KY**	**-3.0**
46.	NY	-4.7	46.	SD	-6.5
47.	IL	-4.9	47.	SC	-7.0
48.	NM	-7.7	48.	TN	-7.6
49.	AL	-8.4	49.	AL	-9.7
50.	MS	-10.9	50.	MS	-10.8

Note: A positive number indicates that a state did better than expected, while a negative number shows that a state performed worse than expected.

more urban, affluent, and technology-savvy states to have higher levels of broadband usage.

As expected, all three variables are statistically significant (.05) and in the expected direction. The model explains about half of the variation in broadband usage (adjusted r-squared = .56) and shows that the top five states with respect to exceeding expectations are Alaska (11 percentage points higher than expected), Utah (9.2), Idaho (8.1), New Hampshire (7.9), and Oregon (6.7). For example, given Alaska's population distribution between urban and rural areas, its per capita income, and its score on the Milken Institute State Technology and Science Index, the predicted or expected home broadband percentage is about 62 percent but its actual percentage is around 73 percent, or 11 percentage points higher. Clearly then, there are other important factors at work in Alaska, Utah, Idaho, New Hampshire, and Oregon, as well as in the other over performing states, that would better explain their higher broadband adoption rates. On the other hand, Mississippi is the most underperforming state using this model, coming in at nearly 11 percentage points below expected. Kentucky more or less performs at the expected level estimated by this model, slightly underperforming by 1.6 percentage points (See Table 1).

Model 2: The Past is the Best Predictor of the Future Model – We can also use earlier broadband rates to estimate more recent ones. For example, much in the same way that one might use a track athlete's performance in a past race to predict what it might be in a current race, we can use the Census Bureau's 2003 broadband rates to predict the expected 2009 broadband rates. As shown in Figure 2, the line or slope is the predicted broadband rate in 2009 based on the 2003 broadband rate. Some states, like Utah, performed much better in 2009 than expected. Just like an athlete who performs better than expected because of increased training or conditioning, states that perform significantly better than anticipated are likely doing something other states are not doing to create more digitally inclusive communities.

The independent variable—the 2003 broadband percentage—is statistically significant (.05) and in the expected direction (See Table 2). The model explains over half of the variation in broadband usage (adjusted r-squared = .60) and shows that the top five states with respect to exceeding expectations are Utah (9.2), Idaho (9.0), Wyoming (8.7), Oregon (7.1) and Delaware (6.5). Mississippi is again the most underperforming state using this model, coming in at nearly 11 percentage points below expected. Kentucky performs less well in this model by underperforming by 3 percentage points.

This analysis suggests that while Kentucky has steadily increased in the percentage of households with broadband, it still has room to grow. The rapid adoption of this technology is taking place all over the country, making it an ongoing—though attainable—challenge for the state to reach parity with the rest of the nation. In the following section we examine the digital divide more precisely through a different lens. By doing so we hope to highlight those specific areas where bridging the digital divide would help advance the overall state adoption rate.

FIGURE 2
Predicting 2009 Broadband Rates with 2003 Rates

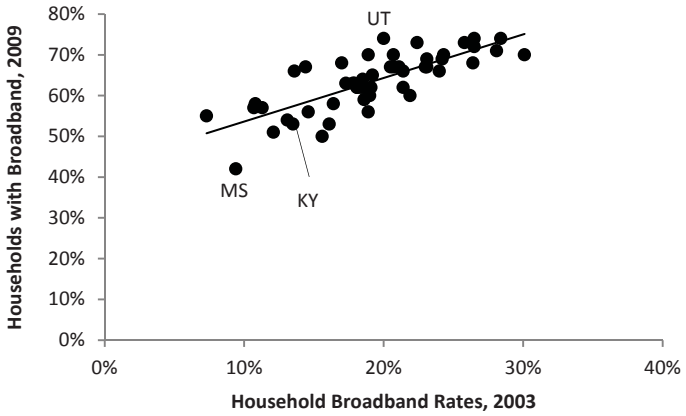


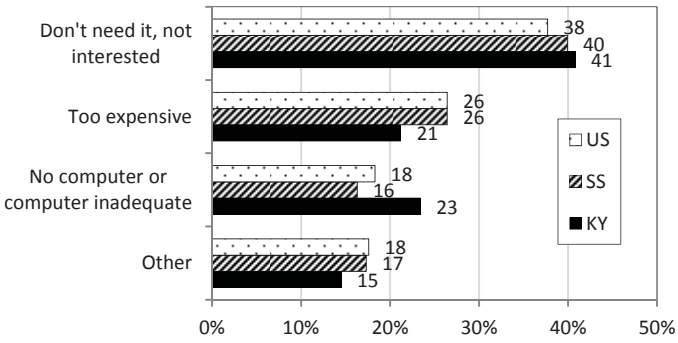
TABLE 2
Regression Results from Two Models

Model 1 (adjusted r-squared=.56)				
Variable	Coef.	SE	t	P>|t|
Constant	28.0	4.9	5.8	<0.0001
Urban Population (2000)	0.1324	0.0575	2.3	0.0258
Per Capita Personal Income (2009)	0.000473	0.000153	3.1	0.0035
Milken Index Score	0.1447	0.06713	2.2	0.0364
Model 2 (adjusted r-squared=.60)				
Variable	Coef.	SE	t	P>|t|
Constant	42.9	2.48	17.3	<0.0001
Broadband Rate (2003)	1.066	0.125	8.5	<0.0001

Points of Leverage: Identifying the Marginal Differences

What are some of the stated reasons for lack of broadband in the home? In the 2009 Current Population Survey Internet Use Supplement, the following question was asked: What is the main reason that you do not have high-speed (that is, faster than dial-up) Internet access at home? Kentucky respondents are about as likely as those in surrounding states and the U.S. to say, "Don't need it, not interested," less likely however to cite the cost of broadband as a reason, but more likely to indicate "No computer or computer inadequate" (see Figure 3).[10]

FIGURE 3
Stated Reasons for No Broadband at Home (2009), Kentucky, Surrounding States, and the U.S.



Source: Author's analysis of Current Population Survey (CPS) data

We use CPS data to analyze the digital divide across socioeconomic and demographic lines in Kentucky, the surrounding states and the U.S. We are specifically interested in the predictor variables of household income, educational attainment, location of residence (metropolitan or not), gender, age, and race. Simple cross-tabulations or "gross" differences between broadband use and the predictor variables can suggest the existence of a divide. However, the problem with "gross" differences is that many of the predictor variables are highly correlated. Consequently, if we see a digital divide across education lines we cannot determine how much is due to education, income (since lower education is associated with lower incomes), or location of residence (since individuals in urban areas tend to have slightly higher levels of income and educational attainment).

To better understand these independent relationships we used a multivariate statistical model (logistic regression) to estimate the effect that the socioeconomic and demographic characteristics have on the probability of broadband in the home. While the CPS data can be analyzed at the individual or household level, here we are focusing on the household level by limiting our sample to the reference person. This kind of analysis allows us to estimate the independent relationship, for example, between race and technology use while holding other important factors constant, like education, income, gender, age, and location of residence. The estimated differences using this technique are referred to as "net" or "marginal" differences. To calculate the marginal differences we use the logistic regression coefficients in Table 3. By holding constant the predictor variables at the average values except

TABLE 3
Logistic Regression Results

	Kentucky	Surrounding States	United States
Constant	-1.6975 (.0075)	-1.3078 (0.0021)	-1.2047 (0.0009)
Income			
Less than $20,000	Omitted		
$20,000 to $34,999	0.6724 (0.0057)	0.4407 (0.0017)	0.562 (0.0007)
$35,000 to $59,999	1.461 (0.0059)	1.167 (0.0017)	1.2558 (0.0007)
Over $60,000	1.7308 (0.0063)	2.0395 (0.0019)	2.1744 (0.0008)
Missing Income	0.7282 (0.0052)	0.7175 (0.0016)	0.7229 (0.0007)
Education			
Less than High School	-0.7017 (0.0053)	-0.4934 (0.0017)	-0.5539 (0.0007)
High School	Omitted		
Some College	0.8321 (0.0046)	0.6472 (0.0013)	0.6279 (0.0005)
Bachelors or Higher	1.4123 (0.0055)	1.2663 (0.0015)	1.1924 (0.0006)
Race			
White (non-Hispanic)	0.8175 (0.0060)	0.5616 (0.0013)	0.4847 (0.0005)
Non-White (non-Hispanic)	Omitted		
Residence			
Non-Metro (rural)	Omitted		
Metro (urban)	0.2173 (0.0037)	0.3453 (0.0013)	0.4296 (0.0006)
Age			
Under 25	-0.326 (0.0076)	0.1045 (0.0022)	0.2368 (0.0009)
25 to 54	Omitted		
55 and Older	-0.8196 (0.0038)	-0.888 (0.0011)	-0.8295 (0.0005)
Gender			
Female	Omitted		
Male	0.3017 (0.0037)	0.1091 (0.0011)	0.0741 (0.0004)
Model Prediction/Actual	55.5% (53.9%)	64.4% (60.4%)	68.7% (63.8%)

Note: All coefficients are statistically significant (p<.01). The model prediction in the last row is the predicted value using the model coefficients and the mean values from the samples for the independent variables.

for one variable, we can estimate the net or marginal effect that a specific variable has on the probability of home broadband adoption.[11]

The results of our analysis are presented in Table 4. These results reveal a stark digital divide in Kentucky on the basis of income, education, race, and age. For example, an examination of the net or marginal differences shows that Kentuckians with household income over $60,000 are 2.2 times more likely to have home broadband than those with household income less than $20,000. The marginal differences are similar for Kentucky, the surrounding states, and the U.S., as evidenced by average broadband adoption gaps between the highest and lowest income groups of 40.4, 43.6, and 44.2 percent respectively.

The importance of education is illustrated by the estimate that individuals with a bachelor's degree or higher in Kentucky are 1.7 times more likely to have home broadband access than those with a high school diploma or GED, and are 2.6 times more likely than those with less than a high school education. In fact, the effect of education appears to be stronger in Kentucky compared to surrounding states and the U.S., as reflected by average broadband adoption gaps between the highest and lowest education categories of 48.1, 39.2, and 37.8 percentage points respectively.

Race also exerts an influence over home broadband adoption in Kentucky. Non-Hispanic whites are around 1.5 times more likely to have home broadband access than non-Hispanic non-whites. And similar to education, the effect of race appears to be stronger in Kentucky compared to surrounding states and the U.S., as shown by average broadband adoption gaps between non-Hispanic whites and non-whites of 20.1, 13.3, and 10.8 percentage points respectively.[12]

Finally, the youngest Kentuckians are much more likely to use these technologies, which is no surprise. The adoption gap between those under 25 years old and those 55 and older is smaller in Kentucky compared to the surrounding states and the U.S., but this is mainly because of the relatively low home broadband adoption by those under 25 in Kentucky. What is somewhat surprising is the difference between non-metro and metro areas is somewhat smaller in Kentucky (5.4 percent) than in either surrounding states (8.1) or the U.S. (9.7). While these differences are not large, they are noteworthy.

TABLE 4
Estimated Net and Gross Percentages of Households with Broadband, 2009

	Kentucky		Surrounding States		United States	
	Gross	Net	Gross	Net	Gross	Net
Total Population	53.9%	55.5%	60.4%	64.4%	63.8%	68.7%
Income						
Less than $20,000	27.9%	34.2%	32.5%	40.2%	33.7%	42.4%
$20,000 to $34,999	47.8%	50.5%	45.4%	51.1%	50.4%	56.3%
$35,000 to $59,999	71.4%	69.2%	68.1%	68.4%	70.9%	72.1%
Over $60,000	82.1%	74.6%	87.8%	83.8%	89.4%	86.6%
Education						
Less than High School	22.3%	29.6%	27.2%	40.9%	29.1%	44.2%
High School	44.4%	45.9%	47.8%	53.1%	51.3%	57.9%
Some College	65.7%	66.1%	66.4%	68.4%	69.9%	72.0%
Bachelors or Higher	82.8%	77.7%	84.0%	80.1%	84.8%	81.9%
Race						
White (non-Hispanic)	56.1%	57.7%	63.2%	67.1%	68.3%	71.7%
Non-White (non-Hispanic)	36.4%	37.6%	50.2%	53.8%	53.6%	61.0%
Residence						
Non-Metro	48.0%	52.6%	48.4%	57.9%	51.7%	60.5%
Metro	59.2%	58.0%	63.5%	66.0%	66.2%	70.2%
Age						
Under 25	51.8%	55.9%	58.9%	73.6%	64.4%	79.0%
25 to 54	63.8%	63.7%	69.7%	71.5%	71.9%	74.8%
55 and Older	40.5%	43.6%	46.4%	50.8%	51.8%	56.4%
Gender						
Female	50.3%	51.6%	56.6%	63.1%	60.6%	67.8%
Male	57.2%	59.0%	64.0%	65.6%	66.9%	69.4%

Conclusion

While Kentucky has made steady progress in the percentage of households with broadband, our analysis reveals that more progress is possible and necessary. These findings make a subtle yet powerful point: the people who are most vulnerable in today's economy—the least educated—are far less inclined to have home broadband access, which would more easily enable them to acquire some of the skills demanded in higher-paying jobs. With the demand for high-skill workers rising rapidly, experts emphasize the importance of lifelong learning and continuous skill upgrading. Many workers will change jobs in the coming years, either by choice or by necessity. Those people with low incomes and low education levels will experience difficulties moving up the income ladder if they do not acquire some high-technology skills.

Another troubling finding is the persistently wide gap between non-Hispanic whites and non-whites. A persistent digital divide in the Commonwealth could forestall the promise of broad-based economic prosperity. Today, broadband access is becoming a fundamentally important factor for social connections and economic success, evidenced by the ubiquity of social networking and online job postings and applications. Indeed, increasingly companies require that applications and resumes from prospective employees be submitted online as businesses begin to realize, at least in part, the "paperless" office.

Certainly the lack of home broadband access does not necessarily exclude one from realizing the benefits of having easy access to a high-speed Internet connection. Public libraries are increasingly being used as the onramp to the information highway by those who otherwise might not have ready access. The results of this analysis suggest that communities that primarily serve minority and lower-income groups should assess their policies and procedures with respect to library staffing hours as well as librarian training to ensure they are adequately serving the needs of their customers. Indeed, a broad range of state- and local-level policies aimed at fostering digitally inclusive communities will be essential for developing the higher skills that today's employers are seeking, the entrepreneurial talents needed to capture more economic opportunities for ourselves, and the willingness to pursue education opportunities available through high-speed Internet connections like broadband.

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[1]A.B. Krueger, "How Computers Have Changed the Wage Structure: Evidence from Microdata, 1984-1989," *Quarterly Journal of Economics,* Feb. 1993: 33-60.

[2]William H. Lehr, Carlos A. Osorio, Sharon E. Gillett, and Marvin A. Sirbu, "Measuring Broadband's Economic Impact," Oct. 2005, Massachusetts Institute of Technology Program on Internet and Telecoms Coverage, 22 Nov. 2005 <http://itc.mit.edu/itel/docs/2005/MeasuringBB_EconImpact.pdf>.

[3]Robert E. Litan and Alice M. Rivlin, *Beyond the Dot.coms* (Washington: Brookings Institution Press, Dec. 2001).

[4]Lennard G. Kruger and Angele A. Gilroy, *Broadband Internet Access and the Digital Divide: Federal Assistance Programs* (Congressional Research Service, August 4, 2010).

[5]The surrounding states include the seven states contiguous to Kentucky (i.e., IL, IN, MO, OH, TN, VA, and WV).

[6]Current Population Survey (CPS) Internet Use 2009 <http://www.ntia.doc.gov/data/CPS2009_Tables.html>. Kentucky's percentage is statistically different from the surrounding states average (alpha=.05).

[7]At the 90% confidence interval, Kentucky's ranking of 46th was not significantly different from the states ranked from 39th to 50th. See "Percent of Households with Internet Broadband Access, Ranked by State: 2009 (Numbers in Thousands)," <http://www.ntia.doc.gov/data/CPS2009_Tables.html>.

[8]Percent of Households with Internet Broadband Access, 2009, U.S. Census Bureau, Current Population Survey <http://www.ntia.doc.gov/data/CPS2009_Tables.html>.

[9]State Technology and Science Index: Enduring Lessons for the Intangible Economy, by Ross DeVol and Anita Charuworn with Soojung Kim, June 19, 2008, available online at <http://www.milkeninstitute.org/pdf/StateTechScienceIndex.pdf>.

[10]The "Other" category includes the following responses: Can use it somewhere else; Not available in area; Privacy and security; Concern for children's access; Lack of confidence or skills; or Other reasons.

[11]Others have used this approach when analyzing CPS data on Internet access. See, for example, Tora K. Bikson and Constantijn W.A. Panis, *Citizens, Computers, and Connectivity: A Review of Trends* (Santa Monica, CA: RAND, 1999), and *Exploring the Digital Nation: Home Broadband Internet Adoption in the United States,* prepared by the Economics and Statistics Administration, the National Telecommunications and Information Administration, and the U.S. Department of Commerce, November 2010.

[12]We did not include a separate variable for Hispanic because of small samples sizes in Kentucky.

Kentucky Annual Economic Report 2011
Center for Business and Economic Research
335BA Gatton Building
University of Kentucky
Lexington, KY 40506-0034

(859) 257-7675 (859) 257-7671 (Fax)
cber@uky.edu
http://cber.uky.edu

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