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Kentucky Annual Economic Report 2018

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2018 KENTUCKY ANNUAL ECONOMIC REPORT

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

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Gatton College of Business and Economics

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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 areas. Recent projects have been conducted on manpower, labor, and human resources; tourism economics; transportation economics; health economics; regulatory reform; public finance; technology use and adoption; education policy; and economic growth and development.

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From the Director . . .

Dr. Chris Bollinger

This report is one of the important ways that the Center for Business and Economic Research fulfills its mission as specified in the Kentucky Revised Statutes (KRS 164.738) to examine various aspects of the Kentucky economy. The analysis and data presented here cover a variety of topics that range from an economic forecast for Kentucky in 2018 to a broad presentation of factors affecting the economy.

The Stock Market has hit an all-time high repeatedly this year, with annual gains of over 20 percent. The national unemployment rate stands at 4.1 percent and it appears that gross domestic product growth will be around 2.2 percent for the year. A total of 1.7 million jobs were added in 2017 and labor force participation in the U.S. stands at 62.7 percent, up 0.1 percent from November 2016. Consequently, the economic forecast for the coming year is generally positive. Indeed, the average person in Kentucky probably feels economically stable and secure. At 5 percent, the unemployment rate is hovering at historic lows, inflation is muted at about 2 percent, and average weekly wages increased in the state by 2.8 percent from 2016 (Q2) to 2017 (Q2).

The current economic expansion is now the second longest since 1945. Typically, expansions last approximately 6 years, and we are now eight and a half years into the current expansion. While there is nothing signaling an end to the expansion in the leading economic indicators, many pundits are predicting a recession will begin within the next six to eighteen months. Moreover, many financial advisors seem to be expecting a major stock market correction this spring, although opinions on these forecasts vary widely.

My complete forecast is outlined in the Forecast Chapter (page 15). In short, I expect the economic momentum of late 2017 will carry over to the first part of 2018—with economic growth continuing to be robust. However, the main question facing us now is: how long will the expansion continue? It is difficult to know for certain, but I am predicting a mild recession starting sometime in late 2018 or in 2019.

We present a broad array of data on Kentucky that measures both economic inputs and outputs. We have organized the data into twelve broad thematic areas: Agriculture, Community, Economic, Economic Security, Education, Energy, Environment, Health, Infrastructure, Innovation, Population, and Public Finance.

The 2018 Kentucky Annual Economic Report includes data for Kentucky over many years which allows one to assess change over time. We have included data on the U.S. and the twelve states considered Kentucky's main economic competitors — Alabama, Georgia, Illinois, Indiana, Mississippi, Missouri, North Carolina, Ohio, South Carolina, Tennessee, Virginia, and West Virginia. This enables comparisons on many dimensions of economic prowess and social well-being.

The data presented here represent a comprehensive accounting of many, although not all of the factors, affecting the state's economy. The breadth of these data demonstrates that no single factor determines the state's economic prospects—it is an amalgamation of many disparate factors which shape and determine our economic trajectory. However, there is one factor that is more important than all the others, and that is education. By investing in it, we can improve household incomes, individual health, and our overall quality of life. The key to Kentucky's economic future lies in its human capital.

Acknowledgments

The inspiration and framework for this report rests, of course, on the foundation constructed by prior CBER staff and the previous forty-five *Annual Reports* they produced. Moreover, we have melded their tradition of academic rigor with the intellectual breadth found in the biennial reports on trends affecting Kentucky's future once produced by the staff of the Kentucky Long-Term Policy Research Center—*Michal Smith-Mello, Billie Dunavent, Amy Watts (Burke), Mark Schirmer, Peter Schirmer,* and *Suzanne King*.

CBER research assistants play an important role in producing this report. *Xiaozhou Ding* and *Jacob Williams* assisted Dr. Bollinger with the Economic Forecast, and *Veronica Turner* and *Adam Childress* assisted with several other sections of this report.

Warren Nash, Executive Director of **The Von Allmen Center for Entrepreneurship,** also provided important support. This Center is the epicenter for entrepreneurship and commercialization at the University of Kentucky and in the Bluegrass Region. The Center brings together students, researchers, clinicians, mentors, service providers, and investors to create new businesses and jobs in the Commonwealth. The Von Allmen Center has been part of the Kentucky Innovation Network since its inception in 2002 (vace.uky.edu). **Warren Nash** is the Executive Director of the Von Allmen Center and he can be contacted at 859.257.6871 or warren.nash@uky.edu.

Von Allmen Center for Entrepreneurship

& The Lexington Office of the Kentucky Innovation Network

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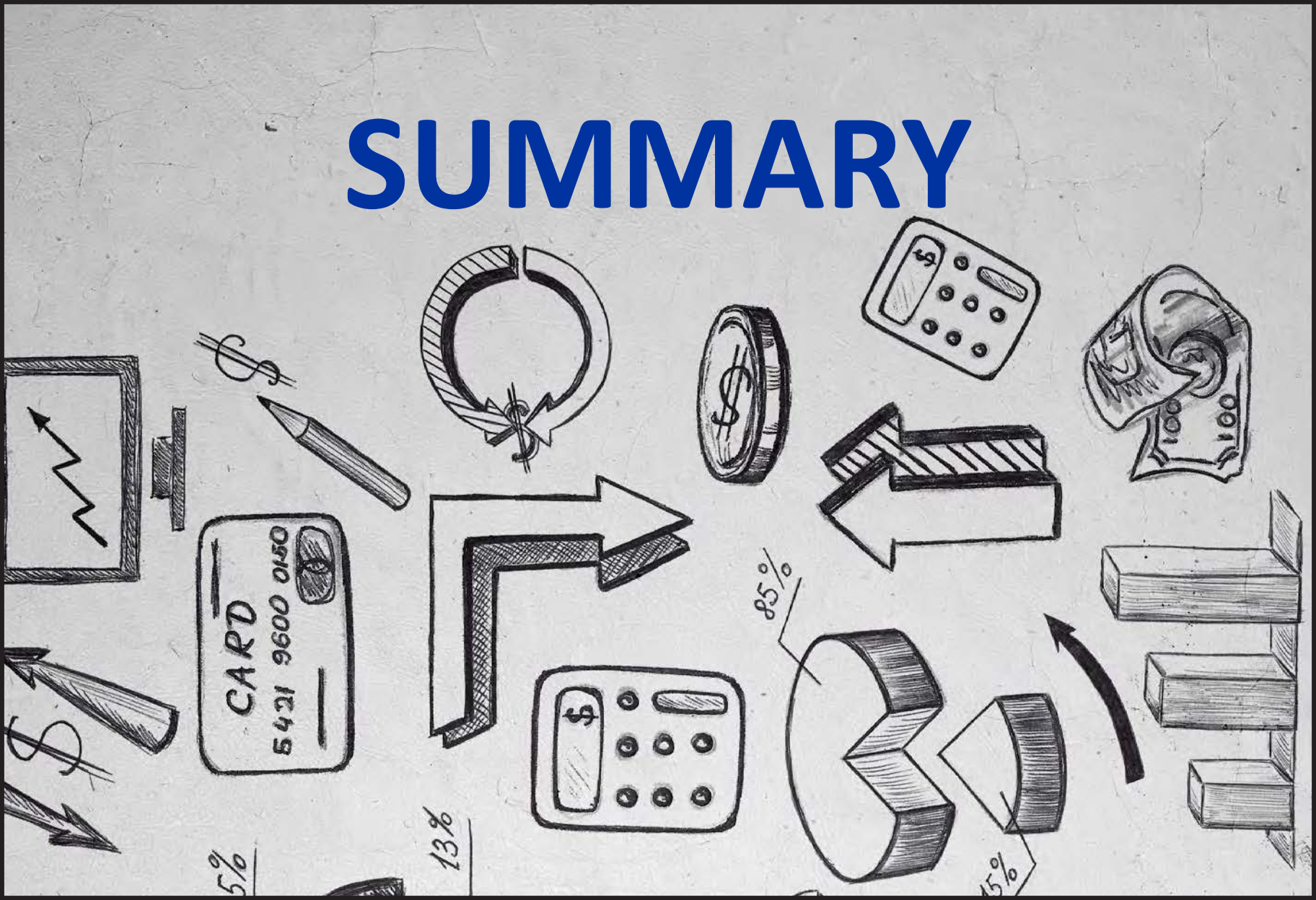


Summary

Ten Takeaways on Kentucky's Economy

PERHAPS THE MOST NOTEWORTHY ECONOMIC TREND over the last three and a half decades is the growing importance of education for economic success. Improving educational outcomes and enhancing the skills of Kentucky's prime working-age adults would, no doubt, help to move the needle on the state's labor force participation rate, which is one of the lowest in the country. This is especially true in rural areas where education levels and labor force participation rates are generally lower. While improving educational outcomes is necessary for increasing the labor force participation rate, it is not necessarily sufficient. For a variety of reasons, including, but not limited to, the changing global energy market and high chronic disease rates, many regions around the state are languishing economically. There are two primary factors that drive economic growth and enhance productivity—education and innovation. Kentucky has experienced educational progress over the last several years, but has consistently lagged behind in growth entrepreneurism and innovation.

Gatton College of Business & Economics

There are three Kentuckys—one that is thriving, one that is treading water, and one that is struggling.

Since many communities across the state lack an advanced telecommunications infrastructure, another factor that would help level the economic playing field for rural communities is enhanced connectivity. To accomplish any of these objectives, however, such as investing in education, health, or infrastructure, it will require comprehensive tax reform to fix the state's structural deficit.

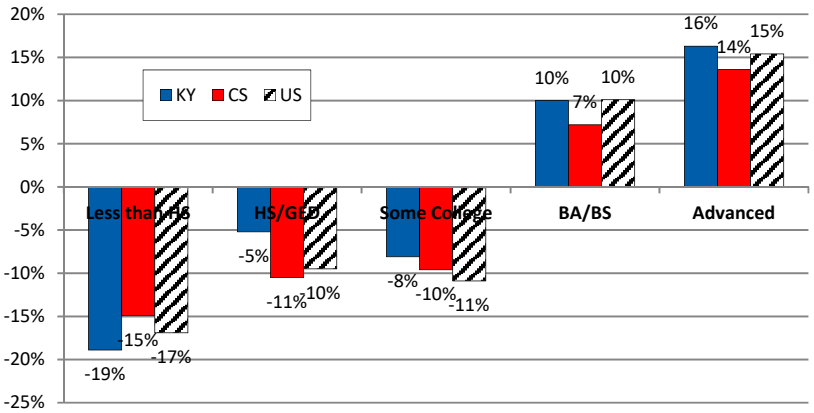
The economic forecast for the coming year is generally positive. Indeed, the average person in Kentucky probably feels economically stable and secure. At 5 percent, the unemployment rate is hovering at historic lows, inflation is muted at about 2 percent, and average weekly wages increased in the state by 2.8 percent from 2016 (Q2) to 2017 (Q2). Focusing on the "average," however, obscures a more complicated reality that differs from region to region, county to county, and indeed, from neighborhood to neighborhood. Arguably, there are three Kentuckys—one thriving, one treading water, and one struggling. And the lines dividing these groups do not necessarily extend along neat and tidy contours, as the chasms cut unevenly across geographic, educational, racial, and gender lines. In the sections that follow, we present ten takeaways on Kentucky's economy.

Education Pays

On average, those with higher levels of education have realized wage gains since the 1970s, while those with only a high school credential, or less, experienced large declines in hourly wages. The data in the bar chart include hourly earnings for workers paid by the hour (excluding overtime, tips, commissions, and bonuses), as well as the usual hourly earnings for nonhourly workers (including overtime, tips, commissions, and bonuses). The labor market in the U.S. has changed significantly over the last two and a half decades. Real hourly wages (inflation removed) for Kentuckians with only a high school credential declined by 5 percent from the late 1970s to the present. At the same time, the wages of those individuals with a Bachelor's degree increased by 10 percent. As is evident by the chart, the same pattern has played out in the competitor states and across the U.S. The lesson here is clear: to get ahead financially in today's labor market, it is essential to have higher levels of education.

Middle-class families have become less economically secure—and not just in Kentucky. For nearly 40 years, household income levels have changed at uneven rates depending upon whether one is "rich," "poor," or somewhere in-between. For Kentucky families, incomes at the 25th percentile—what some might consider "lower middle class"—declined by 12.1 percent compared to essentially no change at the nation level (see page 90). By comparison, incomes at the 75th percentile, or "upper middle class," increased for Kentucky and the U.S. by around 5.8 and 20 percent, respectively, in real dollars, from the late 1970s to the mid-2010s. The contrast is the greatest between incomes at the 10th and

Cumulative Change in Median Real Hourly Wages, 1979-1981 to 2014-2016, by Educational Attainment, Kentucky, Competitor States and the U.S.



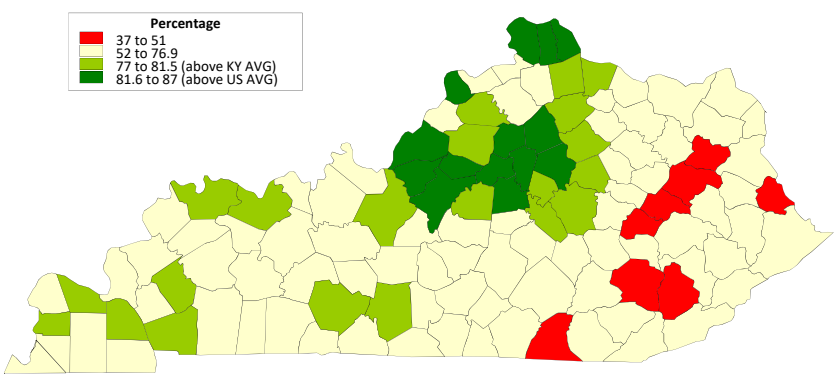
Source: Author's analysis of CPS Outgoing Rotation Group (ORG) data using files created by the Center for Economic Policy Research (CEPR), available at http://ceprdata.org/cps-uniform-data-extracts/cps-outgoing-rotation-group/.

90th percentiles, with incomes declining in Kentucky by 18.3 percent at the lower income level and increasing by 23.2 percent at the upper income level; a large difference also exists between the 10th and 90th percentiles for the competitor states and the U.S. Many factors have contributed to the widening gap, including the rise of globalization and outsourcing, increasing returns to high-level skills, job automation, declining unionization, immigration, and tax policies.

Labor Force Participation Rate

There are 14 Kentucky counties with a labor force participation rate among prime working-age adults (25 to 54 years old) that is equal to or greater than the U.S. average (81.6%). As one can see on the map, these counties are clustered in the Urban Triangle. On the other hand, there are seven counties with a labor force participation rate below 50 percent: Martin, Lee, Elliott, Clay, Leslie, Morgan, and Wolfe. Most of the counties in the urban triangle have labor force participation rates that are at least as high as the Kentucky average (76.9%). A critical factor that will determine the state's future economic growth is to identify and successfully implement programs that increase the labor force participation rate, particularly for prime working-age adults. These strategies include, but are not limited to, increasing the transition from high school to post-secondary education, improving the skills of non-college educated workers, and addressing the substance abuse problem. Research published in 2017 by Princeton University economist Alan Krueger found that from 1999 to 2015 up to 20 percent of the national drop in the labor force participation rate among prime working-age men and 25 percent of the drop among women is due to the use and abuse of opioids. Dr. Krueger is

Kentucky Labor Force Participation Rate by County, Prime Working-Age Adults, 25 to 54 Years Old



Source: U.S. Census, American Community Survey, 5-Year Estimate, 2012 to 2016, Table S2301

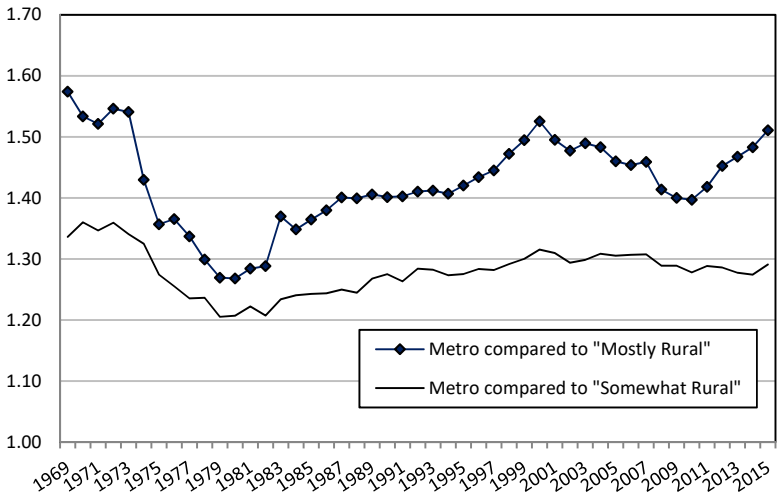
quoted in the *Wall Street Journal* as saying "The opioid epidemic and labor-force participation are now intertwined."

Location, Location, Location

There are large differences in the growth rate in total employment for Kentucky's regions from the peak of the last economic expansion, which was the fourth quarter of 2007, to the fourth quarter of 2016. Overall, employment growth was 4.7 percent for Kentucky. The Urban Triangle experienced an 8.6 percent increase in total employment, which exceeds the U.S. average of 6 percent. The other regions in the state grew more slowly, as evidenced by the 1.4 percent increase in Western Kentucky and 4 percent increase in South Central Kentucky. In Eastern Kentucky, employment is nearly 11 percent lower—a significant decline over the nine year period that reflects the declining fortunes of the coal industry as well as other factors.

Creating abundant high-paying jobs in Kentucky's rural areas has been and continues to be a challenge for policymakers, economic development professionals, and civic leaders. This figure illustrates the gap in wages between workers in Kentucky's metro counties and those in "somewhat rural" or "mostly rural" counties. Going back to 1969, wages in metro areas have been consistently higher than those in rural counties—especially when compared to Kentucky's 60 "mostly rural" counties. In 2015, for example, wages in metro counties were about 30 percent higher than those in "somewhat rural" counties and just over

Kentucky's Urban-Rural Wage & Salary Ratio, 1969-2015



Source: Bureau of Economic Analysis, CA30, Economic Profile
Note: Author estimated by taking ratio between Beale Codes 9-8-7 (mostly rural), 6-5-4 (somewhat rural), and 3-2-1 (metro).

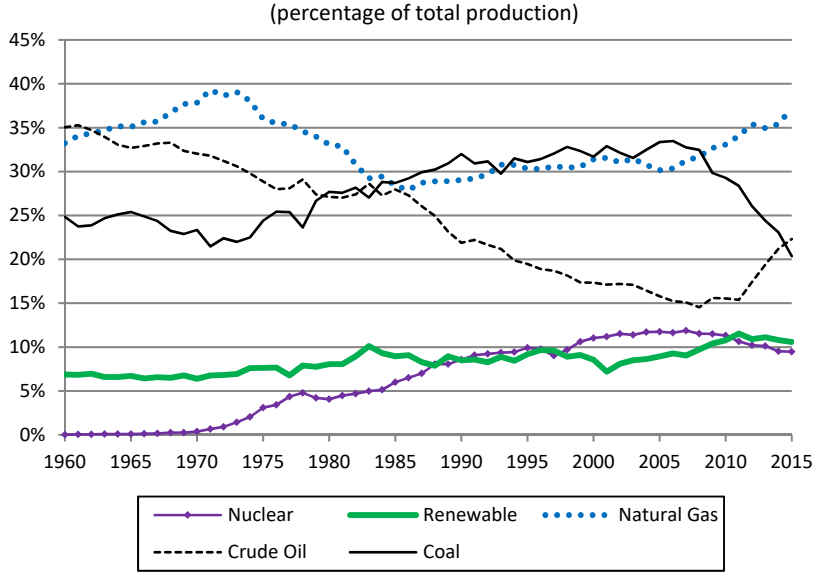
50 percent higher than wages in "mostly rural" counties. And the difference in net earnings is even greater, 37 and 84 percent respectively.

While the current urban-rural wage difference is notable, the growing gap over the last three and a half decades is perhaps more significant. The wage differential between the 35 metro counties and 85 rural counties increased steadily from the late 1970s to the present—suggesting new approaches to rural community and economic development are needed. Based on numerous studies of rural communities across the country, economists have outlined approaches for rural America to improve rural prosperity by thinking and acting regionally, finding new economic niches in high-value knowledge industries that leverage a region's strengths, and placing a premium on homegrown entrepreneurs.

Changing Energy Market

A major contributing factor to the large decline in total employment in Eastern Kentucky is, of course, the changing global energy market. The use of natural gas to produce electricity—and the concomitant decline in the use of coal—has been going on for about 20 years. In 1988, coal accounted for about 57 percent of the total megawatt hours generated and natural gas accounted for just over 9 percent. This was the high point for coal and the low point for natural gas when viewed over the 66 year period from 1949 to 2016. Since 1988, coal has been declining and natural gas has been increasing and now accounts for 33.8 percent; coal, by

Sources of U.S. Energy Production, 1960 to 2015
(percentage of total production)



Source: U.S. Energy Information Administration, State Energy Data System (SEDS), 1960 to 2015

comparison, accounts for 30.4 percent. Nuclear is another major energy source of electricity in the U.S. at 19.7 percent. The fracking boom has made natural gas a more financially attractive source of fuel for generating electricity. Relatively cheap natural gas, the rising importance of renewable sources, which currently accounts for about 14.9 percent of total net electricity generation in the U.S., and the mounting environmental concerns surrounding coal-fired power plants, are making fundamental changes to the global energy market—which, of course, are being felt in Kentucky's coal regions.

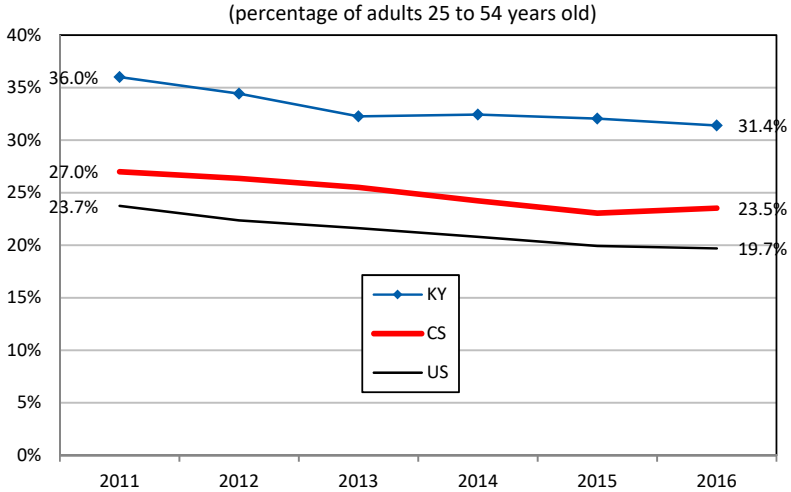
The U.S. Energy Information Administration (EIA) develops multiple scenarios of future energy production; the chart shows the distribution of sources for total energy production from 1960 to 2015. Currently, according to the EIA *Annual Energy Outlook 2017*, coal's contribution is about double that of nonhydroelectric renewable energy, but in the base or reference case scenario, the EIA expects U.S. energy production to be "led by growth in natural gas and renewables." The EIA projects that by 2040 nonhydroelectric renewable energy and coal will be making more or less equal contributions to the total U.S. energy production. There are important future economic implications for Kentucky as a result of this anticipated shift in energy production. As noted in the U.S. Department of Energy, *United States Energy and Employment Report*, "rising employment in solar, wind, and natural gas coincides with the shift in energy generation by source, especially given recent large-scale distributed and utility-scale solar capacity additions." Because Kentucky lags behind in renewable energy production, it is likely that it also lags behind in employment levels for this growing industry. Of Kentucky's total energy production, only 4.4 percent is from renewable sources, compared to 10.6 and 13.5 percent, in the U.S. and competitor states (i.e., AL, GA, IL, IN, MO, MS, NC, OH, SC, TN, VA, and WV), respectively.

Economic Consequences of Smoking

We know that opioid abuse is associated with a depressed labor force participation rate, but smoking, as the leading preventable cause of death in the United States, takes a heavier human and economic toll on the state. Kentucky has one of the highest adult smoking rates in the nation. As a consequence, smoking-related causes of death, including lung cancer and heart disease, take a disproportionately high toll here. With a smoking rate among prime working-age adults (25 to 54 years old) of 31.4 percent, Kentucky is well above the national average of 19.7 percent. Kentucky is statistically tied with Arkansas (29.3%), Missouri (28.1%), and West Virginia (32.0%) for the highest rate. The other 47 states, DC, as well as the competitor state and U.S. average, have statistically significant lower rates. The economic costs associated with smoking are high. The Centers for Disease Control and Prevention (CDC) report that smoking-related illness in the United States costs more than $300 billion annually, which includes

$170 billion for direct medical care for adults and more than $156 billion in lost productivity. According to November 2017 estimates from the Kentucky Coalition for a Smoke-Free Tomorrow, $1.92 billion is spent annually in Kentucky on health care costs related to smoking and 8,900 adults die each year from smoking. By comparison, there were 1,404 drug overdose deaths in Kentucky in 2016, about one-sixth of the lives lost from smoking.

Prime Working-Age Adults Who are Current Smokers, Kentucky, Competitor States, and the U.S., 2012-2016
(percentage of adults 25 to 54 years old)

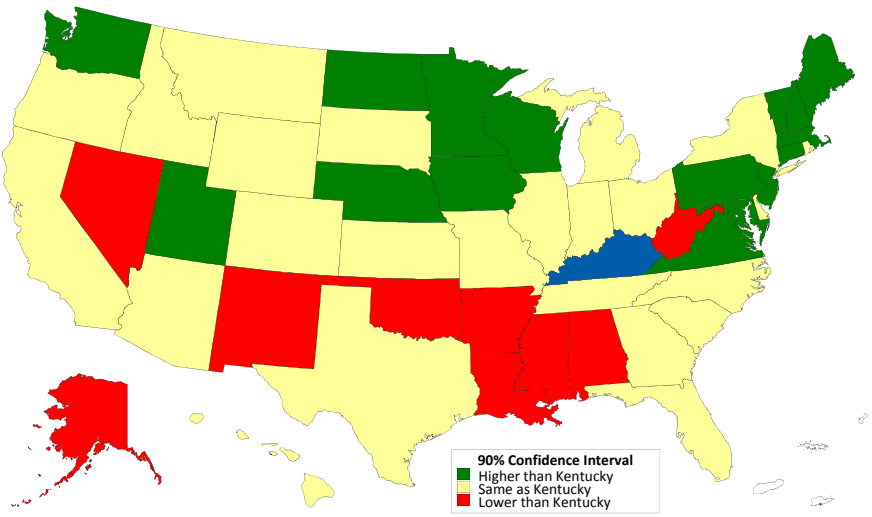


Educational Progress

To increase the state's per capita income, which has been around 80 percent of the U.S. average for the last 40 years, we need a top-tier educational system and an increasing percentage of the population with at least a Bachelor's degree. The map below shows how educational outcomes in Kentucky compare to those in other states. Based on 12 educational attainment and achievement factors combined into a single index (see the table on the page 113), Kentucky is statistically higher than 8 states, lower than 17 states, and no different statistically from 24 states (using a 90% confidence interval). Looking at Kentucky's competitor states, this Index shows that Kentucky ranks higher than Alabama, Mississippi, and West Virginia, but lower than Virginia. There is not a statistically significant difference between Kentucky and the other competitor states (i.e., Georgia, Illinois, Indiana, Missouri, North Carolina, Ohio, South Carolina, and Tennessee).

The percentages of Kentucky 4th and 8th graders scoring proficient or higher on the NAEP exams in 2015 is statistically higher than the national (public) average in two instances—4th grade reading and 4th grade science. Conversely, Kentucky's 8th graders continue to struggle evidenced by the math scores being

Kentucky's Educational Quality Compared to Other States, 2015-2016
(Based on 12 measures of educational attainment and achievement)

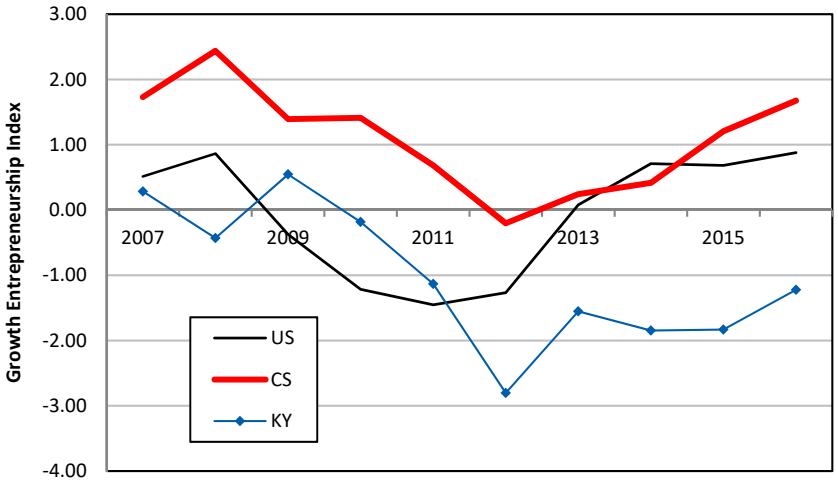


statistically significantly lower than the national public average for each of the seven NAEP assessments from 2003 to 2015. And there is no statistical difference between Kentucky and the U.S. for 8th grade reading, 8th grade science, and 4th grade math. On the other hand, Kentucky high school students continue to make significant gains in the percentage of recent graduates who are college and career ready as well as demonstrating Advanced Placement exam mastery.

Growth Entrepreneurism and Innovation

In addition to improving educational outcomes, the other factor associated with increasing state-level per capita income is creating an entrepreneurial culture that fuels economic growth through innovation. The Kauffman Foundation Index of Growth Entrepreneurship is based on three factors: the rate of startup growth, which measures the average employment growth in a firm's first five years; the share of "scaleups," which is the prevalence of firms that started with less than 50 people but employ at least that many by the tenth year of operation; and the density of high-growth companies, which is the prevalence of companies with a minimum of $2 million in annual revenue that also experience 20 percent annualized growth over a three-year period. This Index "is a composite measure of entrepreneurial business growth ... that captures growth entrepreneurship in all industries and measures business growth from both revenue and job perspectives." Since the peak of the previous economic expansion in 2007, Kentucky has lost ground to itself—evidenced by a lower index value in 2016 compared to 2007—but its standing among the states has remained the same, ranking 39th in both 2007 and 2016. Both the U.S. and the competitor states

Kauffman Index of Growth Entrepreneurship, 2007-2016, Kentucky, Competitor States, and the U.S.



Source: Kauffman Foundation, 2017 Growth Entrepreneurship Index
Note: CS is an average of Kentucky's competitor states, calculated by the author

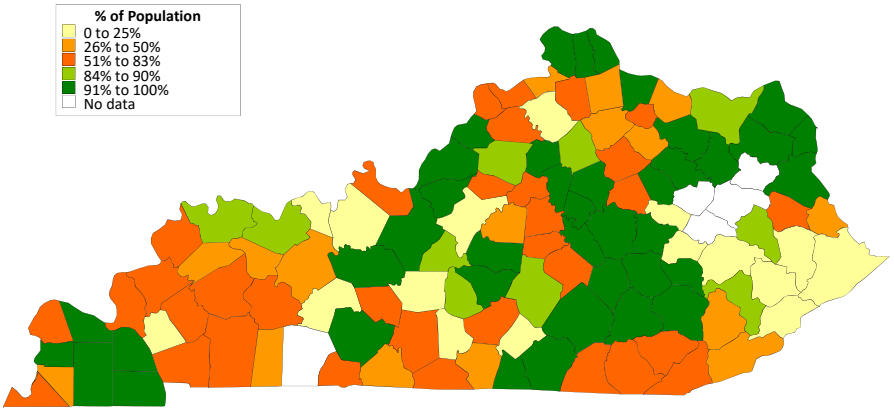
have similar index values in 2016 as they had in 2007. As virtually all of the measures in the Innovation section of this annual report show (see pages 197 to 213), Kentucky lags behind in its innovation capacity.

Imagination, intelligence, and tenacity can transform a great idea into a thriving business or a global enterprise, but entrepreneurial success is a function of many factors—such as adequate financing, a good support structure, and favorable timing. By creating the conditions that widen the window of entrepreneurial opportunity, we can help create what has eluded Kentucky for so long, a robust environment where entrepreneurial ideas regularly become commercialized innovations.

Enhanced Connectivity

Access to and use of the internet appear to be increasingly important for achieving economic success in the Information Age. Studies suggest that enhancing the nation's broadband infrastructure can improve innovation, entrepreneurship, and productivity (Brookings, 2013). However, according to the Federal Communications Commission (FCC), access to advanced telecommunications capability (i.e., at least 25 Mbps download/3 Mbps upload) is not uniformly available. The FCC's *2016 Broadband Progress Report* states that it "is not being deployed to all Americans in a reasonable and timely fashion... especially in rural areas..." An estimated 96 percent of Americans in urban areas have access to high-speed internet while only 61 percent of rural residents do.

Access to Fixed Advanced Telecommunications Capability by Kentucky County, 2015



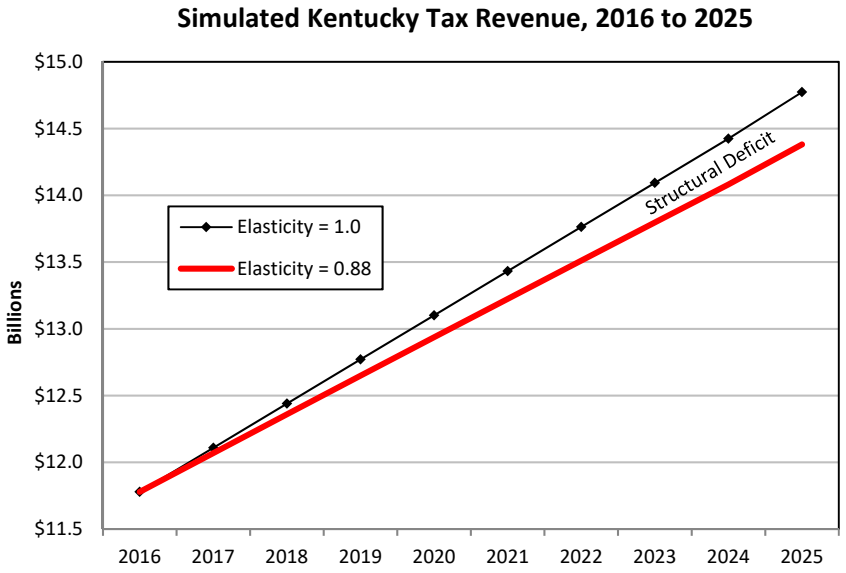
Source: FCC 2016 Broadband Progress Report,https://apps.fcc.gov/edocs_public/attachmatch/FCC-16-6A2.xlsx

Compared to the U.S. overall, the estimated percentage of individuals who have adopted high-speed internet is especially low in Kentucky (8% vs. 37%). Finally, at 21.1 megabits per second (Mbps), Kentucky's estimated median download speed is about half as fast as the U.S. estimate of 39 Mbps. All of these data suggest that Kentucky is lagging in its internet infrastructure, especially in rural areas.

A June 2017 *Wall Street Journal* article, "Rural America is Stranded in the Dial-up Age," describes the importance of high-speed internet for the economic prospects of rural communities: "Counties without modern internet connections can't attract new firms, and their isolation discourages the enterprises they have: ranchers who want to buy and sell cattle in online auctions or farmers who could use the internet to monitor crops. Reliance on broadband includes any business that uses high-speed data transmission, spanning banks to insurance firms to factories. Rural counties with more households connected to broadband had higher incomes and lower unemployment than those with fewer, according to a 2015 study..." There are a number of Kentucky counties that will continue to face significant economic challenges without access to high-speed internet. The *KentuckyWired* initiative, however, should help improve the state's internet infrastructure.

Structural Deficit

Increasing investments in education, health, or infrastructure will be costly, and difficult to achieve given the state's other needs; comprehensive tax reform will be required to fix the state's structural deficit. The work of the *Governor's*



Source: Estimated by the author

Blue Ribbon Commission on Tax Reform was conducted over five years ago, and we concluded then that the state had a substantial structural deficit. Our updated analysis, which is based on data from 2009 to 2016, suggests that Kentucky still has a significant structural deficit. We estimate that Kentucky's tax revenue elasticity is about 0.88. This means that, on average, tax revenue increases at about 88 percent of the overall economic growth rate. Ideally, revenue elasticity would be 1.0, indicating that, on average, state revenue changes at the same rate as the state's economy. Without fundamental tax reforms, Kentucky could face a $400 billion structural deficit by the 2024-2026 biennial state budget. Consequently, the state could find itself increasingly unable to fund necessary government services.

Forecast

The current economic expansion is now the second longest since 1945. Typically, expansions last approximately 6 years, and we are now in the 8th year of the current expansion. While there is nothing signaling an end to the expansion in the leading economic indicators, many pundits are predicting a recession will begin within the next six to eighteen months. Moreover, many financial advisors seem to be expecting a major stock market correction this spring, although opinions on all of these forecasts vary widely.

As outlined in the Forecast chapter, Dr. Bollinger is expecting the economic momentum of late 2017 will carry over to the first part of 2018—with economic

growth continuing to be robust. He expects final growth in gross domestic product (GDP) nationally to be around 2.5 percent. Early 2018 will likely see stronger quarterly growth rates, however, but by late 2018 is should begin to slow. Indeed, he is predicting that overall employment growth for the year will be about 1 percent, with an unemployment rate rising to 4.8 percent by the end of the year. Inflation will remain largely constant at 2 percent. His expectations are similar for the Kentucky economy. While he expects GDP growth may be weaker at 1.5 percent, the unemployment rate will return to 5.2 percent. The result will be an overall annual employment growth of 1.5 percent, similar to this past year. And in both the U.S. and Kentucky economies, he is forecasting nearly zero growth in manufacturing employment.

TABLE 1
Forecast for 2018

	2017 Forecast	2017 Actual or Best Available	2018 Forecast
Real GDP Growth—U.S.	2.5%	2.6%	2.5%
Unemployment Rate—U.S.	4.8%	4.1%	4.8%
Inflation—U.S.	2.0%	2.2%	2.0%
Employment Growth—U.S.	2.0%	1.4%	1.0%
Growth in Manufacturing Employment—U.S.	0.0%	1.5%	0.0%
Real GDP Growth—Kentucky	2.0%	2.0%	1.5%
Unemployment Rate—Kentucky	4.8%	4.9%	5.2%
Employment Growth—Kentucky	1.0%	1.5%	1.5%
Growth in Manufacturing Employment—Kentucky	0.0%	0.3%	0.0%

Conclusion

We talk about those in the lower, middle, or upper income group, those with one level of educational attainment or another, and those living in one region of the state or another as if they are fixed and static. But they are not—they are dynamic. Individuals can get additional education and training, migrate to another area with more job opportunities, and otherwise improve their standard of living or quality of life by taking active steps to do so. Kentucky has many strengths upon which to build, including a low cost of living, numerous natural amenities, and an enviable location within a day's drive of two-thirds of the U.S. population. By enhancing workforce quality, health outcomes, and online connectivity, we can maximize the potential of the state's most important resource: its people.


ECONOMIC FORECAST

The Kentucky Economy: Steady As She Goes

Christopher R. Bollinger, Ph.D., Gatton Proffessor of Economics

AS I WRITE THIS, Congress is considering the passage of the "Tax Cuts and Jobs Act" of 2017. Most analysts think it will increase gross domestic product (GDP) by approximately 0.3 percent, although many remain less convinced. The Stock Market has hit an all-time high repeatedly this year, with annual gains of over 20 percent. The national unemployment rate stands at 4.1 percent and it appears that GDP growth will be around 2.2 percent for the year. A total of 1.7 million jobs were added in 2017 and labor force participation stands at 62.7 percent, up 0.1 percent from November 2016. The second and third quarters of 2017, in particular, were very strong with GDP growth of 3.1 percent and 3.3 percent, respectively. Over the year, we have seen weekly and hourly earnings grow by 2.3 percent and 2.0 percent respectively,

The main question facing us now is: how long will the expansion continue?

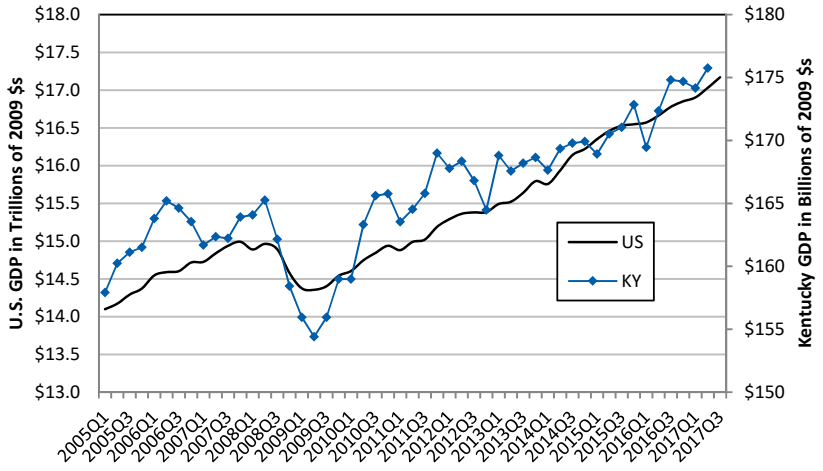
but on a real term basis they are flat, taking into account a 2.2 percent inflation rate over all.

With all signs indicating the nation is at the peak of the current business cycle, the main question facing us now is: how long will the expansion continue? While I certainly would love to think that the economy will continue to chug along and even gain more steam, I am also well aware that, at the time of this writing, the economy has been in expansion for 102 months (June 2009 through December 2017). Provided that the recession does not start this month, we are now in the second longest expansion in post-World War II history. Thus, we should turn our attention to the leading economic indicators.

National and State Economies

The overall national economy has been doing very well. While first quarter GDP grew sluggishly at only 1.2 percent, the remainder of the year has been quite strong, breaking 3 percent in both quarters two and three. Quarter four will likely be around 3.3 percent and most forecasts are placing the year at a 2.6

FIGURE 1
Quarterly Real GDP, U.S. and Kentucky
(2005 Q1 to 2017 Q3)



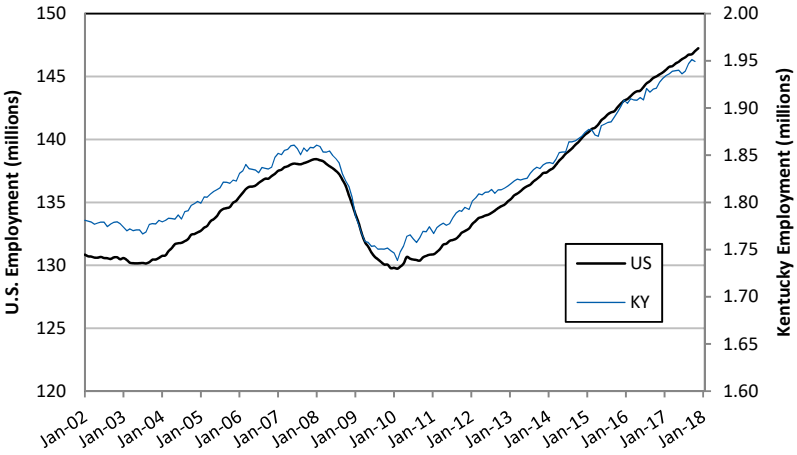
Source: U.S. Dept. of Commerce, Bureau of Economic Analysis, NIPA Table 1.1.1.

percent growth overall. Figure 1 plots the level of both the U.S. and Kentucky GDP (U.S. measured on the left hand axis and Kentucky on the right). Kentucky's GDP has been slightly less stellar. Beginning in quarter four of last year, we saw two quarters of decline (-0.1% and -0.3%). However, the second quarter of 2017 saw a 1 percent increase in GDP and from Q2 2016 to Q2 2017 there was a 2 percent increase in Kentucky's GDP. Given the strong U.S. economy in both quarter two and three, we would have also expected strong growth in Kentucky.

In Figures 2 and 3 we look at national and state employment (Figure 2) and unemployment (Figure 3). As with overall GDP, employment at both the national and state level has continued to rise steadily, with the U.S. economy adding over 2 million jobs since November 2016 and Kentucky adding 28,000 , generating an employment growth rate of 1.4 percent for the U.S. and 1.5 percent for Kentucky. The year opened with U.S. unemployment at 4.8 percent and has steadily fallen to 4.1 percent as of November of 2017. Kentucky has not faired quite as well in this regard, with unemployment both rising (5.4% in July) and then falling to 5 percent in October, from the initial 5 percent unemployment in January.

Manufacturing, in spite of declining labor market importance, remains a bell weather indictor. Figure 4 presents both the U.S and Kentucky employment levels (with U.S. measured on the left axis and Kentucky measured on the right). Overall, U.S. manufacturing employment grew at a rate of 1.5 percent (November 2016 through November 2017). This is roughly the same as overall employment growth, which is quite remarkable. Kentucky grew at a relatively lackluster rate of 0.3 percent since October of 2016 to present.

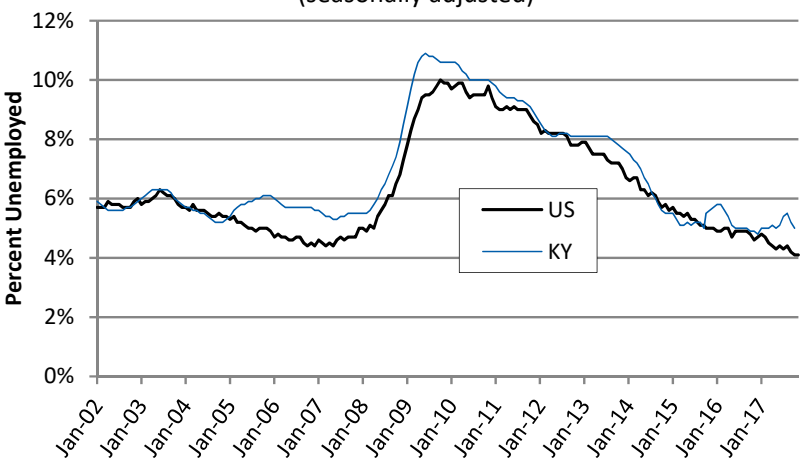
FIGURE 2
Employment Levels, U.S. and Kentucky
(January 2002 to November 2017)



Source: Bureau of Labor Statistics (total nonfarm, seasonally adjusted)

Inflation has been modest this year at 2.2 percent. As is always the case, this hides tremendous variation in important sectors. As noted above, U.S. weekly and hourly earnings have largely kept pace growing at 2.3 percent and 2.0 percent respectively. The energy sector saw the largest increases in prices with an overall 9.4 percent price increase, led by an 18.6 percent price increase in fuel oil and a

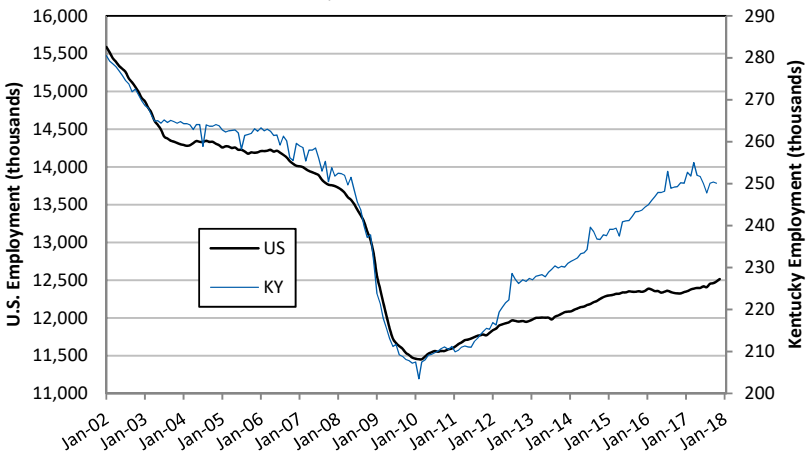
FIGURE 3
Unemployment Rate, Kentucky & the U.S.
(seasonally adjusted)



Source: Bureau of Labor Statistics

16.5 percent increase in motor fuel and gasoline. Although electricity costs rose a modest 2.5 percent, food, in contrast, only grew at 1.4 percent, with most of that growth coming from an increase in the cost of food away from home of a modest 2.4 percent. Medical care services only grew 1.6 percent and apparel and vehicles (both new and used) saw declines in prices during the last twelve months.

FIGURE 4
Manufacturing Employment Levels, U.S. and Kentucky
(January 2002 to November 2017)



Source: Bureau of Labor Statistics (all employees, seasonally adjusted)

At a national level, I have been watching two important indicators: Consumer Sentiment Index and the Yield Spread. Consumer Sentiment (from the University of Michigan) has been relatively steady the last twelve months. In November of 2016, it was at 93.8 and rose sharply in December to 98.2. While July of 2017 saw a drop to 93.4, October saw it hit a high of 100.7, the highest it's been since January 2004. November of 2017 has the Consumer Sentiment Index at 98.5, unchanged compared to January of 2017. It appears to me that while news stories may move the sentiment on a monthly basis we appear to be tracking an index centered around 97.

The Yield Spread measures the difference between the 10 year treasury rate and the 3 month treasury rate. The spread has been falling slowly, having begun the year at nearly 2 percent it stands now – December 14, 2017 – at 1.03. However, the decline has been slow which is not in any way alarming. The overall trend since 2014 has been down, suggesting differences in long run compared to short run expectations are similar.

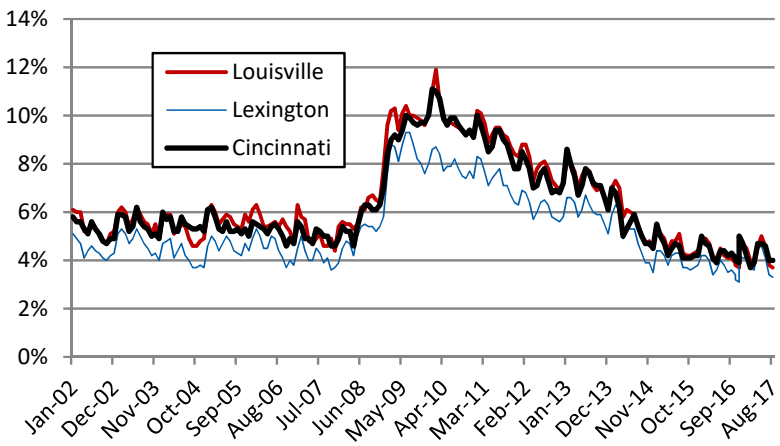
Lexington, Louisville and Cincinnati

The three cities in Kentucky comprising the Golden Triangle account for more than half of the population and economic activity of the state of Kentucky. The unemployment rate in all three cities is at 4 percent or lower as of August of 2017 (the latest data available at this writing). Lexington's 3.3 percent unemployment rate this summer masks a rise during the winter (mostly seasonal) reaching a peak in May of 4.6 percent. Similarly, while Cincinnati's rate rose from 4.2 percent in August of 2016 to a high of 4.7 percent in early spring, the return to 4 percent by August of 2017 reflects normal seasonality of this indicator. Louisville's drop from a 4.1 percent rate in August of 2016 to a 3.7 percent rate in August of 2017 appears to be the strongest of the three metropolitan areas, although, again, seasonality saw a high of 4.6 percent in April of 2017. The small changes in unemployment rate suggest that employment growth, both in the state and local economies, appear to be driven by individuals entering the labor market. This includes three groups: young workers entering for the first time, younger workers re-entering after pursuing other activities such education or childbirth, and discouraged workers returning to the labor force.

FIGURE 5

Unemployment Rate, Major MSAs in Kentucky

(not seasonally adjusted, total nonfarm, all employees)



Source: Bureau of Labor Statistics

Forecast

As noted in the introduction, the current expansion is now the second longest in post war (World War II) history. Typical historical expansions last approximately 6 years and we have now been expanding for over 8 years. In examining leading indicators, I do not see a particular indication that the expansion will come to an

end, however, many pundits are predicting a recession beginning within the next six to eighteen months. Many financial advisors seem to be expecting a major stock market correction this spring, although opinions on all of these forecasts vary widely.

I think that the first part of 2018 will continue to be strong and overall the growth that I am forecasting for the year is largely unchanged from my forecast and the outcomes for 2017.

There is no evidence in economics that a longer expansion increases the probability of a recession. However, I have not met any economist who thinks we are done with recessions forever. The business cycle has not been tamed and it is certain that we will have another recession. The question that remains is when this will occur. Predicting the timing of a recession is notoriously difficult. However, I predict a mild recession starting sometime in late 2018 or in 2019.

Table 1 presents my forecast from last year, the actual outcomes last year and the forecast for 2018. My forecast last year called for 2.5 percent national GDP growth accompanied by 2 percent employment growth. The actual outcomes were 2.6 percent and 1.4 percent. I also thought that unemployment had reached a low and would hover just below 5 percent, however it continued to decline, reaching 4.1 percent by the end of the year (although the average would be about 4.5 percent over the 12 months). My inflation prediction was for 2 percent and the actual was 2.2 percent, indicating that the economy has not begun to heat up dramatically.

My national forecasts for 2018 are similar. I think that the first part of 2018 will continue to be strong and overall the growth that I am forecasting for the year is largely unchanged from my forecast and the outcomes for 2017. I expect the final growth in GDP nationally to be around 2.5 percent. Early 2018 will likely

TABLE 1
Forecast for 2018

	2017 Forecast	2017 Actual or Best Available	2018 Forecast
Real GDP Growth—U.S.	2.5%	2.6%	2.5%
Unemployment Rate—U.S.	4.8%	4.1%	4.8%
Inflation—U.S.	2.0%	2.2%	2.0%
Employment Growth—U.S.	2.0%	1.4%	1.0%
Growth in Manufacturing Employment—U.S.	0.0%	1.5%	0.0%
Real GDP Growth—Kentucky	2.0%	2.0%	1.5%
Unemployment Rate—Kentucky	4.8%	4.9%	5.2%
Employment Growth—Kentucky	1.0%	1.5%	1.5%
Growth in Manufacturing Employment—Kentucky	0.0%	0.3%	0.0%

see stronger quarterly growth rates, however I expect late 2018 to slow. Indeed, I predict that overall employment growth for the year will be lower at 1 percent, with an unemployment rate rising to 4.8 percent again by year's end. Inflation will remain largely constant at 2 percent. I do not expect high inflation during any period.

For Kentucky my expectations are similar. While I believe GDP growth may be a weaker 1.5 percent, the unemployment rate will return to 5.2 percent following early employment growth leading to an overall annual employment growth of 1.5 percent, similar to this past year. In both the U.S and the Kentucky economies, I predict nearly zero growth in manufacturing employment.

It is difficult to forecast the economy, and generally economists like myself get it wrong. Many of you may disagree on the likelihood of an actual recession and I take no happiness in predicting a recession. I will be watching consumer sentiment and other important leading indicators closely through the year, and I would encourage you to do so as well.

AGRICULTURE

Agriculture

AGRICULTURAL ECONOMISTS at the University of Kentucky expect the state to largely follow national trends, with agricultural cash receipts increasing in 2017 to $5.6 billion, 3.5 percent higher than last year, but well below the record $6.5 billion in 2014. In a 2015 study by the UK College of Agriculture, *The Importance of Agriculture for Kentucky*, researchers found that the total economic impact of agriculture on the state's economy was $45.6 billion of output, nearly 259,000 jobs, and $6.2 billion in labor income. The reality, however, is that the agricultural sector accounts for about 1.1 percent of Kentucky's gross domestic product and has been steadily declining for the last several years. Even though its contribution to the state economy has been generally decreasing, the impact of agriculture in a local or regional economy can be significant. Agricultural commodities and related activities can have an important economic impact, with studies of the equine and bourbon industries, for example, showing economic impacts in the billions of dollars. Kentucky's farm traditions have long yielded significant economic benefits to the state, but the development of more refined, downstream products that use these raw

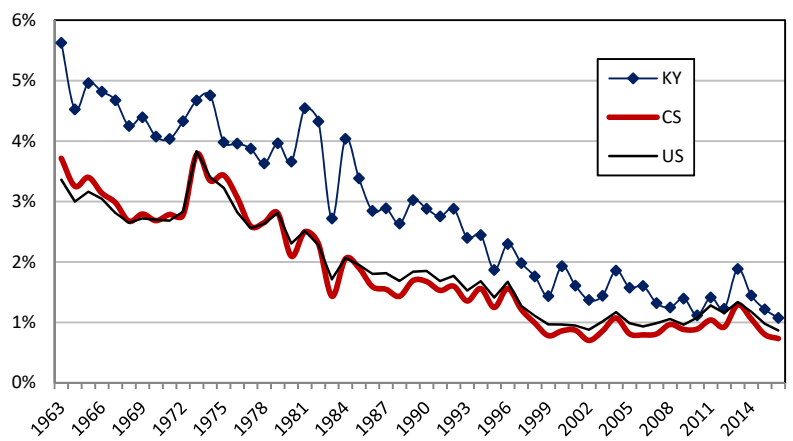
While small at the state level, the economic impact of agriculture at a local or regional level can be significant.

materials holds the promise of even greater returns. In fact, the value-added part of Kentucky's agricultural economy has been steadily increasing for the last several years. In 2015, valued-added food production in Kentucky approached $5.25 billion (in constant 2016 dollars), representing a marked increase from $3.44 billion in 1993. While some form of agriculture enterprise is present in every Kentucky county, many rural communities are relatively more dependent on this industry for jobs and income. The Shaping Our Appalachian Region (SOAR) working group on Agriculture, Community and Regional Foods, and Natural Resources is aspiring to leverage the agricultural sector in Eastern Kentucky to create jobs and increase incomes. One of their goals is to connect local producers to local markets. This is a promising strategy, given the growth of the "slow food" movement and the state's relatively strong embrace of local food suppliers and community supported agriculture (CSA). However, while acknowledging the growth potential offered by "accelerating local food movement and demand for value added products," UK agricultural economists caution that "labor uncertainties remain a major concern potentially constraining future growth."

Agriculture and GDP

While still playing an important role in some *local* and *regional* areas around the state, agriculture's role in the larger state economy has been declining for many years. Within the Agriculture, Forestry, Fishing, and Hunting sector, the Bureau of Economic Analysis (BEA) includes "establishments primarily engaged in growing crops, raising animals, harvesting timber, harvesting fish and other animals from a farm, ranch or their natural habitats." The BEA notes that "these establishments are often described as farms, ranches, dairies, greenhouses, nurseries, orchards or hatcheries...(and) the sector includes two basic activities: crop and animal production (farms) and forestry, fishing, and related activities." In 1963 agriculture accounted for about 5 percent of Kentucky's gross domestic product (GDP), compared to about three-and-a-half percent for the U.S. and competitor states. In 2016, this economic sector accounted for 1.1 percent of Kentucky's gross domestic product, compared to 0.9 percent in the U.S. and 0.7 percent in the competitor states. South Dakota has the highest percentage among the states with agriculture accounting for 6.7 percent of its gross domestic product while Connecticut has the lowest at 0.10 percent. Among the competitor states, Mississippi is the highest at 2.3 percent and Virginia the lowest at 0.3 percent.

Agriculture and Related Actvities in Kentucky, Competitor States, and the U.S., 1963 to 2016
(agriculture, forestry, fishing & hunting as a percentage of GDP)

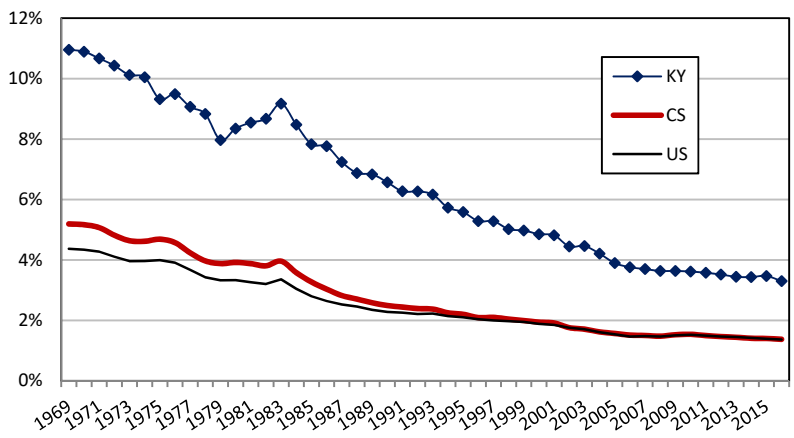


Source: U.S. Department of Commerce, Bureau of Economic Analysis

FARM EMPLOYMENT

Farm mechanization and a changing state economy have resulted in a steady decline in the percentage of Kentuckians working on the farm. Farm employment is the "number of workers engaged in the direct production of agricultural commodities, either livestock or crops; whether as a sole proprietor, partner, or hired laborer." The Bureau of Economic Analysis estimates Kentucky's farm employment at about 82,500, which is around 3.3 percent of total employment or jobs in the state. As one can see on the chart below, this is much higher than either the competitor states or the U.S., both of which are estimated at 1.4 percent. While Kentucky's farm employment is high compared to other states and the nation, it has decreased precipitously since the late 1960s when it was about 11 percent. Kentucky's farm employment has been under 4 percent since 2005 and has remained more or less stable since that time.

Farm Employment as a Percentage of Total Employment, Kentucky, Competitor States, and the U.S., 1969 to 2016
(percentage of total jobs, includes full- and part-time employment)

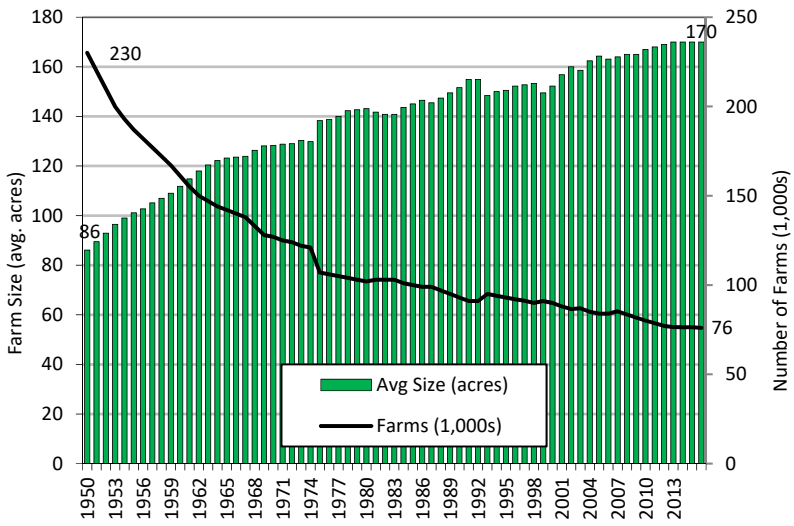


Source: U.S. Department of Commerce, Bureau of Economic Analysis

FARMS

The family farm has nearly become a quaint ghost of Kentucky's past. Over the last half century, two major trends have transformed the state's countryside: the consolidation of small, family-owned farms into larger enterprises; and the conversion of agricultural land to urban (or suburban) uses. As seen here, roughly one-third as many farms exist today as there were in 1950, while the average size of Kentucky's farms has doubled. According to the 2012 Census of Agriculture, which is conducted every five years by the U.S. Department of Agriculture, Kentucky experienced the largest decrease in farmland among the states from 2007 to 2012. It is likely, however, that much of the decrease in farmland is due to farmland going idle rather than transformed through residential, industrial, or commercial development. Yet, during this period the number of farms decreased from 85,260 in 2007 to 77,064 in 2012. Most of the farms in Kentucky are owned by an individual or a family (90%), and 43 percent of Kentucky farmers spend at least 200 days a year off the farm working in other jobs.

Kentucky Farms and Average Farm Size, 1950 to 2016

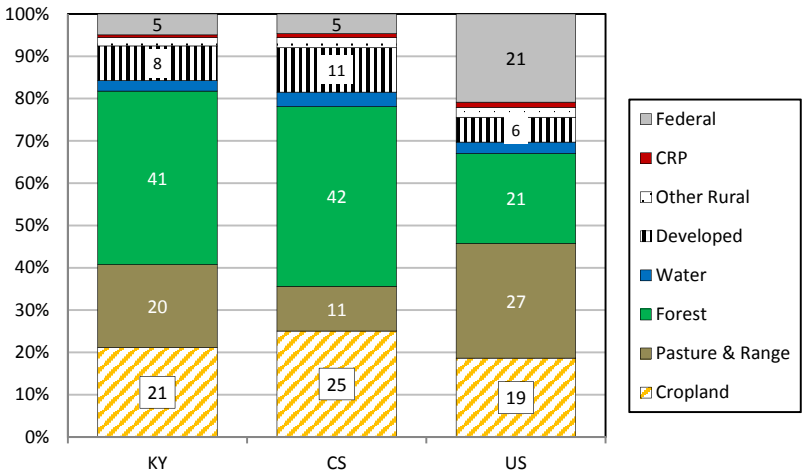


Source: Kentucky Department of Agriculture & USDA

LAND USE

The 2012 National Resources Inventory (NRI) is the most recent in a series of natural resource inventories conducted by the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS); it provides a consistent framework back to 1982. These data provide insights on the status, condition, and trends of land, soil, water, and related resources on the country's non-Federal lands. Non-Federal lands include privately owned lands, tribal and trust lands, and lands controlled by state and local governments. The chart below shows that the vast majority of land in the U.S. falls into one of three categories: cropland, forest, or pasture/range. In Kentucky, these three categories account for 82 percent of the total land area; this is a higher percentage than the competitor states and the U.S. Forest accounts for the largest category in Kentucky, 41 percent. Approximately 8 percent of Kentucky is "developed," compared to 11 percent in the competitor states and 6 percent in the U.S. When thinking about Kentucky's physical environment, factors that affect trees and forests—whether as a by-product of economic activity, urban development, or invasive species—have the potential to profoundly influence the aesthetic qualities of Kentucky's natural beauty.

Major Uses of Land, 2012,
Kentucky, Competitor States, and the U.S.
(percent of total land area)

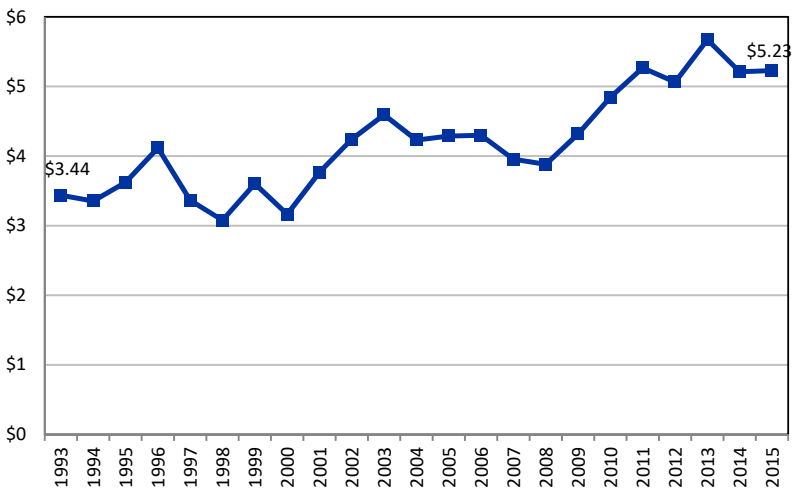


Source: U.S. Department of Agriculture, National Resources Inventory

Value-Added Food Production

While Kentucky's farm traditions have long yielded significant economic benefits to the state, the development of more refined, downstream products that use these raw materials holds the promise of even greater returns. Salsa, not tomatoes, is an example of a value-added food product that can enrich and sustain a farm economy. In 2015 valued-added food production in Kentucky approached $5.25 billion (in constant 2016 dollars), representing a marked increase from $3.44 billion in 1993. There are any number of value-added food products—from honey to wine to jerky to jam—that provide opportunities to enrich individuals as well as communities and generate new economic opportunities that help sustain Kentucky's rural areas.

Value Added to Food Products in Kentucky, 1993-2015
(constant 2016 billions)



Source: U.S. Census, Annual Survey of Manufacturers

Farm Commodities

The past two-and-a-half decades have seen significant changes in Kentucky's agricultural profile. In 1990, tobacco was the state's signature commodity and constituted nearly a quarter of Kentucky's farm receipts (23.8%). By 2000, tobacco ranked second and accounted for 18.5 percent of farm receipts, and by 2016 it had declined to sixth and 5.5 percent of Kentucky's total farm receipts. While tobacco's value has dropped precipitously, Kentucky's other major crops—corn, soybeans, hay, and wheat—have all shown considerable improvement. The most dramatic growth, however, has been poultry—now the state's top farm commodity. In 1990, farm chickens, broilers (chickens raised for food), and chicken eggs constituted less than 1 percent of total farm receipts (0.82%). In 2016, these three poultry commodities accounted for 18.5 percent of the $5.4 billion in total farm receipts. The dramatic swings in receipts for Kentucky's various farm products underscores the necessity of agricultural diversity, so that farmers' fortunes do not rise and fall based on the market for a single commodity.

Kentucky's Leading Farm Commodities, 2016

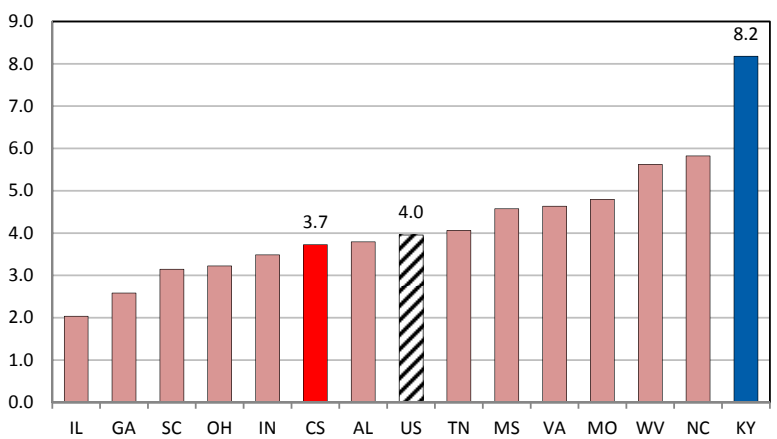
RANK	COMMODITY	VALUE OF RECEIPTS ($1,000s)
1	Other animals and products	908,994
2	Broilers	875,600
3	Soybeans	826,820
4	Corn	753,257
5	Cattle and calves	733,674
6	Tobacco	296,272
7	Hay	230,086
8	Dairy products, Milk	179,224
9	Miscellaneous crops	167,640
10	Wheat	152,883
11	Chicken eggs	118,592
12	Hogs	103,243
13	Turkeys	24,747
14	Farm chickens	2,769
15	Honey	925

Source: USDA Economic Research Service.

Local Food Suppliers

Internationally, the "slow food" movement has grown exponentially, providing a boost to small farms in an era of industrialized agriculture and making fresher food, often organically grown, more readily available. Kentuckians are embracing the movement of foods grown closer to home, giving rise to an increasing number of bustling farmers' markets that have helped advance agricultural diversification in a post-tobacco world and make healthy fare more readily available. Ten years ago there were 114 farmers' markets registered with the Kentucky Department of Agriculture—and during the 2017 market season there were 162. In 2008, more than three-fourths of Kentuckians said they occasionally (51.5 percent) or frequently (28.6 percent) made purchases at a farmers' market. Another way to obtain locally grown food is through a CSA, community-supported agriculture, which permit consumers to buy a portion of a farmer's output—fruits, vegetables, and other farm products delivered weekly—at the beginning of the growing season. Kentucky is a leader in the number of farms that market products through CSAs. Vermont is the national leader at 53 CSA farms per 100,000 population, followed by Maine at 31. Kentucky ranks 11th nationally at 8.2. The U.S. average is 4.0 and the competitor state average is 3.7.

Farms Marketing Products Through Community Supported Agriculture (CSA), 2012
(per 100,000 population)



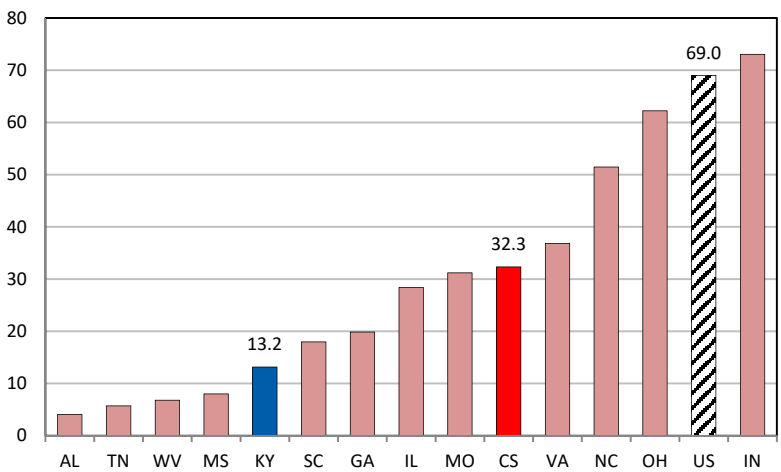
Source: 2012 Census of Agriculture
Note: CS is the weighted average of the competitor states.

ORGANIC FARMING

The outlook for organic products appears strong, as consumers continue to embrace organic and locally produced commodities. According to the U.S. Organic Trade Association (OTA), consumer demand for organic has grown by double-digits nearly every year since the 1990s, with sales increasing from $3.6 billion in 1997 to $43.3 billion in 2015. Citing Nielsen data, the OTA reports that 82 percent of U.S. households purchase organic products (78% in Kentucky). Nationally the number of organically certified farms increased from 9,140 to 14,217 during the five-year period from 2011 to 2016, and sales of organically produced commodities increased by 114 percent, from $3.53 billion to $7.55 billion. While the value of sales (246% increase), number of farms (127%), and total organic acreage (192%) has increased in Kentucky during this time period, other states appear to be pursuing organic farming with greater enthusiasm. While Kentucky's network of small farms would seem to be an ideal place for the organic movement to flourish, the chart shows that—at least by this metric, the number of organic farms—Kentucky lags the U.S. and most competitor states. Kentucky has 13.2 organic farms per 10,000 total farms, compared to 32.3 for the competitor states and 69 for the U.S.

Certified Organic Farms, 2016

(per 10,000 total farms)



Source: USDA Certified Organic Survey, various years & USDA Farms and Land in Farms, 2016 Summary
Note: CS is the weighted average of the competitor states. Ohio estimate is based on 2015 data.


COMMUNITY

Community

COMMUNITY characteristics exert a strong influence on economic outcomes. We know it intuitively, and it is increasingly confirmed by research. Studies have long found that individual economic success is associated with neighborhood or community quality. Research published in 2015 by economists Raj Chetty and Nathaniel Hendren, *The Impacts of Neighborhoods on Intergenerational Mobility: Childhood Exposure Effects and County-Level Estimates*, concludes that the quality of a child's neighborhood can have a long-lasting effect into adulthood on college attendance, teenage birth rates, poverty status, and income. Based on related research from economist Eric Chyn published in 2016, the effect of a neighborhood on one's future economic well-being is even stronger than what Chetty and Hendren found. Concepts like community development and economic development are linked so tightly that the terms are frequently used interchangeably. Economic activities take place in our communities, so characteristics that measure community connections, strengths and weaknesses, and resiliency are vital for understanding economic conditions and future economic prospects. Having a strong and robust civil society

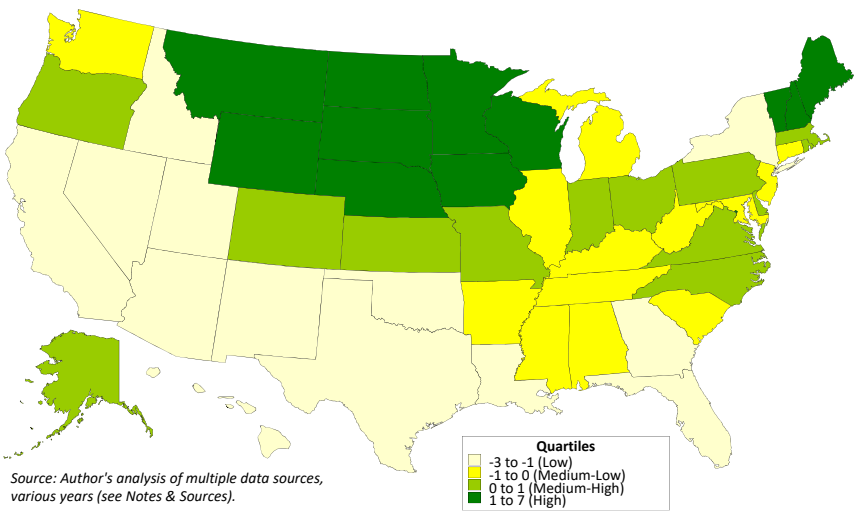
On many measures of community strength, Kentucky is on par with or better than the nation.

has many benefits. As was noted in a report from the University of Kentucky Nonprofit Leadership Initiative, *More than Charity*, "Nonprofits provide access to the arts, protect the environment, feed the hungry, assist the disabled in finding meaningful employment, provide affordable mental health services, teach the illiterate to read, provide quality child care for working parents and hundreds of other services that strengthen our communities and enhance our quality of life." Measuring a concept as amorphous as community strength and social capital is difficult. Nonetheless, on many measures of community strength, Kentucky is on par with or better than the national average, including the crime rate, volunteer rates, and levels of trust. Conversely, Kentucky's number of hours volunteered, level of charitable giving, and number of nonprofits, lag behind the national average. The level of social capital is unevenly spread across Kentucky—as the map on page 41 reveals. Efforts to enhance social capital will likely take on renewed emphasis in the future as governments search out community-based organizations, non-profits, businesses and citizens to forge partnerships in order to meet new and existing challenges facing our communities.

Social Capital Index

An array of important thinkers have advanced the idea that strong community structures are beneficial to economic health (e.g., James Coleman, 1990; Robert Putnam, 1993; Francis Fukuyama, 1995). We know that strong communities are important for several reasons, but the relationship between social capital—which the OECD defines as the "networks together with shared norms, values and understandings that facilitate co-operation within or among groups"—and economic growth and prosperity is still being explored and studied. Pulling from the existing economic development literature, The World Bank notes that "development and growth specialists are uncovering the importance of social cohesion for societies to prosper economically and for development to be sustainable." Rupasingha, Goetz, and Freshwater (2000, 2006) operationalize the concept of social capital by using variables that include, but are not limited to, voting rates, the number of nonprofit organizations, and the presence of community-based membership organizations. While they estimate the production of social capital at the county level, we adopt the same approach to create state-level estimates of social capital, as illustrated below. The darker areas of the map indicate denser networks of social connections while the lighter areas suggest lower levels of social capital. Kentucky is in the second quartile of states.

Social Capital Index, 2010 to 2017

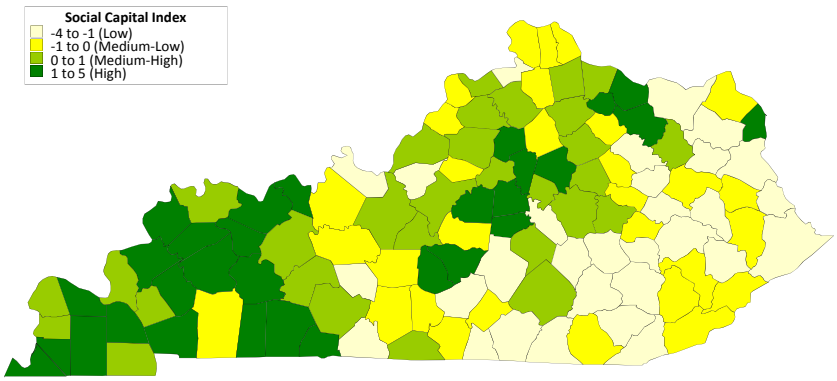


Source: Author's analysis of multiple data sources, various years (see Notes & Sources).

Social Capital Index

Strong, resilient, and vibrant communities are created and nurtured by engaged and connected citizens. The economic development literature suggests that areas with dense networks of citizens who are invested in their communities derive economic benefits. For example, Rupasingha, *et al.,* (2000, 2006) find that "social capital has a statistically significant, independent positive effect on the rate of per-capita income growth." These authors have developed an approach for constructing a county-level social capital index (see the facing page) which we have updated with more current data and present in the map below. These estimates reveal a relatively dense concentration of social capital in Western Kentucky, but much less in Eastern Kentucky.

Social Capital Index, 2010-2015

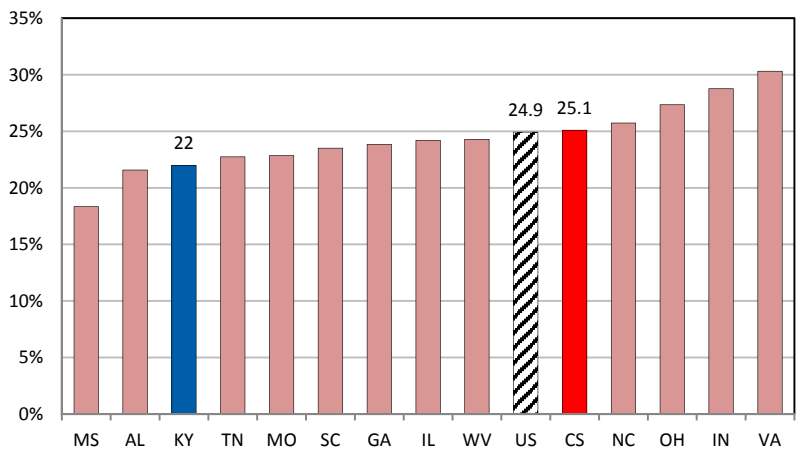


Source: Author's analysis of multiple data sources, various years (see Notes & Sources).

Volunteer Rate

Some studies have linked participation in civil society—volunteering for example—to higher levels of community prosperity, higher achievement in schools, and improved individual health. Volunteers can tackle problems such as poverty, illiteracy, and drug abuse that public or private sectors have not adequately addressed—making a community more attractive for economic development. Some research even suggests that members of communities with high levels of civic participation enjoy better health and live longer. An estimated 22 percent of Kentucky's population 15 and older volunteered at some point in 2015. There is a statistically significant difference between Kentucky and the U.S. (24.9%) and competitor state (25.1%) averages. Only three of the competitor states are statistically significantly different from Kentucky: Ohio, Indiana, and Virginia. The rest of the competitor states are statistically no different from Kentucky (95% CI). Nationally the highest volunteer rate belongs to Utah (39.7%) while the lowest is found in Florida (18.3%).

Volunteer Rate, 2015,
Kentucky, Competitor States, and the U.S.
(percentage of those 15 and older who volunteer during the year)

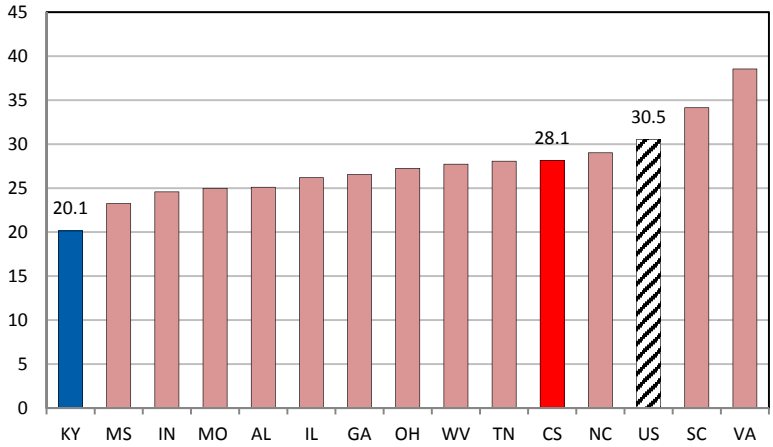


Source: Estimated from U.S. Census, Current Population Survey, September 2015 (Volunteer Use Supplement)

VOLUNTEER HOURS

Kentucky had around 785,000 volunteers in 2015 who contributed nearly 72 million hours of service, or around 20 hours per resident 15 years and older. The total annual estimated value of volunteer service in Kentucky in 2015 was about $1.5 billion. This is based on the Independent Sector's annual estimate of the value of a volunteer hour for Kentucky in 2015 of $21.16. The average number of volunteer hours in Kentucky decreased from 26.6 in 2014, and is substantially lower than the competitive states (28.1) and US (30.5) averages. Moreover, at 20.1 volunteer hours per resident 15 years old and older, Kentucky ranks last in the county (Utah is first with 76.1 hours). Nonetheless, it is clear that volunteers, community groups, and nonprofit organizations add social and economic value to Kentucky's economy and society.

Volunteer Hours, 2015,
Kentucky, Competitor States, and the U.S.
(average hours served in a year, per resident 15 and older)

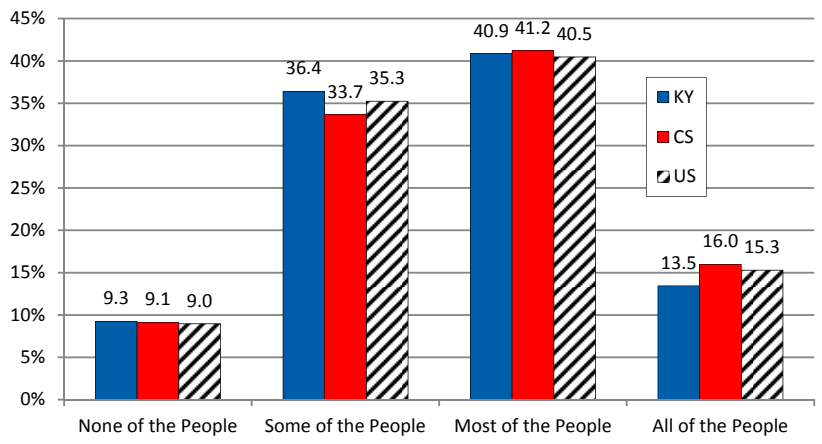


Source: Derived from U.S. Census, Current Population Survey, September 2015 (Volunteer Use Supplement)

TRUST

High levels of trust in a community help bind people together to work for the greater good in a host of ways. Trust has been called the lubricant that facilitates charitable acts, community development, and everyday commerce. When asked whether they trust people in their neighborhood, 41 percent of Kentuckians indicated "most of the people," and just over 13 percent said "all of the people." With over half of the population 18 or older (54%) expressing a high level of trust toward their neighbors, the Kentucky percentage is quite high—but the difference between Kentucky, the competitor states, and the U.S. is not statistically significant.

Trust People in Neighborhood, 2013
Kentucky, Competitor States, and the U.S.
(percent expressing trust, age 18 and older)

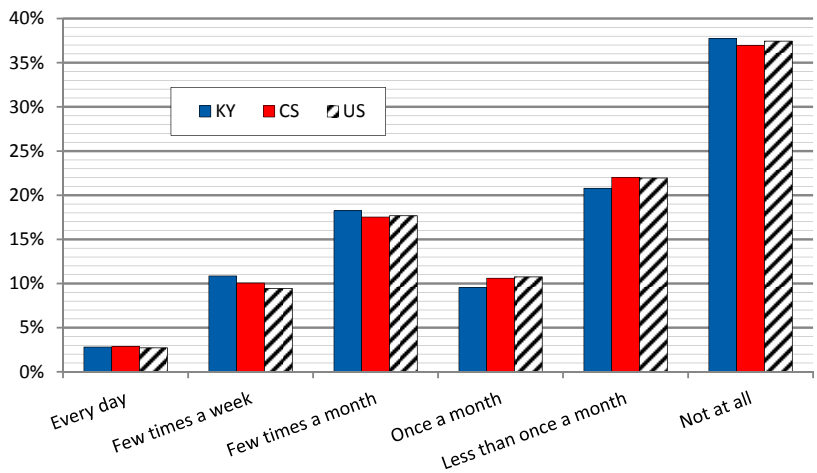


Source: Authors' analysis of November 2013 Current Population Survey data (Civic Engagement Supplement)

FAVORS FOR NEIGHBORS

An indicator of community strength, social capital, and neighborhood cohesiveness is the extent to which neighbors do favors for each other. A majority of Americans do occasional favors for neighbors, with around 63 percent indicating they do so with varying frequency. The question posed is: *How often did you and your neighbors do favors for each other? By favors we mean such things as watching each others children, helping with shopping, house sitting, lending garden or house tools and other small things to help each other – basically every day, a few times a week, a few times a month, once a month, less than once a month, or not at all?* There are virtually no differences between Kentucky, the competitor states, and the U.S. in the frequency with which neighbors do favors for each other. Doing a favor for one's neighbor does not appear to be too demanding since approximately 40 percent perform favors either "a few times a month" or "less than once a month."

Favors for Neighbors, 2013
Kentucky, Competitor States, and the U.S.
(frequency neighbors provide favors to each other, 18 and older)

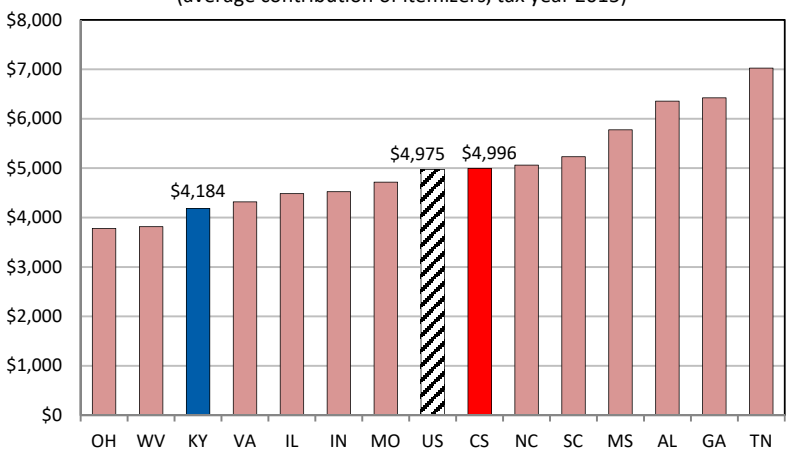


Source: Authors' analysis of November 2013 Current Population Survey data (Civic Engagement Supplement)

Charitable Contributions

America's giving spirit continued to rise in 2016 with giving by *individuals* increasing by an estimated 3.9 percent according to *The Giving Institute*. At $281 billion, charitable giving by individuals in 2016 was equal to about 72 percent of the estimated total contributions from all sources, $390 billion. Nationally the average charitable contribution among those who itemize deductions—which is 28.5 percent of those who file an income tax return—equaled $4,975 for the 2015 tax year, compared to $4,184 in Kentucky. Among the competitor states, Tennessee has the highest amount at $7,024 and Ohio the lowest at $3,780. Nationally, Maine is the lowest at $2,592 and Wyoming is the highest at $9,212. Obviously those who do not itemize deductions on their tax returns also make charitable contributions, but it is estimated that itemizers account for about 80 percent of all charitable contributions from individuals. Overall, *The Giving Institute* reports that in 2016 per capita giving by U.S. adults was $1,155, and average U.S. household giving was $2,240.

Charitable Contributions in 2015,
Kentucky, Competitor States, and the U.S.
(average contribution of itemizers, tax year 2015)

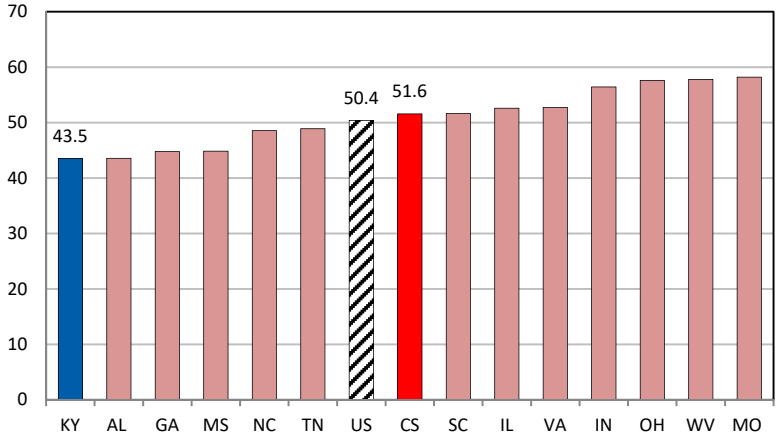


Source: Internal Revenue Service, Statistics of Income, Historical Table 2
Note: CS is the competitor state weighted average

NONPROFITS

Like the number of volunteers or the amount of money donated to charity, the number of nonprofits is an indicator of a community's social capital. The 1.6 million nonprofits in the U.S. include social organizations (e.g., art, health, education, and advocacy groups), labor unions, business and professional organizations, and religious congregations. Nonprofits also have a direct economic impact. According to a 2014 report from the Urban Institute, *The Nonprofit Sector in Brief 2014*, "the nonprofit sector contributed an estimated $887.3 billion to the U.S. economy in 2012, composing 5.4 percent of the country's gross domestic product (GDP)." The average number of nonprofits per 10,000 population in the U.S. is 50.4, compared to Kentucky's 43.5. Among the competitor states, Kentucky has the fewest number of nonprofits per 10,000 population. At 58.1 per 10,000 population, Missouri has the most among competitor states. Montana has the highest number overall with 99.1 while Nevada has the lowest at 31.4. As of August 2017, Kentucky had 19,300 registered nonprofit organizations with $26.2 billion in annual revenue and $47 billion in assets.

Registered Nonprofit Organizations, 2017, Kentucky, Competitor States, and the U.S.
(per 10,000 population)

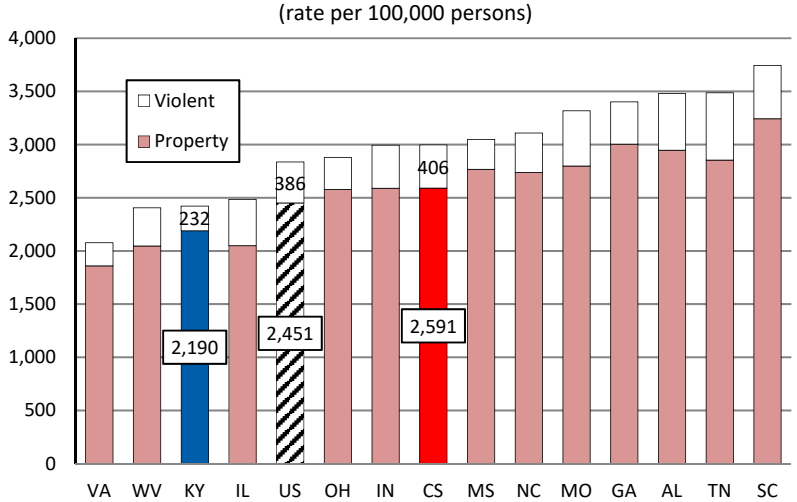


Source: Internal Revenue Service, Exempt Organizations Business Master File (2017, August) & U.S. Census, 2016
Note: CS is the weighted average of the competitor states

CRIME RATE

According to the FBI *2016 Uniform Crime Report*, violent crimes in the U.S. increased 4.1 percent from 2015 to 2016, while property crimes decreased by 1.3 percent—the fourteenth consecutive year these estimates have declined. In the U.S. overall, the estimated rate of violent crime was 386 offenses per 100,000 inhabitants, and the property crime rate was 2,451 offenses per 100,000 inhabitants. The violent crime rate rose 3.4 percent compared to the 2015 rate, and the property crime rate declined 2.0 percent. The number of reported property crimes per 100,000 persons in Kentucky is 2,190, a rate lower than all competitor states except for Virginia, West Virginia, and Illinois. Reports of violent offenses, including murder and nonnegligent manslaughter, forcible rape, robbery, and aggravated assault, also were well below the national rate here and below the rates reported by eleven of twelve competitor states (Virginia's rate is lower). Kentucky's comparatively low crime rate remains a strong asset that contributes to a sense of well-being and trust which, in turn, helps create caring places that nurture productive lives.

Crime Rate,
Kentucky, Competitor States, and the U.S., 2016
(rate per 100,000 persons)



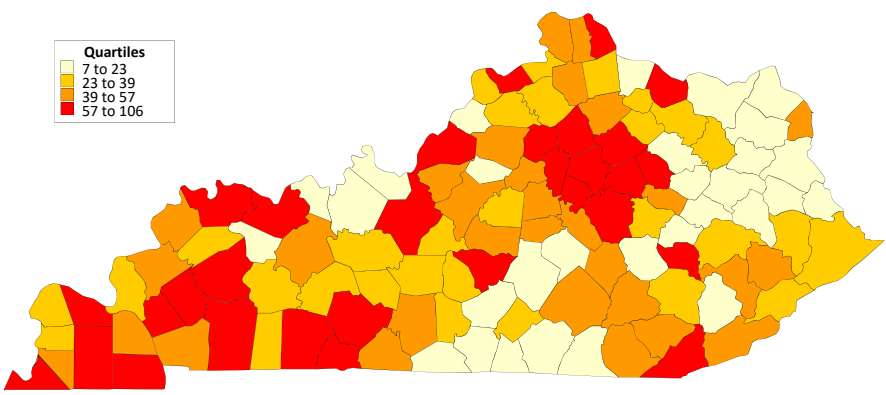
Source: US Federal Bureau of Investigation, 2016 Crime in the United States

CRIMINAL OFFENSE RATE BY COUNTY

Any discussion of community would be incomplete without consideration of the role of crime, which can instill fear, undermine trust, and fray connections—and impact economic development decisions and outcomes. Around 81 percent of Group A offenses in Kentucky fall into one of five categories: larceny/theft (28%), drug/narcotic (21%), assault (15%), burglary/breaking and entering (8%), and destruction/damage/vandalism of property (9%). Group A offenses are serious crimes that include the categories listed above as well as arson, homicide, and sex offenses. The total number of Group A offenses increased by only 1.75 percent from 2015 to 2016, which is a small increase; by comparison the increase from 2014 to 2015 was 25 percent. Perhaps it is no surprise that Kentucky's metro areas have the highest rates of serious crime, but rural areas of the state are certainly not immune to the same types of serious criminal offenses taking place in the largest cities. This map shows the number serious criminal offenses (Group-A) per 1,000 population at the county level. At a rate of 7.2, Lewis County has the lowest rate of Group-A offenses per 1,000 population in the state while Fayette has the highest at 105. By comparison, Kentucky's overall rate is 63. The rate for Kentucky's 35 urban counties is 75, which is higher, of course, than the rate for slightly rural (58) or mostly rural (39) counties.

Criminal Offense Rate by County, 2016

(Group-A Offenses per 1,000 Population)

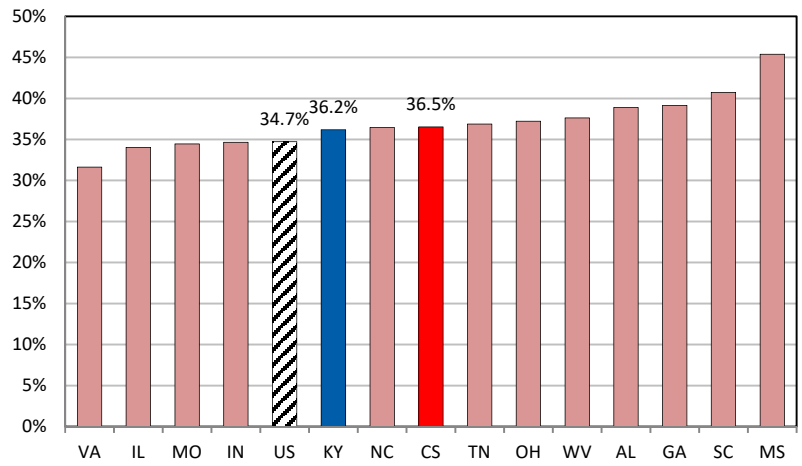


Author's calculations from Kentucky State Police, Crime in Kentucky, 2016.

Children in Single-Parent Families

Recent research shows that intergenerational (economic) mobility can be muted by the constellation of factors associated with growing up in a single-parent family (Chetty, *et al*., 2014). In 1960 approximately 12 percent of children under 18 in the U.S. lived with only one parent; in 2016, however, over one third of this county's children lived in a single-parent family (34.7%). As a country we went from about one in ten children to over one in three—a substantial demographic shift. The research shows that children living in single-parent households tend to face more significant obstacles in life, which present emotional, health, economic and academic challenges for many of these children. And there can be lifelong economic consequences. As Raj Chetty and his colleagues have noted, "the United States is better described as a collection of societies, some of which are 'lands of opportunity' with high rates of mobility across generations, and others in which few children escape poverty." Nationally, Mississippi has the highest rate of children living in single-parent families at 45.4 percent and Utah has the lowest rate at 18.7 percent. Both the Kentucky and competitor state percentages are around 35 to 37 percent, which is similar to the U.S. average.

Children in Single-Parent Families, 2016, Kentucky, Competitor States, and the U.S.
(percent of children under 18)

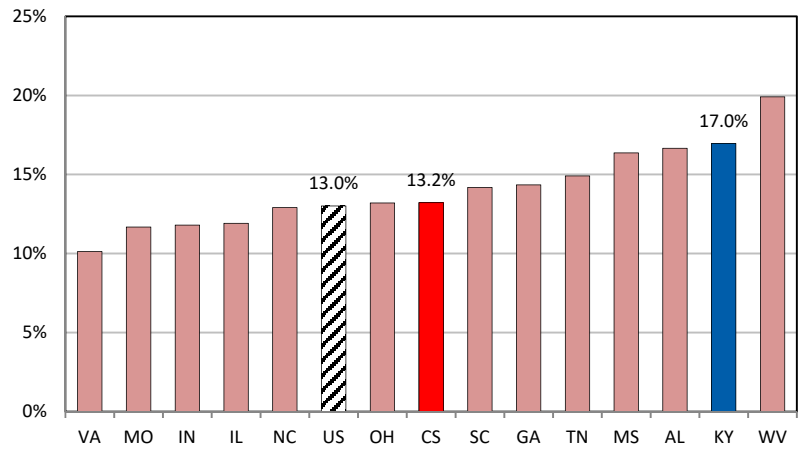


Source: American Community Survey, 1-year estimate, 2016, Table C23008

DISCONNECTED YOUNG ADULTS

Strong, resilient, and vibrant communities are created and nurtured by actively engaged, invested, and connected citizens. The figure below shows the percentage of young adults (18 to 24 years old) who are "disconnected." These young adults are not enrolled in school, are not currently employed, and have no degree beyond a high school diploma or GED. Collectively these factors could indicate that a young person is having difficulty making a successful transition to adulthood. Kentucky's 17 percent is not statistically different (using a 95% confidence interval) from Tennessee, Mississippi, Alabama, or West Virginia. However, Kentucky is statistically higher than the competitor state (13.2%) and U.S. (13.0%) averages, as well as the rest of the competitor states (i.e., VA, MO, IN, IL, NC, OH, SC, & GA). Rhode Island has the lowest percentage of disconnected young adults at 6.9 percent while Louisiana has the highest with 20.1 percent.

Disconnected Young Adults, 2016,
Kentucky, Competitor States, and the U.S.
(percent of young adults, 18 to 24 years old)

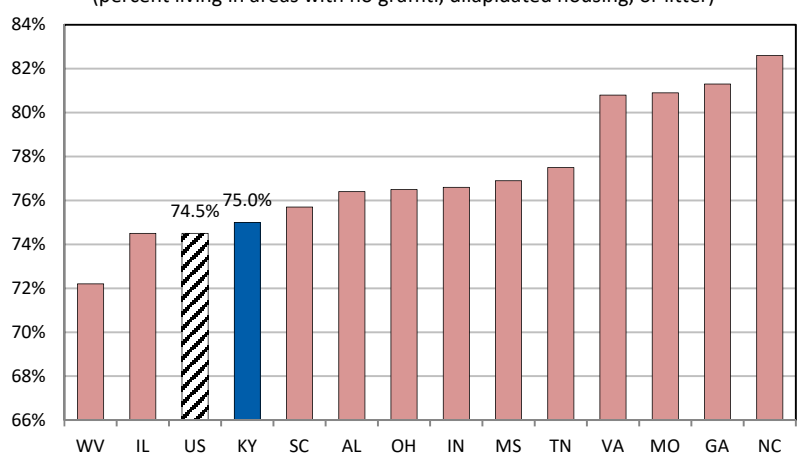


Source: Estimated from 2016 1-Year PUMS

Neighborhood Quality

The incidence of crime is one way to measure the quality of a neighborhood. Other factors that detract from neighborhood quality include graffiti, dilapidated housing, and litter. To gauge the quality of neighborhoods in which children live, the National Survey of Children's Health posed several questions to survey respondents, including "In your neighborhood, is there litter or garbage on the street or sidewalk?," "Does the neighborhood contain poorly kept or dilapidated housing?," and "In your neighborhood is there vandalism such as broken windows or graffiti?" The numbers in the chart below are estimates of the percentage of children living in neighborhoods where none of these three detracting elements are present. Kentucky's percentage (75%) is not statistically different from the U.S. percentage (74.5%) or any of the competitor states. North Carolina has the highest value among the competitor states (82.6%) and West Virginia the lowest (72.2%).

Children Living in Neighborhoods Without Detracting Elements, KY, Competitor States, and the U.S., 2016
(percent living in areas with no graffiti, dilapidated housing, or litter)

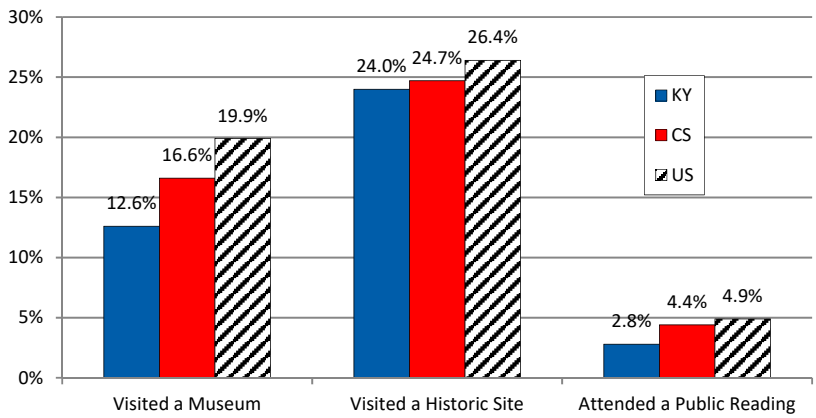


Source: 2016 National Survey of Children's Health

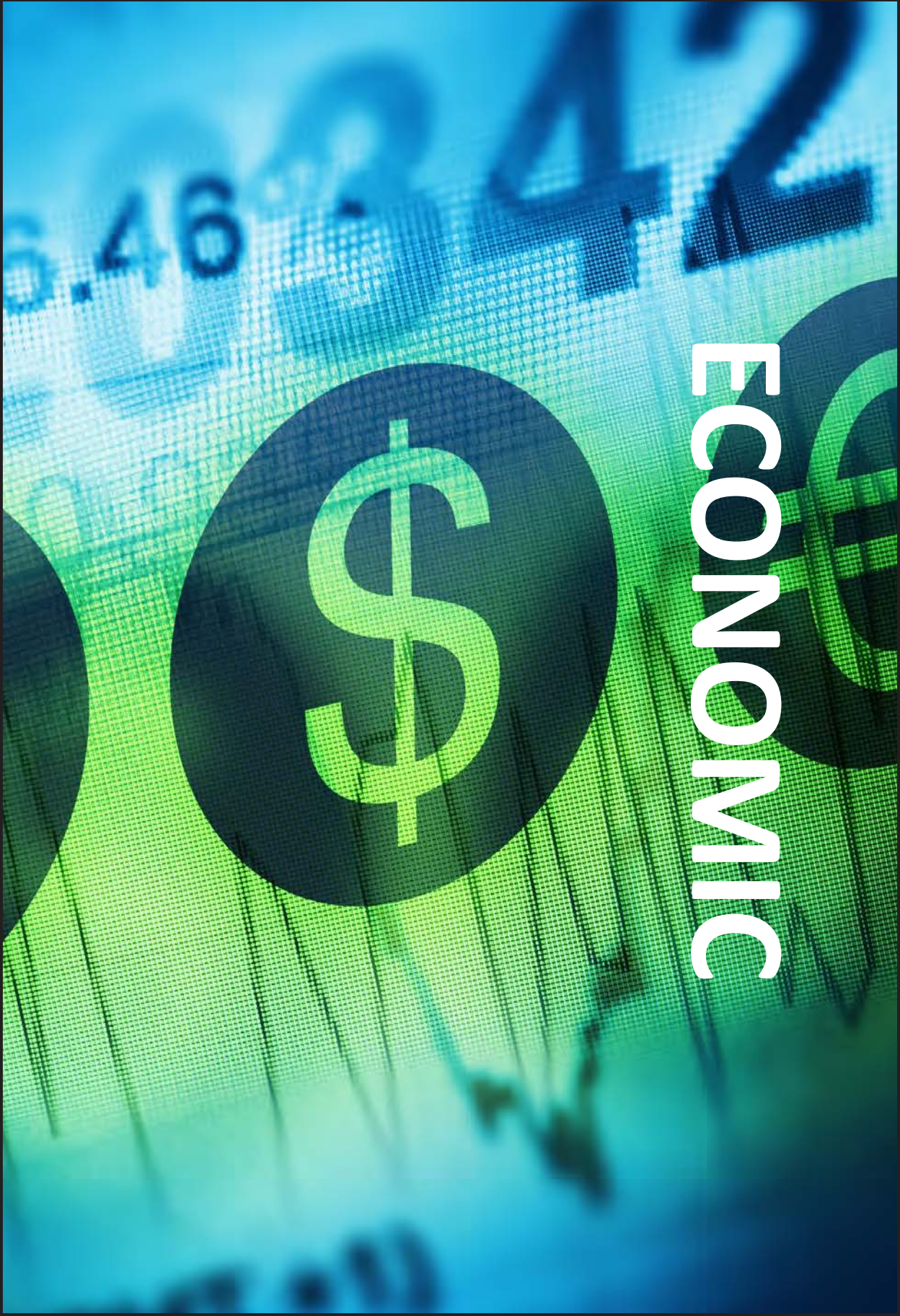
PUBLIC PARTICIPATION IN THE ARTS

A thriving local culture represents a cornerstone of quality of life, allowing citizens to enrich and educate themselves by experiencing the arts and learning about history. Cultural amenities can constitute an integral role in site selection decisions, evidenced by the list of factors Amazon will consider in the siting of its second headquarters. The so-called "creative class" places a premium on living in locations that offer enriching and compelling lifestyles. From music to museums, the arts matter. The chart below shows three items included in the Survey of Public Participation in the Arts that offer insight about the availability of the arts and whether individuals participate in them. They are: whether one has visited an art museum or gallery during the last 12 months; whether one has visited a historic park or monument, toured buildings or neighborhoods for historic or design value during the last 12 months; and whether one has attended a live book reading or a poetry or storytelling event during the last 12 months. Kentucky is statistically lower than the competitor states and the U.S. on museum visitation and public readings, but statistically no different on historic site visitation. As the competitive pressures of a highly skilled global workforce rise, it becomes increasingly important for the Commonwealth to cultivate an environment that will help to attract a creative and entrepreneurial labor force.

Public Participation in the Arts, 2012-2015
Kentucky, Competitor States, and the U.S.
(percent participating in previous 12 months)



Source: Authors' analysis of data from Sarah Flood, Miriam King, Steven Ruggles, and J. Robert Warren. Integrated Public Use Microdata Series, Current Population Survey: Version 5.0 [CPS Public Art Supplement]. Minneapolis, MN: University of Minnesota, 2017. https://doi.org/10.18128/D030.V5.0


ECONOMIC

Economic

WE PRESENT our 2018 economic forecast for Kentucky in the beginning of this annual report. There we discuss our expectations for the future trajectory of gross domestic product, employment, and inflation for the U.S., Kentucky, and the state's major metropolitan areas. We expect weak growth in Kentucky's gross domestic product. Increases in both hourly earnings, as well as average weekly earnings, suggest a strengthening labor market, which potentially bodes well for workers during the coming year. The Coincident Index shows Kentucky's upward trajectory (page 58), reflecting the state's improving economic conditions. It has been a long road to recovery. In the 18-month period from December 2007 to June 2009—the peak of the last economic expansion to the trough of the Great Recession—the state shed nearly 104,000 jobs (seasonally adjusted) as the unemployment rate nearly doubled from 5.5 percent to 10.9 percent. Kentucky's seasonally adjusted unemployment rate in October 2017 was 5 percent. The unemployment rate is hovering at historic lows, inflation is muted at below 2 percent, and average weekly wages increased in the state by 2.8 percent from 2016 (Q2) to 2017 (Q2). Census data released in September 2017

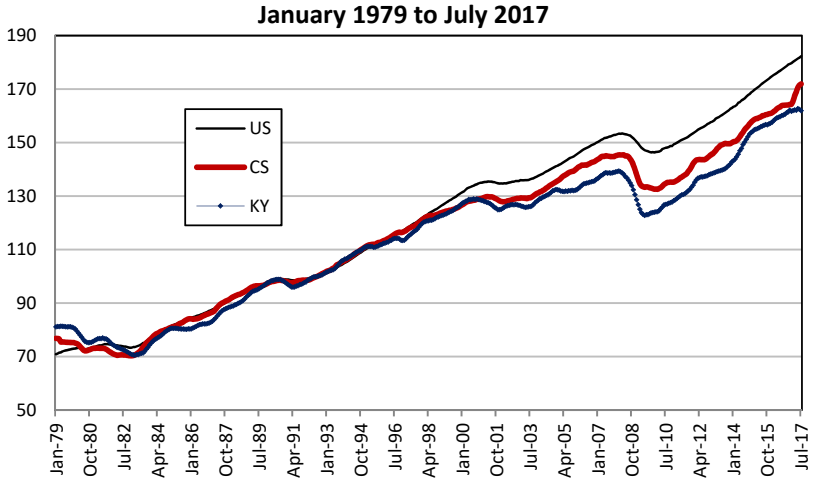
Kentucky continues to trail the U.S. and competitor states' per capita and median household income levels.

show that Kentucky's median household incomes increased by 3.2 percent to $46,660 from the previous year, evidence of an improving economy. Despite this relatively good news, Kentucky continues to trail the U.S. and competitor states' per capita and median household income levels. Moreover, the growth rates in private wages and employment, from the peak of the last economic expansion in 2007 to the present, have been uneven across the state. While the urban triangle region has enjoyed strong private sector wage and employment growth during this period, Eastern Kentucky has experienced a decline. In this section, we refocus the lens on the wider economic landscape and present data on a broader collection of economic indicators. We describe how Kentucky's economy has gradually changed, such as the movement away from goods-production and toward service-providing—something that has important implications for tax policy in Kentucky. We also present data on the extensive and continuing reliance on transfer payments—especially in Kentucky's 60 mostly rural counties, the importance of international trade and foreign direct investment, and the broadening disparity in wages between urban and rural regions.

Coincident Index

The Coincident Index, which was developed by economists at the Federal Reserve Bank of Philadelphia, combines four state-level economic indicators into a single statistic summarizing a state's current economic conditions. The four economic indicators are: nonfarm payroll employment; average hours worked in manufacturing by production workers; the unemployment rate; and wage and salary disbursements. The chart below shows that Kentucky has consistently lagged the U.S. beginning with the dotcom boom in the late 1990s, and the competitor states beginning in about 2005. The automobile industry entered a slump in 2005 which resulted in significant layoffs—driving up Kentucky's unemployment rate. Kentucky's higher-than-average reliance on the manufacturing industry drove up the unemployment rate while the national unemployment rate was decreasing. More recently Kentucky's economic activity, as measured by the coincident index, increased 1.1 percent over the 12-month period from July 2016 to July 2017, significantly lower, however, than the competitor states (4.9%) and the U.S. (2.8%). Kentucky had the smallest increase among the competitor states while Tennessee had the largest at 6.8 percent. Among all the states, Alaska's year-over-year percentage change during this period was -0.3 percent—the lowest of any state—while North Dakota had the largest (7.1%).

Coincident Index,
Kentucky, Competitor States, and the U.S.,
January 1979 to July 2017

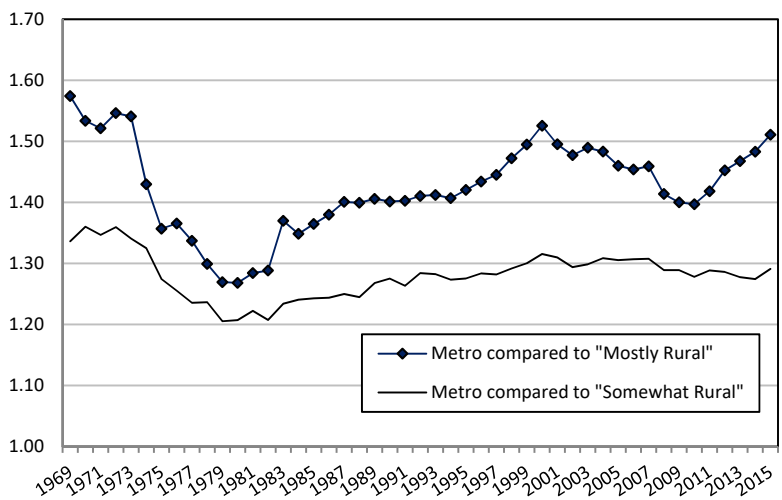


Source: Federal Reserve Bank of Philadelphia
Note: CS is the median value of the twelve competitor states.

WAGE & SALARY RATIO

Creating abundant high-paying jobs in Kentucky's rural areas has been and continues to be a challenge for policymakers, economic development professionals, and civic leaders. This figure illustrates the gap in wages between workers in Kentucky's metro counties and those in "somewhat rural" or "mostly rural" counties. Going back to 1969, wages in metro areas have been consistently higher than those in rural counties—especially when compared to Kentucky's 60 "mostly rural" counties. In 2015, for example, wages in metro counties were about 30 percent higher than those in "somewhat rural" counties and just over 50 percent higher than wages in "mostly rural" counties. While the current urban-rural wage difference is notable, the growing gap over the last three and a half decades is perhaps more significant. The wage differential between the 35 metro counties and 85 rural counties increased steadily from the late 1970s to the present—suggesting new approaches to rural community and economic development are needed. Based on numerous studies of rural communities across the country, economists have outlined approaches for rural America to improve rural prosperity by thinking and acting regionally, finding new economic niches in high-value knowledge industries that leverage a region's strengths, and placing a premium on homegrown entrepreneurs.

Kentucky's Urban-Rural Wage & Salary Ratio, 1969-2015

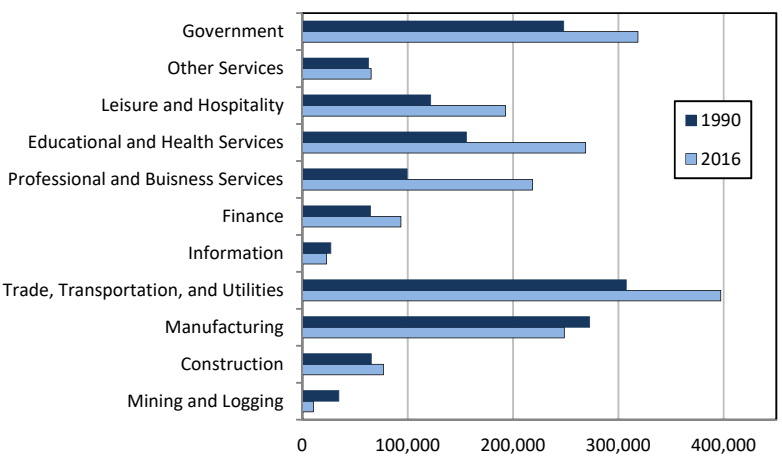


Source: Bureau of Economic Analysis, CA30, Economic Profile
Note: Author estimated by taking ratio between Beale Codes 9-8-7 (mostly rural), 6-5-4 (somewhat rural), and 3-2-1 (metro).

EMPLOYMENT BY SECTOR

Kentucky's economy has changed since 1990. There were, for example, about 454,000 more people employed in 2016 compared to 1990—an increase of 31 percent. Over the same time period Kentucky's population increased about 20 percent. While the overall number of jobs increased, the distribution of employment among these eleven major sectors changed significantly—reflecting the fundamental forces affecting all states. Two sectors lost a significant number of workers during this period—manufacturing, which had about 24,100 less workers in 2016 (a 9% decline) and mining and logging, which also lost around 24,100 jobs (a 69% decline). Conversely, the largest increases in employed occurred in professional and business services (119,000 more jobs for an increase of 120%), educational and health services (113,100 more jobs—73% increase), trade, transportation, and utilities (89,700 more jobs—29% increase), leisure and hospitality (71,100 more jobs—58% increase), government (70,400 more jobs—28% increase), and finance (28,900 more jobs—45 percent increase).

Employment in Major Economic Sectors, Kentucky 1990 and 2016

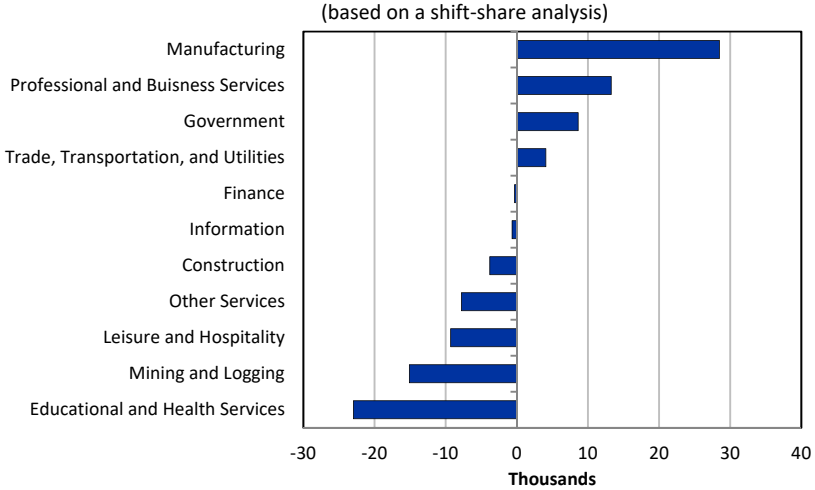


Source: U.S. Department of Labor, Bureau of Labor Statistics

REGIONAL EMPLOYMENT SHIFT

The graph below shows Kentucky's regional competitive effect from a shift-share analysis. A shift-share analysis is one way to identify broad economic sectors that are particularly strong, or weak, in a state or regional economy. This type of analysis takes into account broad national employment trends as well as trends within an industry to determine how much of a change in employment is due to state or regional factors. It can be used to identify a state's leading, or lagging, economic sectors. A state's leading economic sector is one that outperforms the same sector at the national level. Here we examine the period from June 2009, the trough of the Great Recession, to the present (June 2017). How then, did Kentucky's major economic sectors perform relative to their national counterparts during this period? Kentucky's manufacturing and professional & business services sectors outperformed their national counterparts during this eight-year economic expansion. Conversely, given the job losses in the coal industry, it is no surprise that Kentucky's mining and logging sector is "lagging." However, it might be somewhat surprising that the economic sector lagging the most is educational and health services. This might seem counter-intuitive since the sector grew nearly 9 percent during this period, but had it grown at the national level of nearly 18 percent there would be nearly 23,000 more jobs here.

Employment Changes, June 2009 to June 2017,
Kentucky Specific Regional Shift
(based on a shift-share analysis)

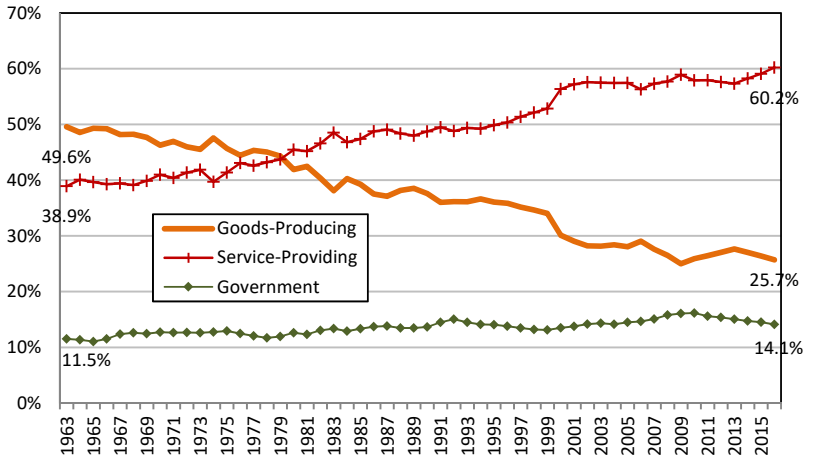


Source: Estimated by Veronica Turner using data from the U.S. Bureau of Labor Statistics (BLS), all employees, not seasonally adjusted

TRANSITION FROM GOODS TO SERVICES: GDP

Economic activity in Kentucky has been changing for the last several decades. Specifically, economic activity has been shifting away from the production of goods and toward the provision of services. These data illustrate in this figure the major sectors in Kentucky's economy as components of the total state gross domestic product (GDP). In the early 1960s services accounted for about 40 percent of Kentucky's economic output and goods amounted to about 50 percent. However, around 1980 the provision of services contributed more to the state's economy than the production of tangible goods. And now services account for 60 percent of Kentucky's economy while goods amount to about 26 percent. Government has increased as a percentage of the economy during this time period too, growing from 11.5 to 14.1 percent. Changes in consumption patterns have followed a similar trajectory. As the state's economy and consumption tilt away from goods and toward services, the sales and use tax base has slowly diminished. This is because most services, such as haircuts or automobile mechanic labor, are not subject to the sales tax. The result has been a gradual reduction in the elasticity of the sales and use tax—still an important source of revenue for the state.

Goods, Services, and Government,
Kentucky Gross Domestic Product, 1963-2016
(percentage of gross domestic product)

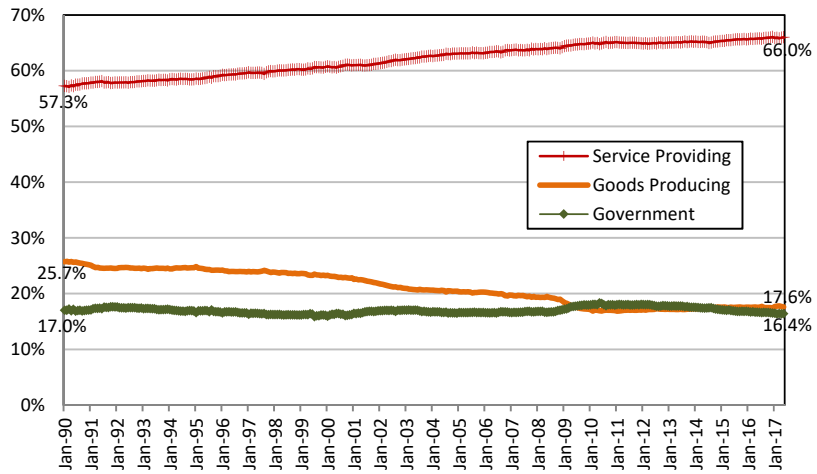


Source: Bureau of Economic Analysis

TRANSITION FROM GOODS TO SERVICES: EMPLOYMENT

Similar to the changing distribution of Kentucky's gross domestic product (see the preceding page), employment has been shifting away from the production of goods and toward the provision of services. These data illustrate the distribution of total nonfarm employment from January 1990 to May 2016; total nonfarm employment represents the total number of paid workers, and excludes those who work in general government, private households, nonprofit organizations serving individuals, and farms. A growing percentage of Kentuckians are working in service-providing industries (i.e., trade, transportation, and utilities; information; financial activities; professional and business services; education and health services; leisure and hospitality; other services), while the number working in the goods-producing industries (i.e., manufacturing, construction, and natural resources and mining) is shrinking. By May 2017, an estimated 66 percent were employed in service-providing industries, 17.6 percent in goods-producing industries, and about 16.4 percent worked in government. This trend does not bode well for Kentucky wage earners since, on average, weekly wages in Kentucky's service-providing sector lower than wages in the goods-producing sector—$765 compared to $1,030.

Kentucky Employment,
Goods, Services, and Government, 1990-2017
(percentage of total nonfarm employement)

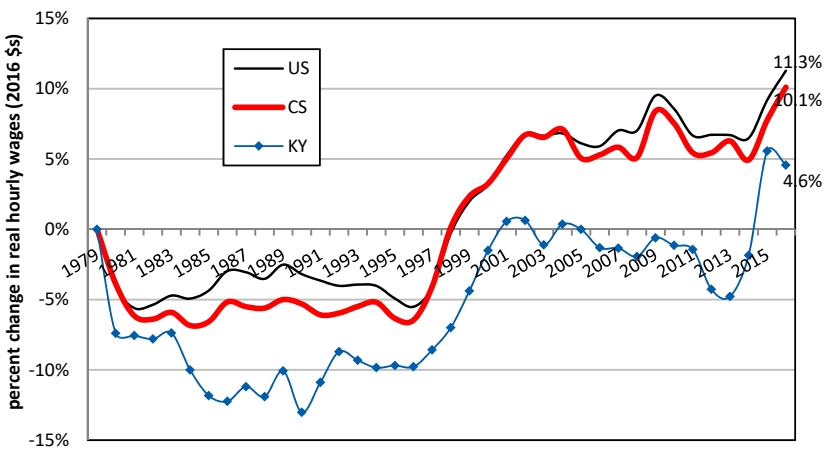


Source: Bureau of Labor Statistics, seasonally adjusted estimates, January 1990 to May 2017

HOURLY WAGES

While the bar chart on hourly wages in the Economic Security Section examines the change in median hourly wages, this line chart shows the percentage change in real *average* hourly wages from 1979 to 2016 in Kentucky, the competitor states, and the U.S. The average hourly wage in Kentucky, compared to 1979, has been lower or unchanged for most of this time period except for the last few years when hourly wages inched up to 4.6 percent. This is about half the increase experienced by the competitor states and the U.S., which have experienced 10.1 and 11.3 percentage increases, respectively. A major reason for Kentucky's slower hourly wage growth is the state's lower average educational attainment rates. Continuing to invest in the state's human capital, which will help to attract, retain, and create more high-paying jobs, will ensure that wages in Kentucky are more in line with those from competitor states and the U.S. overall.

Cumulative Change in Average Real Hourly Wages, 1979 to 2016, Kentucky, Competitor States and the U.S.

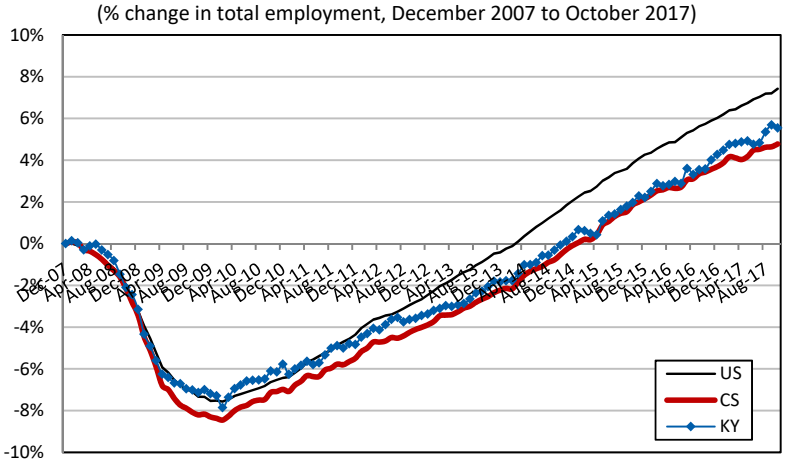


Source: Author's analysis of CPS Outgoing Rotation Group (ORG) data using files created by the Center for Economic Policy Research (CEPR), available at http://ceprdata.org/cps-uniform-data-extracts/cps-outgoing-rotation-group/.

JOB GROWTH

In the 18-month period from December 2007 to June 2009—the peak of the last economic expansion to the trough of the Great Recession—Kentucky lost nearly 104,000 (seasonally adjusted) jobs or about 6.7 percent of its total. By comparison, the U.S. job total was down 6.5 percent and the competitor states lost 7.4 percent. This was not, however, the low point for job losses. Kentucky, along with the rest of the nation, continued to shed jobs for another 8 months and finally reached the low point in February 2010. By this time, the state had lost 121,500 jobs, down 7.9 percent, compared to 8.5 percent in the competitor states and 7.6 percent nationally. Digging out of the recession has been slow, taking nearly seven years until November 2014 to reach the same level of employment it had in December 2007. Kentucky's seasonally adjusted unemployment rate in October 2017 was 5.0 percent, ranking it 45th among the states. Hawaii had the lowest unemployment rate (2.2%) and Alaska the highest (7.2%). The U.S. unemployment rate in November 2017 was 4.1 percent.

Job Growth, Kentucky, Competitor States, and the U.S., Peak of Last Economic Expansion to the Present,
(% change in total employment, December 2007 to October 2017)

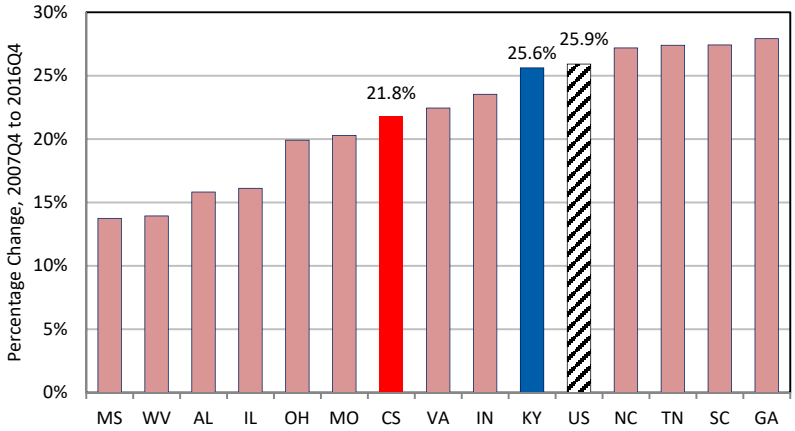


Source: U.S. Department of Labor, Bureau of Labor Statistics, Employment, Hours, and Earnings from the Current Employment Statistics survey, total number of private employees, seasonally adjusted

Wage & Salary Growth by State

Private sector growth of *total* wages and salaries in a state over time is indicative of its economic energy. Here we look at the growth between the peak of the last economic expansion, which was during the fourth quarter of 2007, and the fourth quarter of 2016. By the final quarter of 2016, *total* wages and salaries in the U.S. were about 26 percent higher compared to the peak of the last economic expansion. In our region of the country, Tennessee, Georgia, Kentucky, North Carolina, and South Carolina increased at a pace similar to the U.S., evidenced by Kentucky's 25.6 percent and each of the other four states growing at least 25 percent. Overall, the competitor state average is slightly lower at 21.8 percent. On the national level, North Dakota has the highest wage and salary growth during this period—registering an enviable 76 percent increase—and Wyoming has the lowest rate with 1 percent *decrease*.

Wage and Salary Growth,
Peak of the Last Economic Expansion to 2016 (Q4),
Kentucky, Competitor States & the U.S.

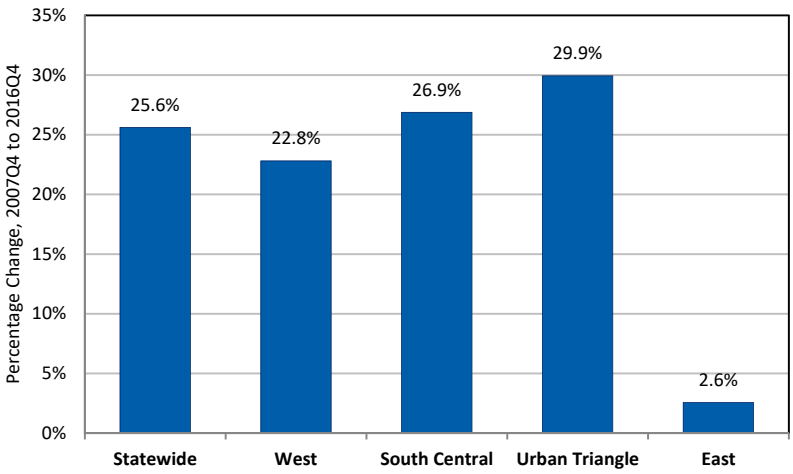


Source: Author's calculations using data from the Bureau of Labor Statistics, Quarterly Census of Employment and Wages (private, all industries, all sizes). The U.S. estimate is constructed from state data.
Note: CS is a weighted average of the competitor states

WAGE & SALARY GROWTH BY KENTUCKY REGION

Using the same data and approach that is described on the preceding page, the growth rate of total wages and salaries for Kentucky and its regions from the peak of the last economic expansion to the fourth quarter of 2016 is shown below (i.e., 2007Q4 to 2016Q4). All of Kentucky's regions—except for Eastern Kentucky—experienced growth rates on par with the U.S. average of 25.9 percent (a county-level map of these four regions is available in the glossary). Wages and salaries increased by 29.9 percent in the Urban Triangle, the state's primary economic engine, with the South Central region not far behind at 26.9 percent. If Kentucky's Urban Triangle were a state, its growth rate would have ranked 9th nationally, placing it among the top tier of states.

Wage and Salary Growth in Kentucky Regions, Peak of the Last Economic Expansion to 2016 (Q4)

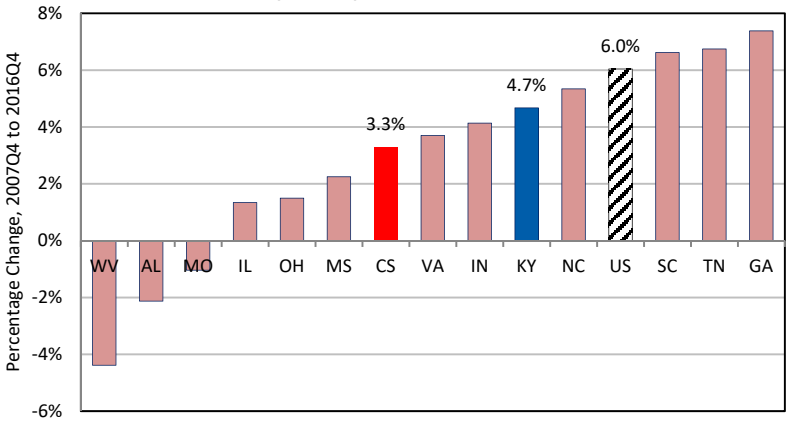


Source: Author's calculations using data from the Bureau of Labor Statistics, Quarterly Census of Employment and Wages (private, all industries, all sizes). See glossary for map of Kentucky regions by county.

EMPLOYMENT GROWTH BY STATE

The private sector growth rate of *total* employment is indicative of a state's economic energy. Here we look at the growth rate between the peak of the last economic expansion, which was during the fourth quarter of 2007, and the fourth quarter of 2016. The U.S. average is 6 percent growth during this period. While not among the top states in the region (i.e., TN, GA, & SC), Kentucky still outperformed most of its competitors in employment growth with a 4.7 percent increase (compared to 3.3 percent for the competitor state average). Kentucky has the 20th highest employment growth rate among the 50 states over this nine year period. North Dakota has the highest total employment growth, experiencing a 22.6 percent increase. Wyoming, on the other hand, experienced a 8.1 percent decrease in total employment, the largest decline among the states.

Employment Growth,
Peak of the Last Economic Expansion to 2016 (Q4),
Kentucky, Competitor States & the U.S.

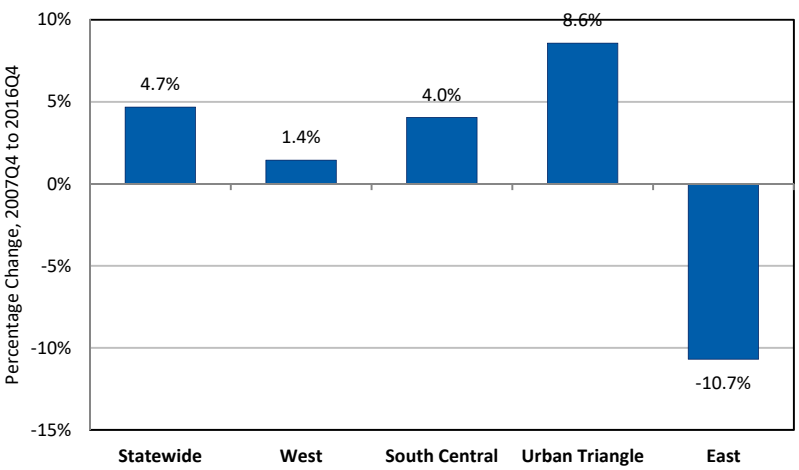


Source: Author's calculations using data from the Bureau of Labor Statistics, Quarterly Census of Employment and Wages (private, all industries, all sizes). The U.S. estimate is constructed from state data.
Note: CS is a weighted average of the competitor states

EMPLOYMENT GROWTH BY KENTUCKY REGION

Using the same data and approach that is described on the preceding page, the growth rate of total employment for Kentucky and its regions from the peak of the last economic expansion to the fourth quarter of 2016 is shown below (a county-level map of these four regions is available in the glossary). Kentucky's Urban Triangle experienced a 8.6 percent increase in total employment, which exceeds the U.S. average of 6 percent. The other regions in the state grew more slowly, as evidenced by the 1.4 percent increase in Western Kentucky and 4 percent increase in South Central Kentucky. In Eastern Kentucky employment is nearly 11 percent lower—a significant decline over the nine year period that reflects the declining fortunes of the coal industry as well as other factors.

Employment Growth in Kentucky Regions, Peak of the Last Economic Expansion to the 2016 (Q4)

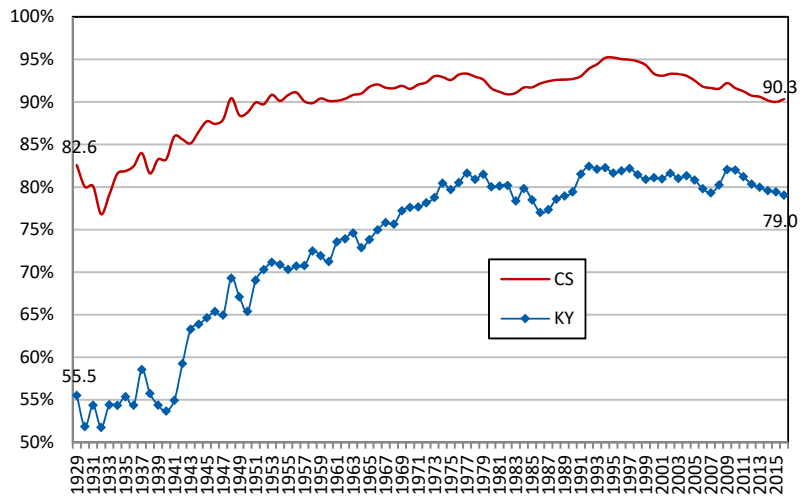


Source: Author's calculations using data from the Bureau of Labor Statistics, Quarterly Census of Employment and Wages (private, all industries, all sizes). See glossary for map of Kentucky regions by county.

Per Capita Personal Income

While Kentucky's per capita personal income has grown significantly over the years, its position relative to the nation has not demonstrably improved since around 1974. Indeed, Kentucky's per capita income has oscillated around 80 percent of the national average since the mid-1970s. In 2016 it was 79 percent of the U.S. average while the average of the competitor states was around 90 percent. Lagging growth in per capita income has kept Kentucky ranked in the bottom 10 states (i.e., 46th in 2016). Within Kentucky there are marked differences between urban, somewhat rural, and mostly rural counties—as reflected in their respective 2015 per capita income levels of $43,160, $35,210, and $31,100.

Per Capita Personal Income as a Percentage of the U.S. Average, Kentucky and Competitor States, 1929 to 2016

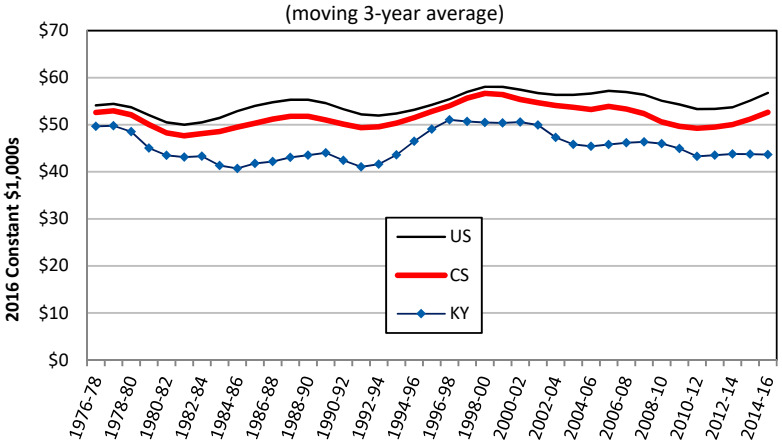


Source: U.S. Department of Commerce, Bureau of Economic Analysis

HOUSEHOLD INCOME

At $43,600, median household income in Kentucky is currently about 77 percent of the U.S. median; it is 93 percent for the competitor states. The median level is the point at which half the households are lower and half are higher. In real dollars, Kentucky's high point was in the late 1990s when median household income was around $51,000; real dollars factor out inflation and are expressed as constant dollars. Kentucky's median household income, in real dollars, is now about $7,400 less compared to the late 1990s. In 2016 significantly more Kentucky households—27.6 percent—reported less than $25,000 in income, compared to 21.2 percent nationally or 23.1 percent for the competitor states (2016 ACS 1-year estimate). Kentucky's lower cost of living accounts for part, but not all, of the state's lower income level. The estimated regional price parity for Kentucky (based on Bureau of Economic Analysis estimates) is 88.6, indicating that prices for a range of items in the state are about 88.6 percent of the U.S. average. The U.S. Census Bureau has two main surveys to collect data on incomes in America. The chart below is based on Current Population survey (CPS), Annual Social and Economic Supplement (ASEC) data. The American Community Survey (ACS) numbers are slightly different. For example, the ACS shows Kentucky's median household income is 81 percent of the U.S. average in 2016.

Median Household Income, 1976-2016
Kentucky, Competitor States, and the U.S.
(moving 3-year average)

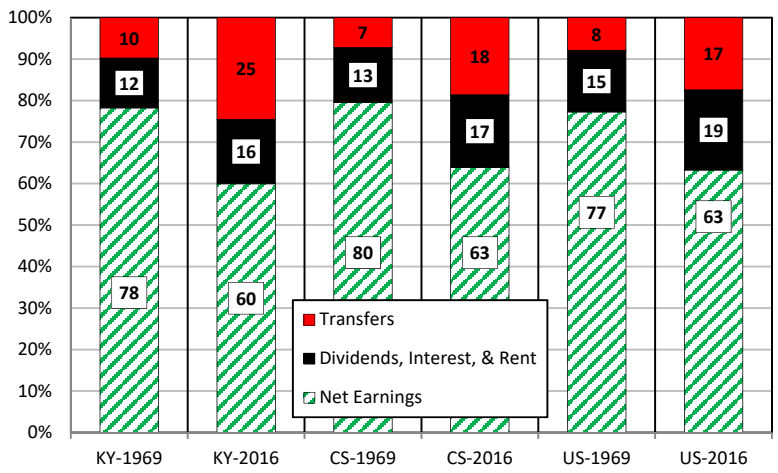


Source: Author's analysis of IPUMS-CPS data, courtesy of Miriam King, Steven Ruggles, J. Trent Alexander, Sarah Flood, Katie Genadek, Matthew B. Schroeder, Brandon Trampe, and Rebecca Vick. Integrated Public Use Microdata Series, Current Population Survey: Version 3.0. [Machine-readable database]. Minneapolis: University of Minnesota, 2010.

Sources of Personal Income

The composition of personal income and its changing nature can exercise a large effect on state and local revenue growth since the personal income tax combined with the occupational tax constitutes the largest portion of Kentucky's state and local revenue receipts. Over the last several years, Kentucky, like the competitor states and the U.S., has experienced a shift in the composition of personal income that has affected revenue adequacy. In 1969, net earnings comprised 78 percent of total personal income in Kentucky. Dividends, interest, and rent, made up another 12 percent. Transfer payments, which consist of government programs like Social Security, Medicare, Temporary Assistance for Needy Families (TANF), and Supplemental Security Income (SSI) payments (to name a few), are essentially untaxed and made up the remaining 10 percent. By 2016, however, net earnings had declined to 60 percent of total personal income while transfer payments increased to 25 percent. By comparison, in 2016 transfer payments constituted 18 percent and 17 percent of personal income in the competitor states and the U.S., respectively.

Sources of Personal Income, 1969 and 2016, Kentucky, Competitor States, and the U.S.
(percent of total personal income)

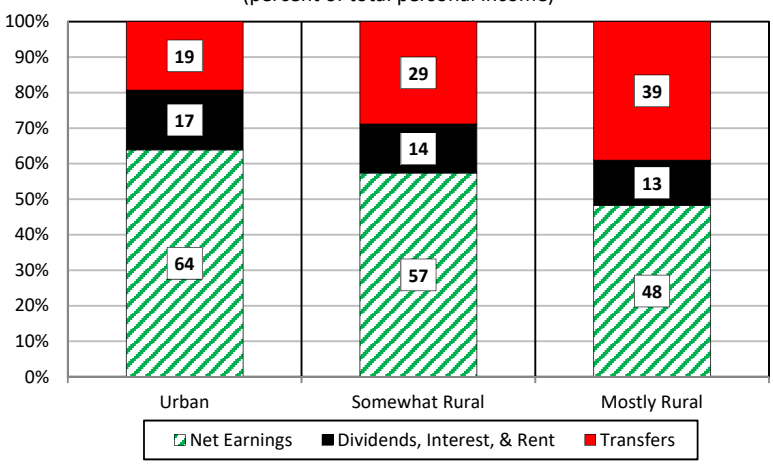


Source: U.S. Department of Commerce, Bureau of Economic Analysis

INCOME SOURCES BY LOCATION

There are significant differences across Kentucky's urban, somewhat rural, and mostly rural counties in the composition of income. In 2016 there were eleven rural counties where transfer payments as a share of total personal income topped 50 percent, and 21 counties where transfer payments are between 40 and 49 percent of personal income. Among the 35 urban counties transfer payments constituted 19 percent while net earnings made up 64 percent of total personal income. These percentages shift away from net earnings and toward transfer payments for the 25 somewhat rural and 60 mostly rural counties. Well over one-third (39%) of total personal income comes from transfer payments in Kentucky's mostly rural counties. Clearly, there are systemic, deep-seated development hurdles in these counties that are difficult to clear despite the multiple attempts to do so over the last several decades.

Kentucky Sources of Personal Income, 2016,
Urban, Somewhat Rural, & Mostly Rural Counties
(percent of total personal income)

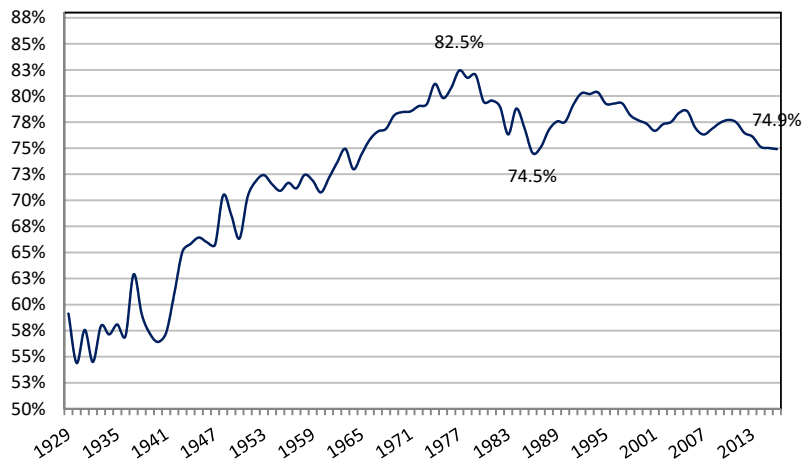


Source: Estimated by author using data from U.S. Department of Commerce, Bureau of Economic Analysis and USDA Rural Urban Codes.

Net Earnings Per Capita

Because net earnings is the portion of personal income that does not include transfer payments from various social assistance or public welfare programs or income from dividends, interest, or rent, it is a good indicator of the underlying economic vitality of a state, county, or region. Kentucky's net earnings per capita relative to the U.S. average increased steadily from 1929 to 1977. Since 1977 Kentucky's net earnings per capita relative to the U.S. has dropped and is currently at about 75 percent, which ranks 45th among the states. Kentucky's net earnings per capita is $23,333, significantly below the highest state, Connecticut ($45,070) and above the lowest state, West Virginia ($20,610).

Net Earnings Per Capita in Kentucky as a Percentage of the U.S. Average, 1929 to 2016

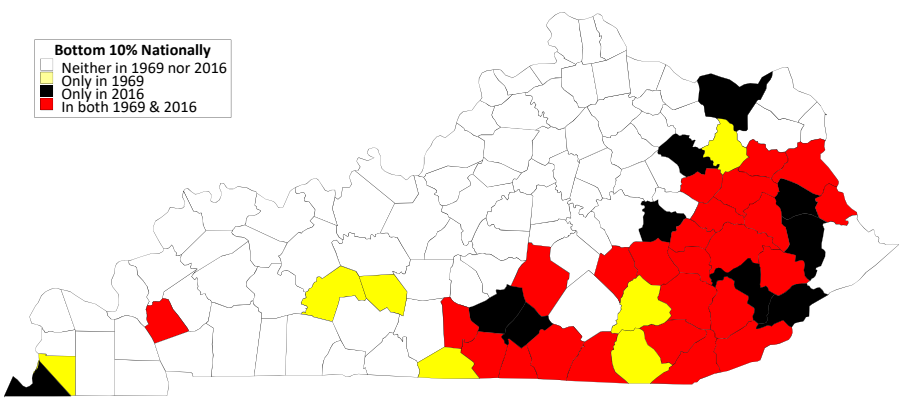


Source: U.S. Department of Commerce, Bureau of Economic Analysis.

NET EARNINGS PER CAPITA BY COUNTY

When President Johnson's War on Poverty was gathering steam in late 1960s, 32 of Kentucky's 120 counties had per capita net earnings placing them in the bottom ten percent of the 3,000-plus counties in the United States. As we note on the previous page, net earnings is the portion of personal income that does not include transfer payments from various social assistance or public welfare programs or income from dividends, interest, or rent, and therefore is a good indicator of the underlying economic vitality of a region. By 2016—47 years later—25 of these counties, or 78%, were still in the bottom ten percent. About two-thirds of the counties nationally (65%) and in the dozen nearby competitor states (65%) that were in the bottom ten percent in 1969 were still there in 2016. While most of these persistently poor counties are in Eastern Kentucky, the map shows several counties in the south central part of the state. An important public policy question is why the percentage of persistently poor counties is so much higher in Kentucky, especially compared to the competitor states.

Kentucky Counties by Net Earnings Per Capita
(Bottom 10 Percent Nationally, 1969 and 2016)



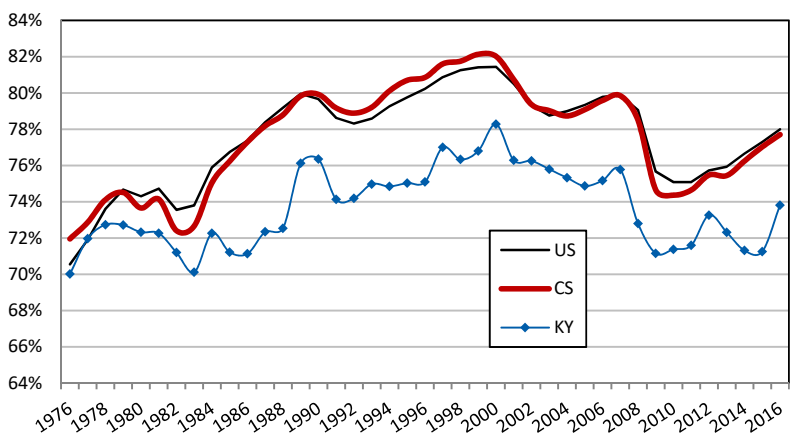
Source: Estimated by the author using data from the Bureau of Economic Analysis
Note: Net earnings is calculated by subtracting current transfers, dividends, interest, and rent from personal income and dividing by the total population.

Employment-Population Ratio

This ratio is the proportion of the civilian non-institutional population that is employed. According to the U.S. Department of Labor, Bureau of Labor Statistics (BLS), some believe the employment-population ratio is a better indicator of economic activity and economic performance than the more frequently referenced unemployment rate. Here, we focus on the prime working-age population, which includes those individuals between 25 to 54 years old. In 2016, Kentucky had one of the lowest employment-population ratios in the country at 73.8 percent. In fact, West Virginia is the only state with a ratio that is statistically significantly lower; there are seven states statistically the same as Kentucky while the remaining 41 states and DC are statistically higher. In 1976, Kentucky and the United States had nearly identical employment-population ratios for this age group at about 70 percent. Since that time, as evidenced in the figure below, both the competitor states and the U.S. have employment-population ratios 4 to 5 percentage points higher than Kentucky. Key factors necessary for increasing the economic growth rate, both in Kentucky as well as in the U.S. overall, are to draw more individuals into the labor force (i.e., increasing the employment-population ratio) and maximizing their overall productivity.

Employment-Population Ratio, Kentucky, Competitor States, and the U.S., 1976 to 2016

(percentage of prime working-age adults, 25 to 54 years old)

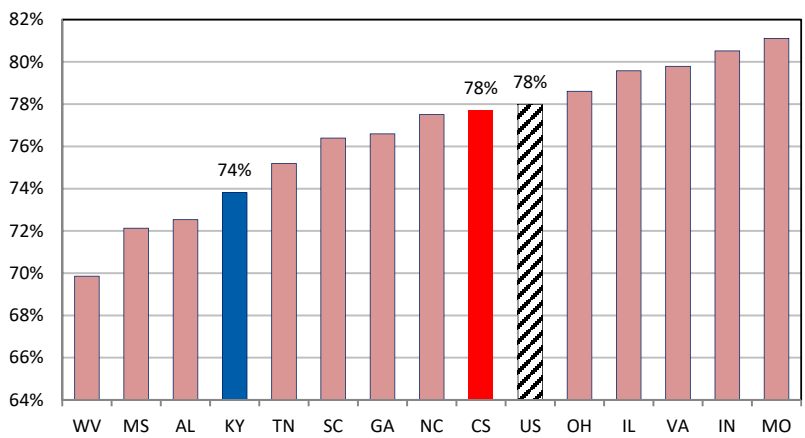


Source: Author's analysis of U.S. Census CPS data from Sarah Flood, Miriam King, Steven Ruggles, and J. Robert Warren. Integrated Public Use Microdata Series, Current Population Survey: Version 4.0 [Basic Monthly datasets]. Minneapolis, MN: University of Minnesota, 2015. http://doi.org/10.18128/D030.V4.0.

EMPLOYMENT-POPULATION RATIO

Only West Virginia has a (statistically significant) lower employment-population ratio than Kentucky among the prime working-age adults (25 to 54 years old). Mississippi, Alabama, and Tennessee are statistically no different from Kentucky, while the balance of the competitor states are statistically higher—as are the competitor state and U.S. averages. West Virginia has the lowest employment-population ratio in the U.S. (69.9%) while Wisconsin has the highest (85.8%). A key for Kentucky's future economic growth is to identify and successfully implement programs that increase the employment-population ratio, particularly for prime working-age adults. These strategies include, but are not limited to, increasing the transition from high school to post-secondary education, improving the skills of non college-educated workers, and addressing the substance abuse problem.

Employment Population Ratio, 2016,
Kentucky, Competitor States & the U.S.
(percentage of prime working-age adults, 25 to 54 years old)

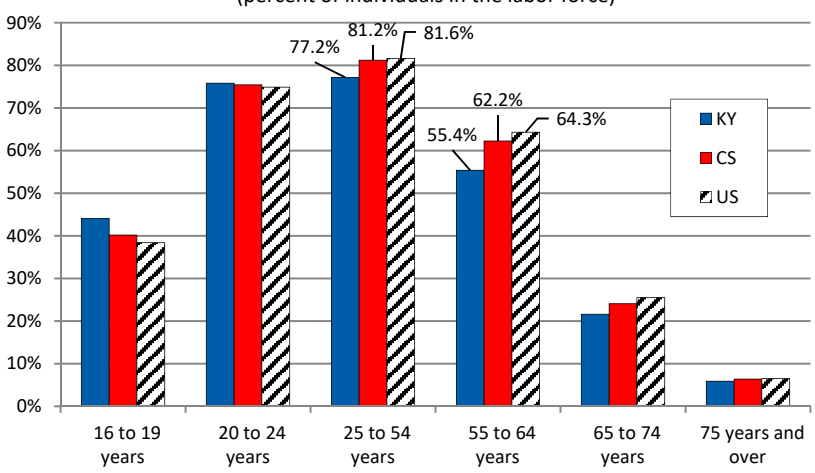


Source: Author's analysis of U.S. Census CPS data from Sarah Flood, Miriam King, Steven Ruggles, and J. Robert Warren. Integrated Public Use Microdata Series, Current Population Survey: Version 4.0 [Basic Monthly datasets]. Minneapolis, MN: University of Minnesota, 2015. http://doi.org/10.18128/D030.V4.0.

LABOR FORCE PARTICIPATION

The labor force participation rate is the proportion of the civilian noninstitutional population that is in the labor force, which is slightly different from the employment-population ratio described on the previous page. The labor force is comprised of individuals who are employed *as well as* individuals who are unemployed but searching for a job. The national labor force participation rate increased from around 60 percent in 1970 to about 67 percent in 2000, driven in large part by the increased participation of women. In 2016 the U.S. labor force participation rate for individuals 16 and older was 63.1 percent and Kentucky's was 59.1 percent. Kentucky's labor force participation rate for those 20 to 24 looks very similar to both the competitor states and the U.S. However, the labor force participation rate for Kentuckians 25 to 54—the prime working years—is 77.2 percent compared to 81.6 percent for the United States. And, in the 55 to 64 age group, Kentucky is significantly lower, as evidenced in the chart below.

Labor Force Participation by Various Age Groups, Kentucky, Competitor States, and the U.S., 2016
(percent of individuals in the labor force)

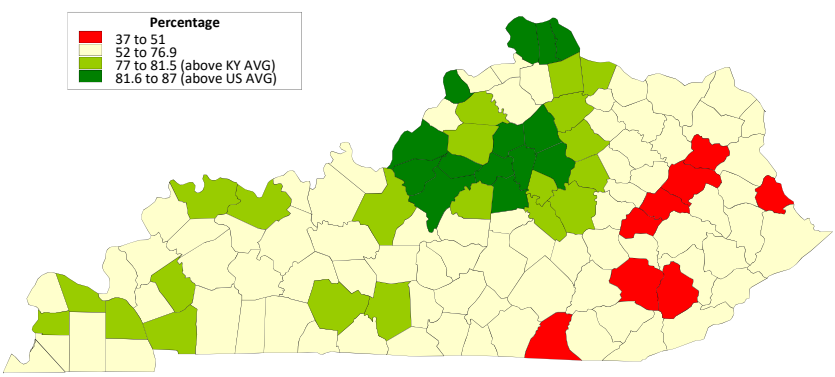


Source: 2016 American Community Survey 1-Year Estimate

LABOR FORCE PARTICIPATION BY COUNTY

There are 14 Kentucky counties with a labor force participation rate among prime working-age adults (25 to 54 years old) that is equal to or greater than the U.S. average (81.6%). On the other hand, there are seven counties with a labor force participation rate below 50 percent: Martin, Lee, Elliott, Clay, Leslie, Morgan, and Wolfe. Most of the counties in the urban triangle have labor force participation rates that are at least as high as the Kentucky average (76.9%), with several that are above the U.S. average. A critical factor that will determine the state's future economic growth is to identify and successfully implement programs that increase the labor force participation rate, particularly for prime working-age adults. These strategies include, but are not limited to, increasing the transition from high school to post-secondary education, improving the skills of non-college educated workers, and addressing the substance abuse problem. Research published in 2017 by Princeton University economist Alan Krueger found that from 1999 to 2015 up to 20 percent of the national drop in the labor force participation rate among prime working-age men and 25 percent of the drop among women is due to the use and abuse of opioids. Dr. Krueger is quoted in the *Wall Street Journal* as saying "The opioid epidemic and labor-force participation are now intertwined."

Kentucky Labor Force Participation Rate by County, Prime Working-Age Adults, 25 to 54 Years Old

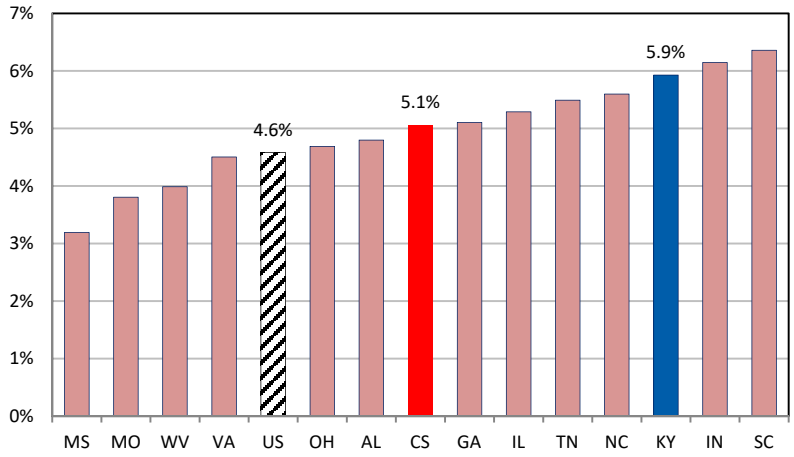


Source: U.S. Census, American Community Survey, 5-Year Estimate, 2012 to 2016, Table S2301

EMPLOYMENT BY FOREIGN COMPANIES

Foreign companies create important economic benefits for the American economy. These companies invest billions of dollars in the U.S. economy and create hundreds of thousands of jobs. Kentucky has worked hard to capitalize on the opportunities presented by globalization—reflected by the presence in the state of more than 400 international companies from nearly 30 countries. A majority-owned U.S. affiliate is an American business enterprise in which there is a foreign direct investment that accounts for at least 50 percent of the ownership. In Kentucky there are an estimated 117,300 individuals employed by majority-owned U.S. affiliates. As a percentage of total full- and part-time wage and salary employment, it is 5.9 percent in Kentucky. This is higher than the U.S. average of 4.6 percent as well as the competitor state average of 5.1 percent.

Employment of Majority-Owned U.S. Affiliates, 2015, Kentucky, Competitor States, & the U.S.
(percentage of total full- & part-time wage and salary employment)

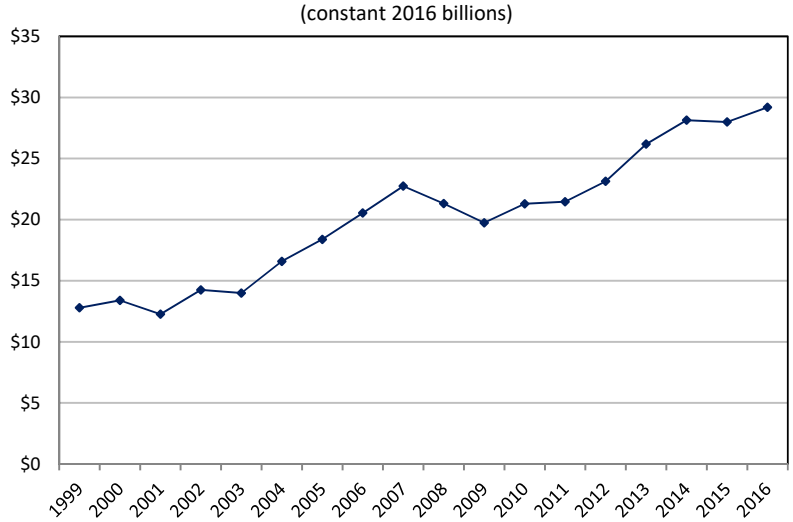


Source: Author's calculations using data from the Bureau of Economic Analysis, Regional Economic Accounts & International Data. Note: The 2015 majority-owned U.S. affiliate data are preliminary, as of Dec. 2, 2017.
Note: CS is a weighted average of the competitor states

EXPORTS

Exports constitute an important piece to the state's economic prosperity. Kentucky's exports of goods have more than doubled in real dollars over the last seventeen years. From 1999 to 2016 the compound annual growth rate of Kentucky's exports is 7.3 percent; this is higher than the U.S. growth rate of 4.4 percent and the 5.3 percent experienced by the competitor states. The value of Kentucky's exports of goods in 2016 was $29.2 billion, which is equivalent to 14.8 percent of Kentucky's gross domestic product; it was 7.4 percent for the competitor states and 7.8 percent for the U.S. Most of Kentucky's exported goods go to Canada, which accounted for 25.6 percent of the total. The United Kingdom was second (9.7), followed by the France (9.7), Mexico (7.6), and Brazil (7.0). Kentucky's businesses exported to over 200 different countries in 2016, but the top five and top ten countries received nearly 59.7 percent and 79 percent, respectively, of the total value. Over half (55.8 percent) of the value of exported goods is accounted for by transportation equipment (e.g., aerospace and motor vehicle industries), followed by chemicals (14.5), computer and electronic products (5.4), machinery-except electrical (5.2), and electrical equipment, such as appliances & components (2.3). Combined, these five sectors accounted for 83.2 percent of Kentucky's exports in 2016.

Kentucky Exports of Goods, 1999-2016
(constant 2016 billions)

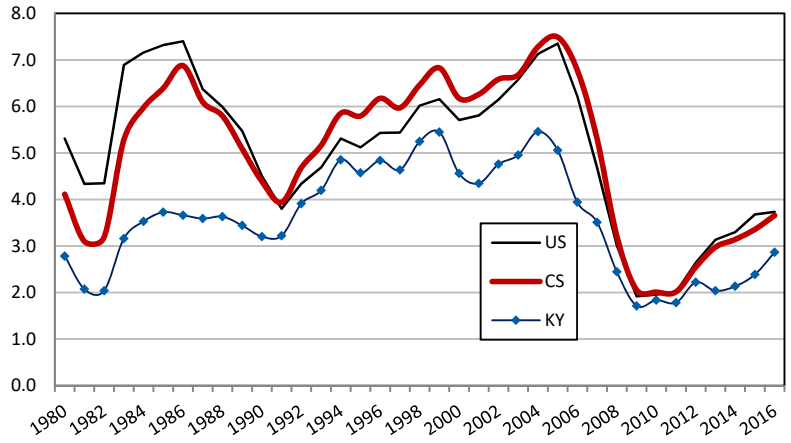


Source: Office of Trade and Industry Information (OTII), Manufacturing and Services, International Trade Administration, U.S. Department of Commerce.

HOUSING STARTS

A housing start is when a new foundation is laid. Because housing starts represent the first step in a series of cascading future purchases, such as furniture, appliances, and landscaping, a housing start is considered a leading economic indicator and a foundation of determining future economic trends. Going back to 1980, Kentucky's housing starts peaked in 2004 with 22,623 and declined steadily until hitting its nadir of about 7,400 in 2009. Following the U.S. and competitor state trend, Kentucky housing starts have stabilized since then and increased to nearly 12,700 in 2016. The overall trends nationally have seen relatively strong gains in multifamily housing, such as apartment buildings, and somewhat lackluster growth in single-family homes, which is a much bigger driver of economic growth. In Kentucky, single family homes accounted for 7,300 of the new starts in 2016, or about 57 percent of the total market.

Number of New Residential Housing Units,
Kentucky, Competitor States, and the U.S., 1980 to 2016
(Per 1,000 Population)

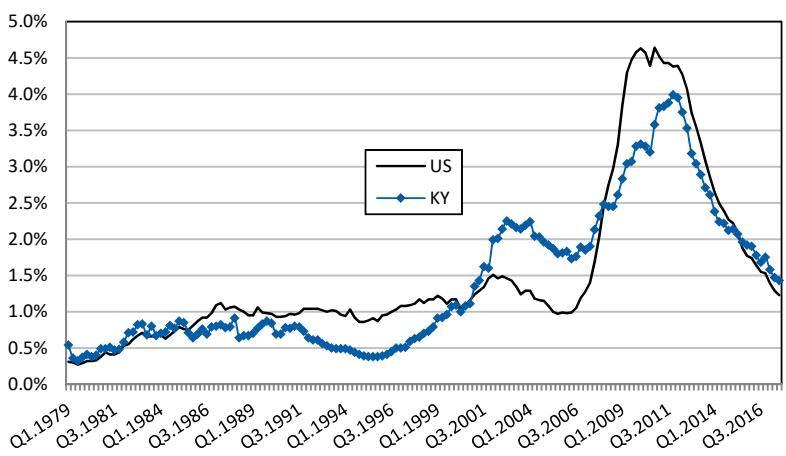


Source: U.S. Census Bureau

FORECLOSURES

Leading up to the Great Recession, the federal government and the private sector undertook extensive efforts to increase the number of homeowners by keeping mortgage rates low and by allowing small, or nonexistent, down payments. By the fourth quarter of 2007—the peak of the last economic expansion—the homeownership rate was 69 percent nationally and 75 percent in Kentucky. It is now clear, however, that many of these new homeowners could not afford their homes, as evidenced in the figure below by a sharp increase in foreclosures beginning in 2008. In Kentucky the percentage of mortgage loans in foreclosure peaked in the fourth quarter of 2011 at 4 percent. The foreclosure rate has declined since then and currently stands at 1.43 percent; the national rate is 1.23 percent. Kentucky's 1.43 percent is its lowest foreclosure rate since the second quarter of 2001 when it was 1.43 percent. By the third quarter of 2017, the homeownership rate was 71.7 percent in Kentucky and 63.9 percent nationally.

Mortgage Foreclosure Inventory,
Kentucky and the U.S., 1979 (Q1) to 2017 (Q3)
(foreclosures as a % of all mortgages, not seasonally adjusted)



Source: Mortgage Bankers Association

ECONOMIC SECURITY

Economic Security

MANY HAVE found themselves on the wrong side of globalization, mechanization, and technological change—as well as having first-hand experience with numerous other social and economic factors like low-performing schools and the disintegration of the nuclear family. Just as Thomas Piketty delineated the scope of *global* inequality in his opus, *Capital in the Twenty First Century*, a populist movement has swept across the globe—from Asia to Europe, and now to the United States. More than income or wealth inequality is propelling this movement, but it has surely provided ample fuel for the popularity of the populist message. A series of reports and studies released over the last few years have focused on the plight of the working class. The *Economic Report of the President* points out that the share of pretax income going to the top 1 percent increased from 8 percent to 18 percent from 1975 to 2014. In this report, we present our analysis of how middle-class families have become less economically secure. For at least 35 years, household income levels have changed at uneven rates depending upon whether one is "rich," "poor," or somewhere in-between. For Kentucky families, incomes at the 25th percentile—

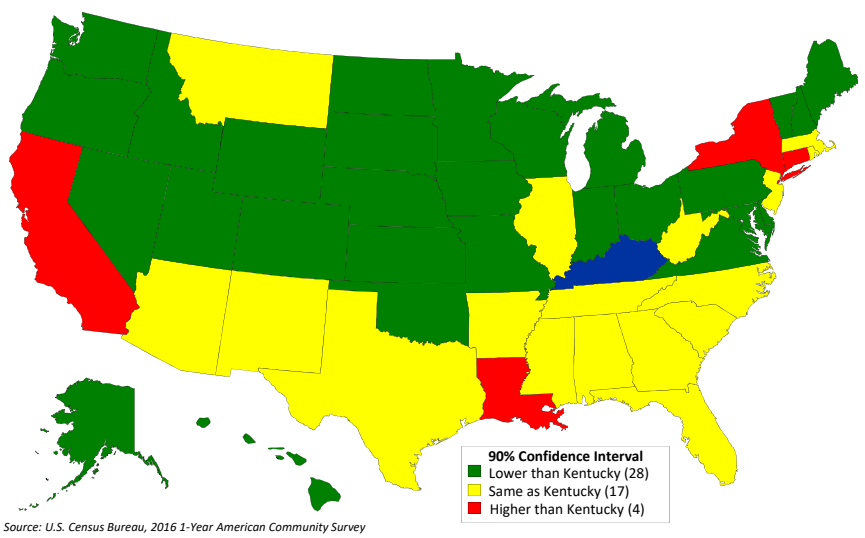
The U.S. economic expansion is unevenly spread.

what some might consider "lower middle class"—declined 12.1 percent in real dollars. By comparison, incomes at the 75th percentile, or "upper middle class," increased for Kentucky and the U.S. by around 5.8 and 20 percent, respectively, in real dollars, from the late 1970s to the mid-2010s. Toward the end of 2015, the Pew Research Center released a report entitled *The American Middle Class is Losing Ground*. They present statistics showing how the size of the American middle class has been slowly contracting since the early 1970s. For example, 61 percent of American adults lived in middle-income households in 1971, but this has steadily decreased since then and is estimated to be 50 percent in 2015. Many individuals still do not feel economically secure eight years after the Great Recession ended. In addition to uneven income growth, the poverty rate, as well as public assistance program participation, is higher in Kentucky than in many of the competitor states, evidence of continued economic uncertainty for many. The growth rate in wages, salaries, and employment, and therefore economic security, is not uniform across the state. The best antidote to decreasing or stagnant wages and income is the pursuit of education.

Gini Index by State

The Gini Index is a measure of income dispersion. A higher number indicates more concentration of income in fewer hands, with a value of "1" indicating that one person holds all the income. The Gini index for the United States in 2016 (0.482) did not change from 2015. The Census Bureau estimated that in 2014 the "richest" 20 percent of households had 51.2 percent of the income—more than in 1967 when the upper 20 percent of Americans had 43.6 percent of the income. The focus on the income distribution has been an important part of the political discourse for at least the last few decades, and it arguably reached new levels of intensity among the political, economic, academic, and journalistic cognoscenti in 2013 with the publication of Thomas Piketty's opus, *Capital in the Twenty-First Century*. These debates have focused on whether, in fact, there is income inequality, and what, if anything, should be done to address it. The map below shows that Kentucky, with a Gini Index value of (.481), has a higher Gini Index (more inequality) than 28 states, and is lower than 4 states; it is statistically the same as 17 states. New York has the highest Gini Index value (.513) and Alaska the lowest (.408).

GINI Index of Income Inequality, 2016

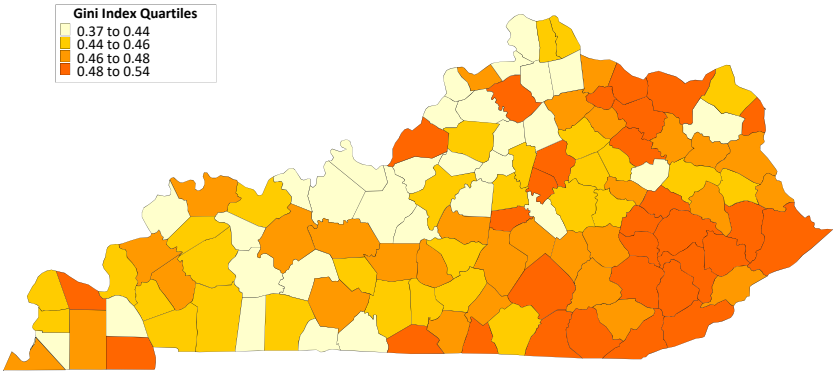


Source: U.S. Census Bureau, 2016 1-Year American Community Survey

GINI INDEX BY COUNTY

This map shows the Gini Index values for Kentucky counties organized into quartiles, or four equal groups. As explained on the previous page, the Gini Index is a measure of income dispersion. A higher number indicates more concentration of income in fewer hands, with a value of "1" indicating that one person holds all the income. The highest Gini Index values (i.e., higher income *in*equality) are concentrated in the poorest areas of Kentucky. Owsley County has the highest Gini Index value (.529) and Spencer County has the lowest (.368).

Kentucky County-Level Gini Index, 2012-2016



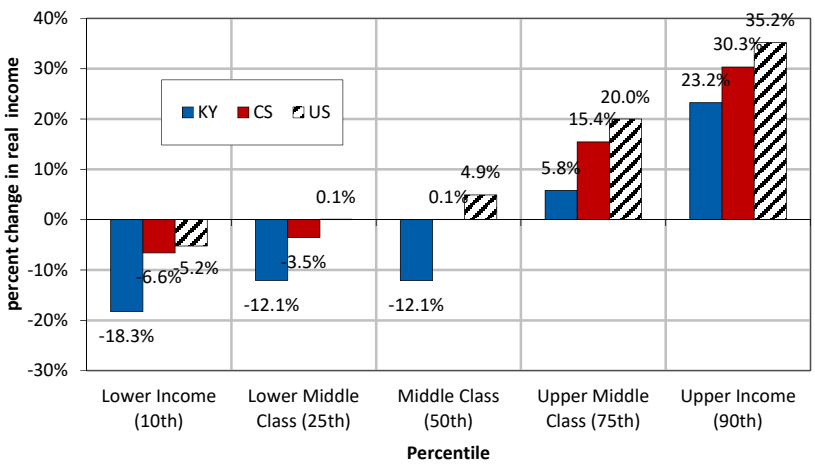
Source: U.S. Census Bureau, 2016 5-Year American Community Survey

HOUSEHOLD INCOME GROWTH

Middle-class families have become less economically secure. For nearly 40 years, household income levels have changed at uneven rates depending upon whether one is "rich," "poor," or somewhere in-between. For Kentucky families, incomes at the 25th percentile—what some might consider "lower middle class"—declined by 12.1 percent compared to essentially no change nationally in real dollars. By comparison, incomes at the 75th percentile, or "upper middle class," increased for Kentucky and the U.S. by around 5.8 and 20 percent, respectively, in real dollars, from the late 1970s to the mid-2010s. The contrast is the greatest between incomes at the 10th and 90th percentiles, with incomes *declining* in Kentucky by 18.3 percent at the lower income level and *increasing* by 23.2 percent at the upper income level; a large difference also exists between the 10th and 90th percentiles for the competitor states and the U.S. These data reflect total pre-tax personal income from all sources for all adults in the household. Noncash benefits, such as food stamps, health benefits, or subsidizing housing are not included as household income. Many factors have contributed to the widening gap, including the rise of globalization and outsourcing, increasing returns to high-level skills, job automation, declining unionization, immigration, and tax policies.

Changes in Household Income, by Income Level, 1976-78 to 2014-16, KY, Competitor States and the U.S.

(based three-year averages of 2016 dollars)

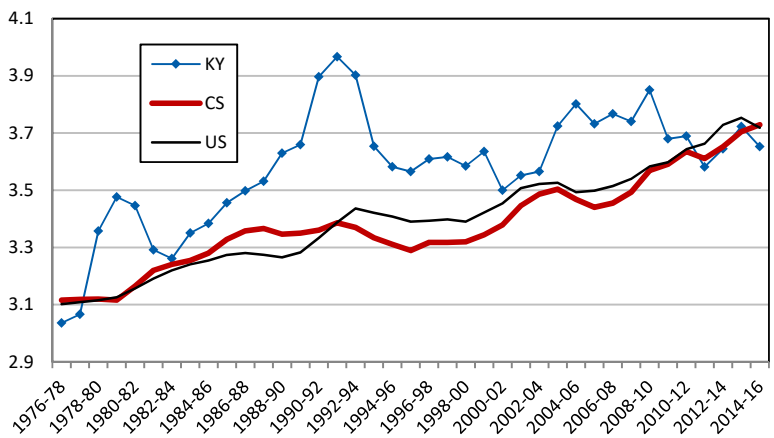


Source: Author's analysis of IPUMS-CPS data, courtesy of Miriam King, Steven Ruggles, J. Trent Alexander, Sarah Flood, Katie Genadek, Matthew B. Schroeder, Brandon Trampe, and Rebecca Vick. Integrated Public Use Microdata Series, Current Population Survey: Version 3.0. [Machine-readable database]. Minneapolis: University of Minnesota, 2010.

HOUSEHOLD INCOME RATIO

Household incomes at the 25th and 75th percentiles can be viewed as boundaries around America's middle class. In the late 1970s, upper middle class households—those at the 75th percentile—had incomes about 3 times larger than lower middle class households, which are those at the 25th percentile; this is true of Kentucky, its competitor states, and the United States overall, where the ratios were 3, 3.1, and 3.1, respectively, around 35 to 40 years ago. However, the gap has widened since then, evidenced by the ratios increasing to about 3.7 for Kentucky, its competitor states, and the U.S. by the mid-2010s. The upward trending lines in the figure below are indicative of a widening income gap between those who occupy the upper and lower boundaries of the American middle class. These trends are occurring because household incomes have been increasing for the upper middle class while declining for the lower middle class (in real terms), as illustrated in the bar chart on the facing page. These household income trends suggest that, especially in Kentucky, those in the bottom half of the income distribution are facing relative economic stagnation and decline compared to those in the competitor states and the U.S.

Household Income Ratios, 75th/25th Percentiles, Kentucky, Competitor States, and the U.S.

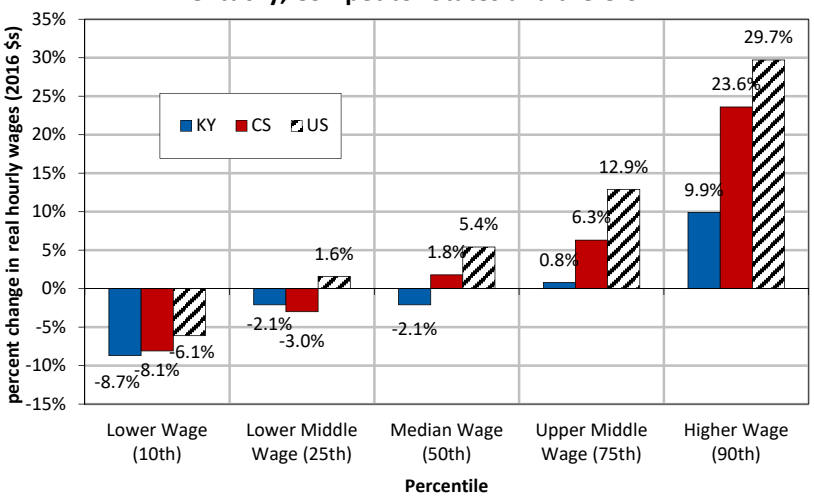


Source: Author's analysis of IPUMS-CPS data, courtesy of Miriam King, Steven Ruggles, J. Trent Alexander, Sarah Flood, Katie Genadek, Matthew B. Schroeder, Brandon Trampe, and Rebecca Vick. Integrated Public Use Microdata Series, Current Population Survey: Version 3.0. [Machine-readable database]. Minneapolis: University of Minnesota, 2010.

HOURLY WAGES

The hourly wage data illustrated in the bar chart below represent a portion of the household income data presented on the preceding two pages. Household income includes, but is not limited to, earnings (e.g., wages, salaries, and self-employment income), interest income, dividend income, public and private pensions, unemployment compensation, public assistance cash benefits (e.g., TANF, SNAP, and SSI), child support, and alimony. By limiting the focus here to hourly wages, we see a clearer picture of workers' labor market experiences. These data include hourly earnings for workers paid by the hour (*excluding* overtime, tips, commissions, and bonuses), as well as the usual hourly earnings for nonhourly workers (*including* overtime, tips, commissions, and bonuses). Similar to the trends in household income, individuals at the 10th, 25th, and even the 50th percentile experienced flat to declining wage change, in real dollars, from 1979 to 2016. In short, if we ordered all Kentucky workers from top to bottom according to their hourly wages, took the wage earner in the very middle (the median), removed the inflationary effect from 1979 to 2016 to get real wages, the Kentucky worker at the median experienced a 2.1 percent *decline* over this time period, with the competitor states and U.S. workers doing only slightly better.

Cummulative Change in Real Hourly Wages, by Wage Percentile, 1979 to 2016, Kentucky, Competitor States and the U.S.

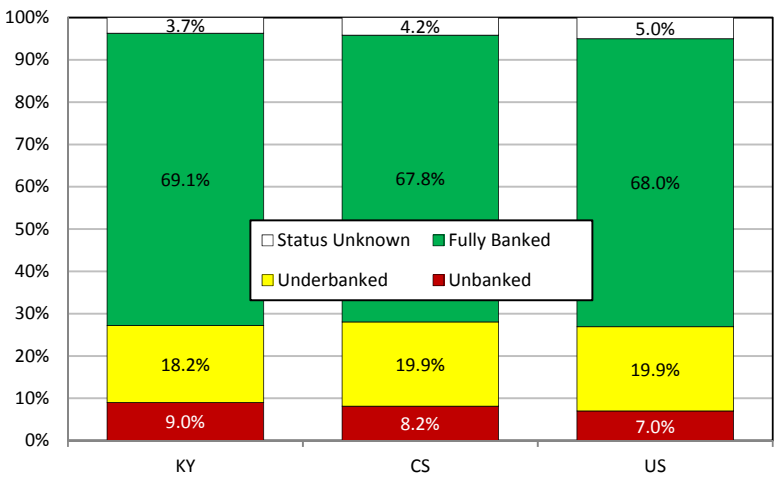


Source: Author's analysis of CPS Outgoing Rotation Group (ORG) data using files created by the Center for Economic Policy Research (CEPR), available at http://ceprdata.org/cps-uniform-data-extracts/cps-outgoing-rotation-group/.

BANKING STATUS

Whether someone has a bank account can have important implications for their financial well-being. According to the Federal Deposit Insurance Corporation (FDIC), "access to an account at a federally insured institution provides households with the opportunity to conduct basic financial transactions, save for emergency and long-term security needs, and access credit on fair and affordable terms." Moreover, it can help protect "households from theft and reduces their vulnerability to discriminatory or predatory lending practices." Surveys done by FDIC find that low-to-moderate income Americans are less likely to "access mainstream financial products such as bank accounts and low-cost loans." At 9%, Kentucky households are slightly more likely to be "unbanked" than either the competitor states (8.2%) or the U.S. (7%), and the same is true for being "underbanked," which are households that use both traditional banks as well as alternative financial services. Nationally as well as in Kentucky, the percentage of households that are unbanked has been declining since 2009—declining from 12% to 9% in Kentucky and from 7.6% to 7% nationally. While overall the unbanked percentage in the U.S. is only 7% in 2015, it rises to 25.6% for households with less than $15,000 in annual income, 18.2% for black households, and 16.2% for Hispanic households.

Household Banking Status, 2015,
Kentucky, Competitor States, and the U.S.
(percent of households)

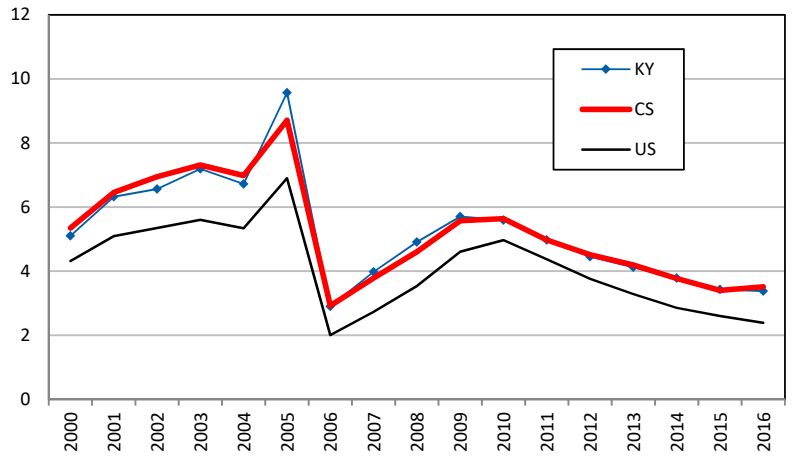


Source: FDIC National Survey of Unbanked and Underbanked Households, 2015

PERSONAL BANKRUPTCIES

Bankruptcy is defined as "a legal proceeding involving a person or business that is unable to repay outstanding debts." The idea is to develop a plan that enables the individual (or business) to gain a fresh financial start while providing creditors with some prospect of repayment for outstanding debts. The personal bankruptcy rate provides an indication of the overall financial health of individuals and families. As consumers acquire excessive debt or economies are in recession, for example, the threat of personal bankruptcy increases. The laws governing bankruptcy changed in 2005, which had the immediate effect of reducing the number of individuals filing for bankruptcy. The personal bankruptcy rate in Kentucky has essentially been the same as the competitor states, which in 2016 is around 3.4 bankruptcies per 1,000 population. The U.S. average has been somewhat lower over the 2000-2016 period, and stood at 2.4 in 2016. Overall, the bankruptcy rate has been on a downward trend since 2010, and is approaching levels not seen since before the Great Recession.

Personal Bankruptcies,
Kentucky, Competitor States, and the U.S., 2000-2016
(bankruptcies per 1,000 population)

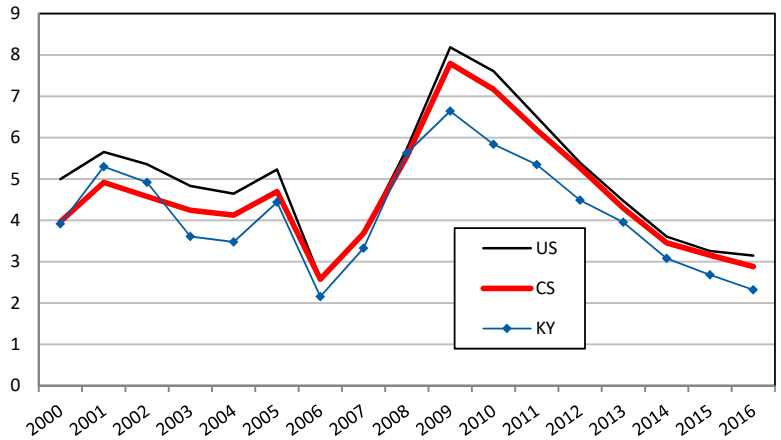


Source: Estimated using data from Administrative Office of the U.S. Courts & Census data, various years.

BUSINESS BANKRUPTCIES

According to the National Bureau of Economic Research (NBER), the trough of the most recent recession was in the second quarter of 2009. It is perhaps no surprise, then, that 2009 is the peak year, as shown in the graph below, for the number of businesses that filed for bankruptcy. Across the various Circuit and District Courts in 2009, there were 60,837 bankruptcy business filings (Chapters 7, 11, 12, 13)—but this has steadily declined since then with 24,114 in 2016. Business filings across the U.S. in the first six months of 2017 are 5.4 percent lower than the number filed in the first six months of 2016. When expressed as a percentage of business establishments, Kentucky has been lower than the competitor states and the U.S. during the last few years but has historically had similar rates.

Business Bankruptcies,
Kentucky, Competitor States, and the U.S., 2000-2016
(bankruptcies per 1,000 business establishments)

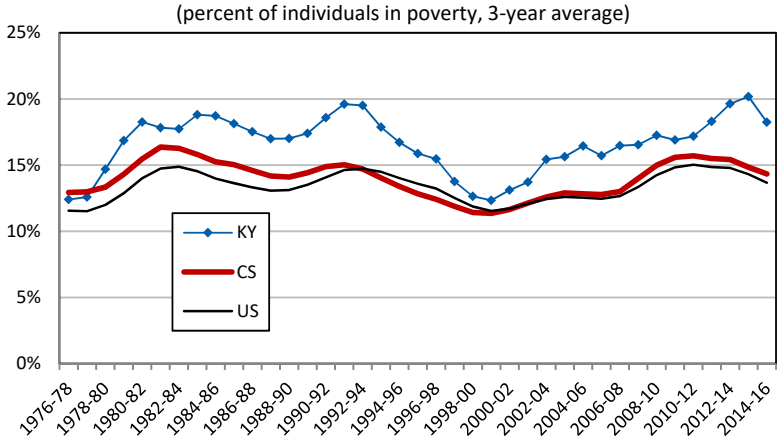


Source: Estimated from Administrative Office of the U.S. Courts data along with establishment data from the U.S. Census, County Business Patterns, various years. Note: 2016 data are estimated by using 2015 establishments and 2016 bankruptcies.

POVERTY RATE

Living in poverty can have far-reaching economic, social, and cultural consequences for families and entire populations. Studies reveal that those who grow up in poverty not only experience a lack of basic needs, but that this scarcity can shape their lives and families for generations. In addition, the concentrations of poverty have a significant negative effect on the fiscal health of cities and regions that, as a result, must shoulder higher spending. The U.S. poverty rate increased during the Great Recession and currently stands at around 14 percent. From about 1980 to the present, Kentucky's poverty rate has been consistently higher than both the U.S. and competitor states. The data in the chart show the 3-year moving average poverty rate estimated from the Annual Social and Economic Supplement (ASEC) of the Current Population Survey (CPS). According to the Census Bureau's 2016 American Community Survey 1-year estimate, another estimate of the poverty rate, Kentucky's poverty rate is 18.5 percent, which is higher than the competitor state (14.7%) and U.S. (14%) poverty estimates.

Poverty Rate 1976 to 2016,
Kentucky, Competitor States, and the U.S.
(percent of individuals in poverty, 3-year average)

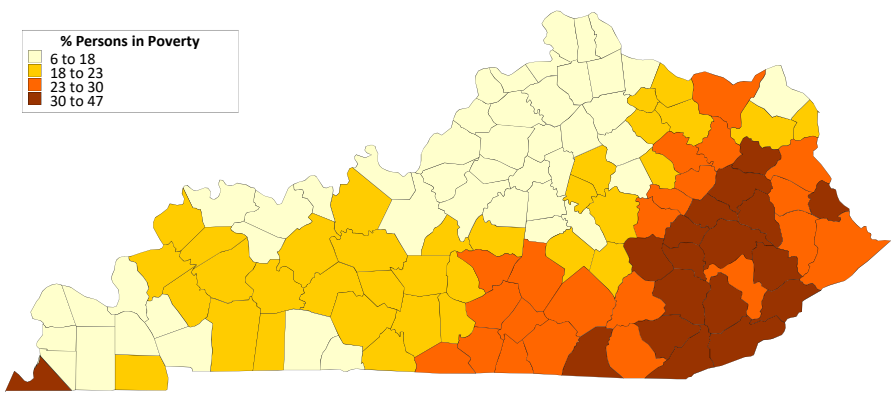


Source: Author's analysis of IPUMS-CPS data, courtesy of Miriam King, Steven Ruggles, J. Trent Alexander, Sarah Flood, Katie Genadek, Matthew B. Schroeder, Brandon Trampe, and Rebecca Vick. Integrated Public Use Microdata Series, Current Population Survey: Version 3.0. [Machine-readable database]. Minneapolis: University of Minnesota, 2010.

POVERTY RATE BY COUNTY

Kentucky's persistently poor counties are concentrated in Eastern Kentucky, but high poverty is found across the state. Poverty rates in Bell, Clay, Martin, McCreary, and Owsley Counties are over 40 percent—the highest in the state—while Bullitt, Boone, Oldham, and Spencer Counties have rates in the single digits. There can be, of course, concentrated pockets of poverty within counties with relatively low rates. At 24.7 percent, the "mostly rural" counties generally have higher poverty rates than "slightly rural" (18.4%) and metro counties (15.3%).

Estimated County Poverty Rates, 2015



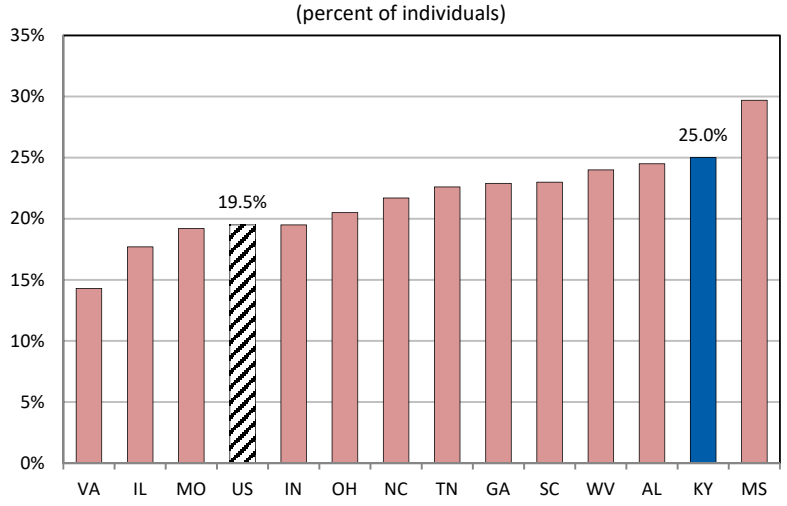
Source: U.S. Census Bureau, Small Area and Income Esimates (SAIPE)

CHILD POVERTY

Child poverty, and all that it bodes for the future, continues to be disturbing and vexing problem for Kentucky. Here, we illustrate child poverty rates for Kentucky, the competitor states, and the U.S. The rates shown are for children who live in households with incomes below 100 percent of the federal poverty level. Kentucky's poverty rate for children under 18 in 2016 was 25.0 percent, a significant increase from 20 percent in 2000. Kentucky's child poverty rate is significantly higher than the U.S. rate of 19.5 percent (using a 90 percent margin of error). At 28.3 percent, New Mexico has the highest child poverty rate in the nation; New Hampshire is the lowest with a child poverty rate of 6.7 percent.

Poverty Rate, 2016, Children Under 18, Kentucky, Competitor States and the U.S.

(percent of individuals)

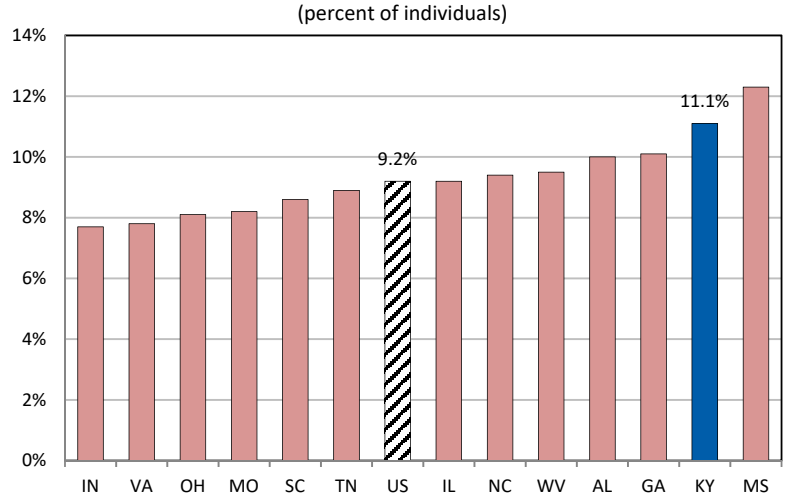


Source: 2016 American Community Survey 1-Year Estimates

ELDER POVERTY

The first wave of Baby Boomers started hitting the traditional retirement age of 65 in 2011 and many are financially ill-prepared for retirement. The Employee Benefit Research Institute's 2016 Retirement Confidence Survey finds, among other insights, that 79 percent of retirees report feeling either "very or somewhat confident" about having enough money to live comfortably throughout their retirement years (compared with 75 percent in 2016). This compares to the 21 percent who are "not too or not at all confident." According to the survey, 76 percent of retirees saved money for retirement—which obviously means that one-quarter did not. This widespread lack of saving for retirement places many seniors in a precarious position for their retirement years. At 11.1 percent, Kentucky's population of persons aged 65 and older who live below the poverty level is higher than most of the competitor states as well as the U.S. average of 9.2 percent. And, these differences are statistically significant. However, there is not a statistically significant difference between Kentucky and Mississippi, which has the highest poverty rate among the competitor states.

Poverty Rate, 2016, Adults 65 and Over
Kentucky, Competitor States and the U.S.
(percent of individuals)

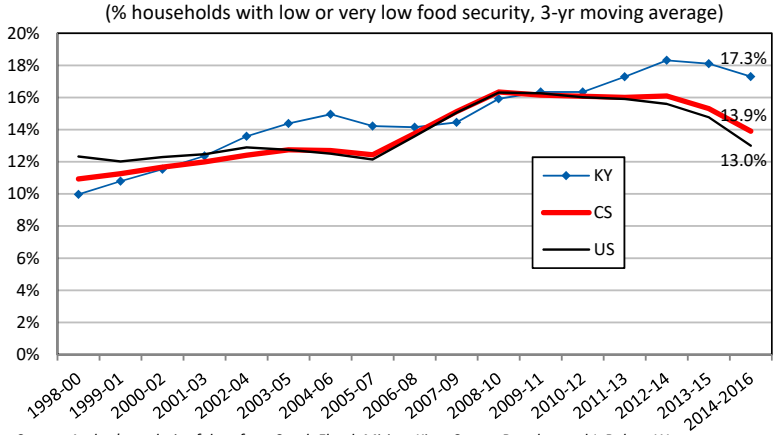


Source: 2016 American Community Survey 1-Year Estimates

Food Insecurity

Food security is defined as having "access at all times to enough food for an active, healthy life for all household members," while food insecurity means "that the food intake of one or more household members was reduced and their eating patterns were disrupted at times during the year because the household lacked money and other resources for food." An estimated 10.1 percent of Kentucky households experienced food insecurity during the 1999-2001 period, and this increased to 17.3 percent in the most recent period. The competitor states and the U.S. averages were lower than Kentucky's, at 13.9 and 13.0 percent, respectively. During the 2014 to 2016 period, there are no states with food insecurity rates that are statisically higher than Kentucky's. There are, however, 17 states that are statisically the same as Kentucky and 33 states (and DC) that are statistically lower. Generally, national data show that rates of food insecurity tend to be higher for certain groups, such as households with children—especially young children (under age 6), households with children headed by a single parent—especially a woman, households headed by a minority—especially Black and Hispanic, and the elderly. Research by University of Kentucky economist James Ziliak reveals that rates of food insecurity have remained persistently high following the Great Recession for Americans over 60.

Prevalence of Food Insecurity,
Kentucky, Competitor States, and the U.S., 1998-2016
(% households with low or very low food security, 3-yr moving average)



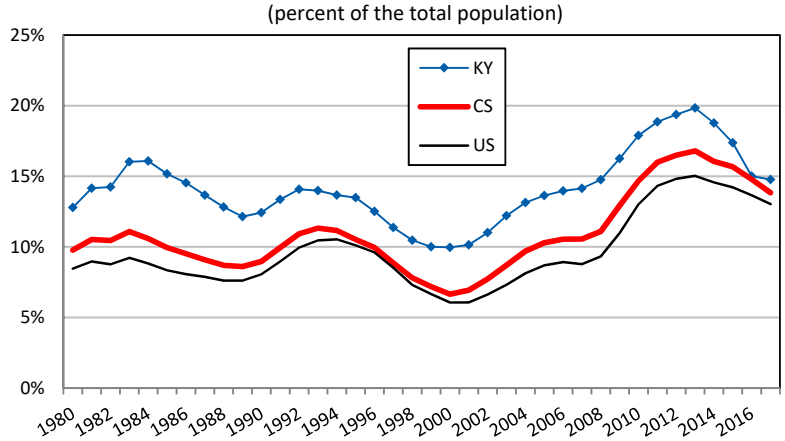
*Source: Author's analysis of data from Sarah Flood, Miriam King, Steven Ruggles, and J. Robert Warren. Integrated Public Use Microdata Series, Current Population Survey: Version 4.0 [Food Security CPS Supplement data]. Minneapolis, MN: University of Minnesota, 1998-2015.
http://doi.org/10.18128/D030.V4.0. The 2014-2016 data are estimated from author's analysis of Current Population Survey Food Security Supplement.*

FOOD STAMP PARTICIPATION

The Food Stamp Act of 1977 defines this federally-funded program as one intended to "permit low-income households to obtain a more nutritious diet." Nationally, almost 75 percent of Food Stamp Program (FSP) participants are in families with children and more than one-quarter of participants are in households with seniors or people with disabilities. From 1980 to 1999, Kentucky's average monthly participation in the Food Stamp Program—known as the Supplemental Nutrition Assistance Program (SNAP)—was approximately 500,600 individuals. The low point in participation was in 1999 when it was 396,400. The number of participants climbed precipitously from that point to nearly 880,000 in 2013, which was over double the 1999 total. It has been declining since then though, as evidenced in the figure below. From May 2015 to May 2016, the number of individuals participating in the SNAP program in Kentucky declined 15.6 percent—a decline unmatched by another state. In 2016, an estimated 15.0 percent of Kentucky's population participated in the FSP, a percentage similar to both the competitor states (14.8%) and the U.S. (13.7%). SNAP benefits are dependent on, among other factors, family size and income levels—with the average SNAP recipient in the U.S. receiving about $126 a month in FY 2017. The average per person benefit in Kentucky was $123 (FY 2016).

Food Stamp Program, Average Monthly Participation, Kentucky, Competitor States, and the U.S., 1980-2017*

(percent of the total population)

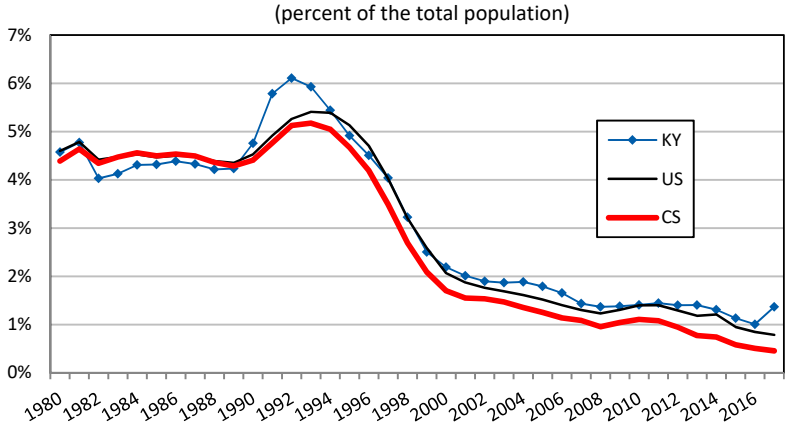


Source: U.S. Department of Agriculture Food and Nutrition Service, U.S. Census, and University of Kentucky Center for Poverty Research. 2016. "UKCPR National Welfare Data, 1980-2015." Gatton College of Business and Economics, University of Kentucky, Lexington, KY. http://www.ukcpr.org/data (accessed November 2017)
**The 2017 estimate is based on January to August numbers.*

TEMPORARY ASSISTANCE FOR NEEDY FAMILIES

The number of Kentuckians receiving Aid to Families with Dependent Children (AFDC)—known as Temporary Assistance to Needy Families (TANF) since the 1996 welfare reform law—has decreased significantly from its high point of 229,400 in 1992 to 44,600 in 2016; roughly 80 percent of the recipients in 2016 were children. This decline is not unique to Kentucky. For example, marking the 20th anniversary of the 1996 legislation that fundamentally changed the program, the Center on Budget and Policy Priorities (CBPP) issued a report in August, 2016, noting that nationally the number of families receiving TANF (AFDC) benefits for every 100 families with children in poverty has declined sharply over time. In 1979, for instance, 82 families per 100 with children in poverty received benefits, compared to 68 in 1996—when TANF was enacted—to 23 in 2014. As a percentage of the total population, more Kentuckians received TANF benefits in 2016, about 1.0 percent, than the competitor state average of 0.5 percent. At 1.1 percent, Tennessee has the highest percentage among the competitor states while Georgia and Indiana have the lowest at 0.25 percent. The benefit amount for a Kentucky family of three is $262 per month, which has not changed since 1996. If the benefit had been indexed to the inflation rate it would equal $404 in 2016.

AFDC/TANF Recipients,
Kentucky, Competitor States, and the U.S., 1980-2017*
(percent of the total population)



Source: The Administration for Children and Families, U.S. Department of Health and Human Services, U.S. Census, and and University of Kentucky Center for Poverty Research. 2016. "UKCPR National Welfare Data, 1980-2015." Gatton College of Business and Economics, University of Kentucky, Lexington, KY. http://www.ukcpr.org/data (accessed November 2017)
**The 2017 estimate is based on October 2016 to March 2017 numbers.*

MEDICAID BENEFICIARIES

Medicaid is a state-federal partnership to provide health care coverage for people with lower incomes, older people, individuals with disabilities, and some families and children. The Medicaid program is jointly funded by states and the federal government. In Kentucky, the Department for Medicaid Services administers the $22 billion program—the budgeted level for the 2016-2018 Biennium. There are many types of services provided for Kentucky's 1.2 million Medicaid beneficiaries—from inpatient hospitalization to long-term care to prescription drugs for acute care. In the wider context of Kentucky's state budget, Medicaid constitutes a significant portion of total state government spending. According to the National Association of State Budget Officers, *State Expenditure Report: Fiscal Years 2014-2016*, 30.3 percent of Kentucky state government expenditures were for Medicaid in FY2016. Kentucky's federal match in FY2017 is 70.5%, meaning that the federal government is paying $2.39 for every $1 of state funds. The percentage of the population on Medicaid in Kentucky, the competitor states, and the U.S. is 28, 20 and 23 percent, respectively. And, as a result of the Affordable Care Act, Kentucky has experienced one of the largest increases in Medicaid enrollment in the country. The U.S. average is a 29 percent increase in enrollment, compared to Kentucky's 107 percent.

Total Monthly Medicaid and CHIP Enrollment, Pre-ACA Compared to June 2017, U.S., Competitor States, and Kentucky

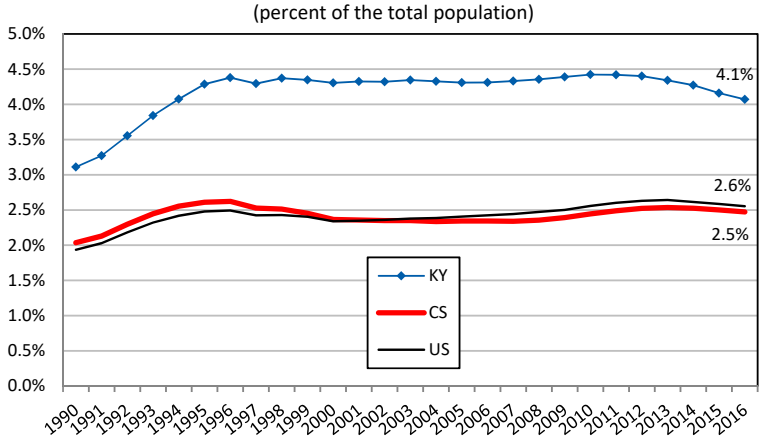
Area	Pre-ACA Average Monthly Enrollment	Total Monthly Medicaid/CHIP Enrollment	% Change	% Total Population Enrolled
US	**56,803,091**	**74,424,652**	**29%**	**23%**
AL	799,176	883,813	11%	18%
GA	1,535,090	1,735,648	13%	17%
IL	2,626,943	3,046,336	16%	24%
IN	1,120,674	1,481,682	32%	22%
KY	**606,805**	**1,254,443**	**107%**	**28%**
MS	637,229	674,981	6%	23%
MO	846,084	964,912	14%	16%
NC	1,595,952	2,037,221	28%	20%
OH	2,161,785	2,806,415	30%	24%
SC	889,744	1,008,200	13%	21%
TN	1,244,516	1,485,418	19%	23%
VA	935,434	997,537	7%	12%
WV	354,544	558,519	58%	12%
CS	**14,747,171**	**17,680,682**	**20%**	**20%**

Source: Kaiser Family Foundation, derived from CMS, Medicaid & CHIP Monthly Applications, Eligibility Determinations, and Enrollment Reports: February 2014 - June 2017 (preliminary), as of August 30, 2017.
Note: CS is a weighted average of the competitor states.

SUPPLEMENTAL SECURITY INCOME (SSI)

The Supplemental Security Income (SSI) is a Federal income supplement program that is administered by the Social Security Administration (SSA) and funded by general tax revenues (not Social Security taxes). According to the SSA, "It is designed to help aged, blind, and disabled people, who have little or no income, and it provides cash to meet basic needs for food, clothing, and shelter." Of Kentucky's 184,100 recipients in 2015, 5 percent were aged and 95 percent were blind and/or disabled. Nearly one-third of the recipients were either under 18 (14.5%) or over 64 years old (17.3%). As is evident by the figure, the percentage of Kentuckians receiving SSI benefits, 4.1 percent, is much higher than the U.S. (2.6%) or competitive state averages (2.5%).

Supplemental Security Income (SSI) Recipients, Kentucky, Competitor States, and the U.S., 1990-2016
(percent of the total population)



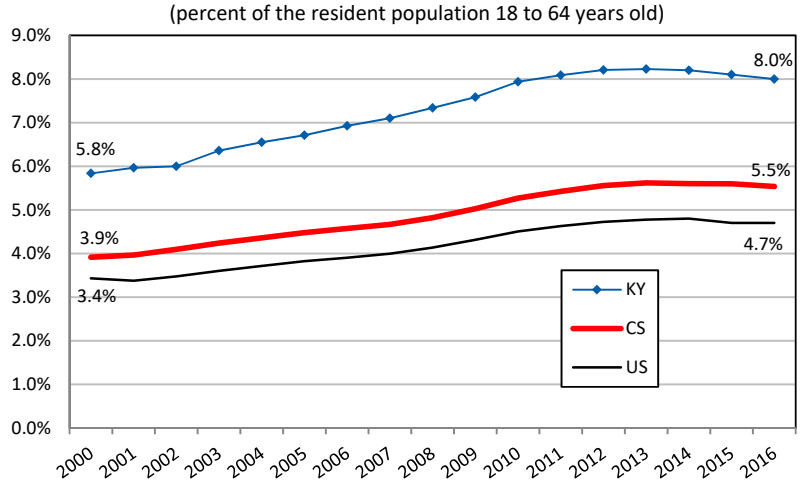
Source: Social Security Administration, U.S. Census, and University of Kentucky Center for Poverty Research. 2016. "UKCPR National Welfare Data, 1980-2015." Gatton College of Business and Economics, University of Kentucky, Lexington, KY. http://www.ukcpr.org/data (accessed November 2017)

DISABILITY INCOME (DI)

According to the Social Security Administration, "Studies show that just over 1 in 4 of today's 20 year-olds will become disabled before reaching age 67." The Social Security Disability Insurance (SSDI) program pays benefits to disabled individuals and some family members if the individual worked long enough and paid Social Security taxes. Kentucky has a higher than average disability rate so it is not surprising that a higher percentage of the state's population receive DI benefits. The percentage of Kentuckians between 18 and 64 years old who receive DI benefits is 8.0 percent, markedly higher than both the competitor state (5.5%) and U.S. (4.7%) averages. The average monthly benefit nationally for disabled workers is $1,171. This program, however, is resting on a shaky financial foundation. Analysts at RAND have pointed out that there is not enough money going into the program to provide benefits to a growing caseload—noting that changes to the program are inevitable and just over the horizon.

Disability Income (DI) Recipients (18-64 Years Old), Kentucky, Competitor States, and the U.S., 2000-2016

(percent of the resident population 18 to 64 years old)



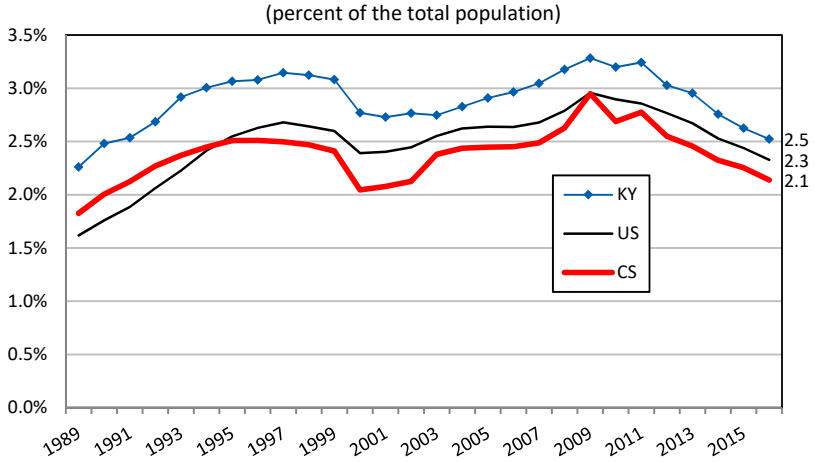
Source: Social Security Administration, Annual Statistical Report on the Social Security Disability Insurance Program, various years.

WOMEN, INFANTS, AND CHILDREN (WIC)

Women, Infants, and Children (WIC) is a federal nutrition program for "supplemental foods, health care referrals, and nutrition education for low-income pregnant, breastfeeding, and non-breastfeeding postpartum women, and to infants and children up to age five who are found to be at nutritional risk." In Kentucky, around 2.5 percent of the population receives WIC benefits, representing a steady decline since its recent peak in 2010; in fact, Kentucky's percentage is at its lowest point since the early 1990s. Kentucky's percentage is only slightly higher than the U.S. (2.3%) and competitor states (2.1%).

Women, Infants, and Children (WIC) Recipients, Kentucky, Competitor States, and the U.S., 1989-2016

(percent of the total population)

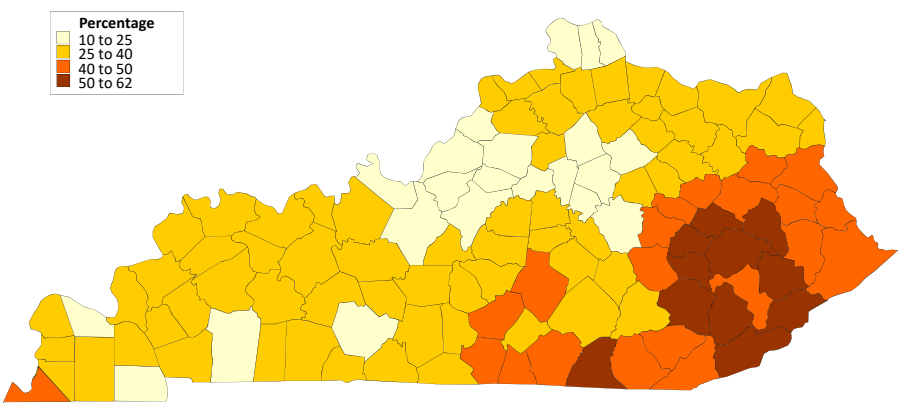


Source: U.S. Department of Agriculture Food and Nutrition Service, U.S. Census, and and University of Kentucky Center for Poverty Research. 2016. "UKCPR National Welfare Data, 1980-2015." Gatton College of Business and Economics, University of Kentucky, Lexington, KY. http://www.ukcpr.org/data (accessed November 2017)

TRANSFER PAYMENTS BY COUNTY

Transfer payments are benefits transferred from local, state, or federal governments to an individual. These payments include, but are not limited to, retirement and disability insurance benefits like Social Security, medical benefits such as those provided through Medicaid and Medicare, income maintenance benefits like TANF and SNAP, unemployment insurance compensation, and veterans' benefits. Transfer payments account for about 17.4 percent of total personal income for the U.S. (24.5 percent for Kentucky statewide)—but several Kentucky counties are significantly higher than the national and state averages. There are eleven Kentucky counties over 50 percent, and 21 counties where transfer payments are between 40 and 49 percent of personal income; there are 66 counties between 25 percent and 40 percent. The percentages for Kentucky's metro, slightly rural, and mostly rural counties are, respectively, 19.3, 28.9, and 39. There are several counties that are heavily dependent on transfer payments as a source of personal income, with the highest percentages concentrated in the Eastern Kentucky.

Transfer Payments by County, 2016
(as a percentage of total personal income)



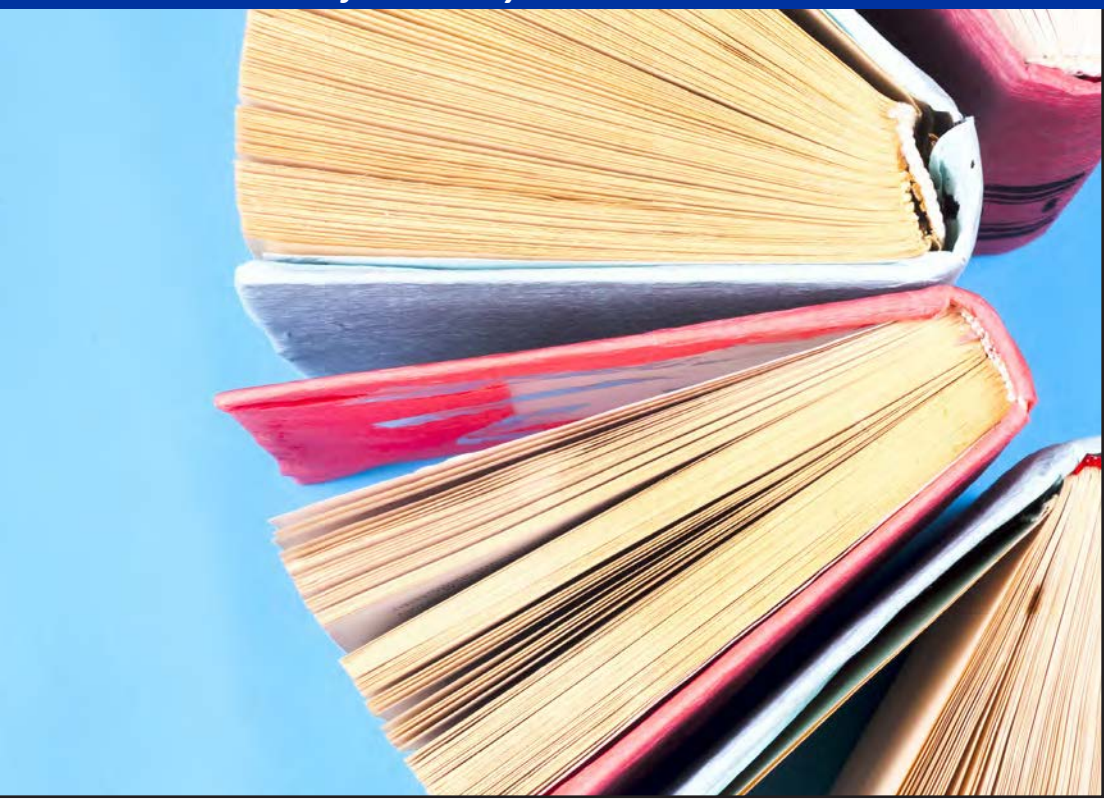
Source: Bureau of Economic Analysis


EDUCATION

Education

EDUCATION IS EXPENSIVE for both the individual and the taxpayer. In fiscal year 2016, 40.4 percent of Kentucky's total state expenditures went to either elementary and secondary education (16.3%) or higher education (24.1%), 10.3 percentage points higher than the national average of 30.1 percent (NASBO, *State Expenditure Report*, 2016). Average tuition across Kentucky's postsecondary system increased 80 percent from 2005-06 to 2015-16 while per capita personal income increased 28 percent over the same period. Education might be expensive but the lack of education is even more costly. Investments in education yield multiple dividends. According to a 2016 RAND study, government spending on early childhood education returns $2 to $4 for every $1 invested. And, as one climbs the educational ladder, the resulting economic benefits, such as higher income and lower unemployment, get larger, especially for those with a 4-year degree or higher. Likewise, there is a clear and consistent pattern with higher levels of education associated with better health, less dependence on public assistance, and increased technology use—just to name a few other benefits. And what is generally good for the individual also benefits the wider community—such

To improve educational outcomes in Kentucky we cannot limit our focus solely to the classroom.

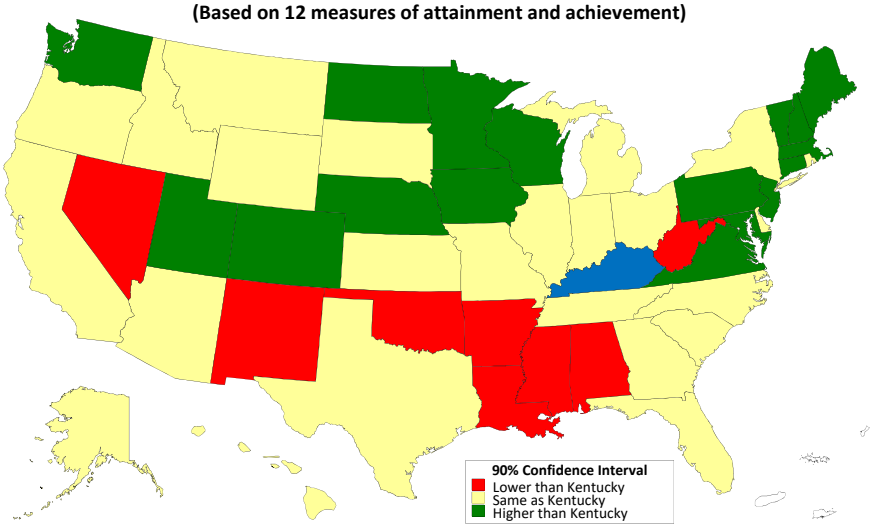


as lower crime rates and more volunteerism. Increasing educational attainment, as well as educational achievement, has measurable positive benefits. Stanford economist Eric Hanushek and his colleagues published a study in 2016 estimating a strong connection between academic achievement and state-level economic growth. They found, for example, that if Kentucky students performed at the same level as those in Minnesota—the state with the highest performing students in the country—then gains to Kentucky's GDP over the next 80 years could top $1 trillion or 5 times the current level. Kentucky's educational status has improved since the early 1990s when its educational reputation was at a low point. Our analysis shows that Kentucky is statistically higher than 8 states, lower than 17, and statistically no different from 24, based on 12 educational attainment and achievement factors combined into a single index. To improve educational outcomes in Kentucky, we cannot limit our focus solely to the classroom. Kentucky faces many obstacles to cost-effective educational performance, ranging from high poverty to poor health. Moderating the harmful effects of poverty on learning will help to reduce these obstacles and facilitate even higher returns.

Education Index

The map below shows how educational outcomes in Kentucky compare to those in other states. Based on 12 educational attainment and achievement factors combined into a single index (see the table on the following page), Kentucky is statistically higher than 8 states, lower than 17 states, and no different statistically from 24 states (using a 90% confidence interval). Looking at Kentucky's competitor states, this Index shows that Kentucky ranks higher than Alabama, Mississippi, and West Virginia, but lower than Virginia. There is not a statistically significant difference between Kentucky and the other competitor states (i.e., Georgia, Illinois, Indiana, Missouri, North Carolina, Ohio, South Carolina, and Tennessee).

Kentucky's Educational Quality Relative to Other States, 2015-2017
(Based on 12 measures of attainment and achievement)



SELECTED EDUCATIONAL INDICATORS

Some key indicators used to compare states on educational outcomes are listed below. They include measures of educational attainment, such as the percentage of the population 25 to 54 (prime working age) with a high school diploma or bachelor's degree, as well as educational achievement, including the percentage of students scoring proficient or higher on the various National Assessment of Educational Progress (NAEP) reading, math, and science exams. The percentages of Kentucky 4th and 8th graders scoring proficient or higher on the NAEP exams in 2015 is statistically higher than the national (public) average in two instances—4th grade reading and 4th grade science. Conversely, Kentucky's 8th graders continue to struggle evidenced by the math scores being statistically significantly lower than the national public average for each of the seven NAEP assessments from 2003 to 2015. And there is no statistical difference between Kentucky and the U.S. for 8th grade reading, 8th grade science, and 4th grade math. On the other hand, Kentucky high school students continue to make significant gains in the percentage of recent graduates who are college and career ready as well as demonstrating Advanced Placement exam mastery. Finally, as evidenced by many of the indicators listed below, there is a considerable gap between Kentucky and the top tier of states.

Comparing Education Indicators for Kentucky, United States, and the Top 17 States, 2015-2017 (numbers are percentages)

Education Indicators	Kentucky	U.S.	Average for Top 17 States†
HS Diploma or Higher (2016)	88.5	88.7	91.8
Two-Year Degree (2016)	10.2	9.1	9.5
Bachelor's Degree or Higher (2016)	26.1	33.9	39.3
Adj. Cohort HS Grad Rate (2016)	88.6	84.1	86.5
ACT % College/Career Ready (2017)	20.0	27.0	39.4*
8th Grade Math NAEP (2015)	27.7	32.1	40.3*
8th Grade Reading NAEP (2015)	36.1	32.7	39.2*
8th Grade Science NAEP (2015)	34.5	33.1	40.7*
4th Grade Math NAEP (2015)	40.5	39.4	45.9*
4th Grade Reading NAEP (2015)	40.4	34.8	40.9*
4th Grade Science NAEP (2015)	44.4	36.5	43.5*
AP Exam Mastery (2016)	17.6	21.9	22.6*

†The top 17 states are statistically significantly higher than Kentucky (using a 90% confidence interval): CO, CT, IA, MA, MD, ME, MN, ND, NE, NH, NJ, PA, UT, VA, VT, WA & WI.
*This is the average of the state averages—*not a weighted average* of these 17 states.
Note: HS Diploma, Two-Year Degree, and Bachelor's Degree are for those between 25 and 54, the prime working age. The NAEP data reflect the percentage of public students scoring proficient or higher, and the U.S. data represents the National Public.

Selected Obstacles to education

While Kentucky has made educational progress, there is much to be done to improve educational outcomes—and not all of it strictly in the classroom. As is evident by the numbers in the table, obstacles to cost-effective educational performance are more prevalent in Kentucky than in most other places. Each of the factors listed below represents a potential obstacle to optimal educational performance and/or cost-effective educational spending. Considering factors like poverty, parental education, obesity, students' health status, disability rates, and missed school days, these obstacles, if addressed, would enable better educational outcomes in Kentucky.

Selected Obstacles to Cost-Effective Educational Performance, Kentucky, the U.S. & the Top 16 Performing States, 2011-2014 (percentages)

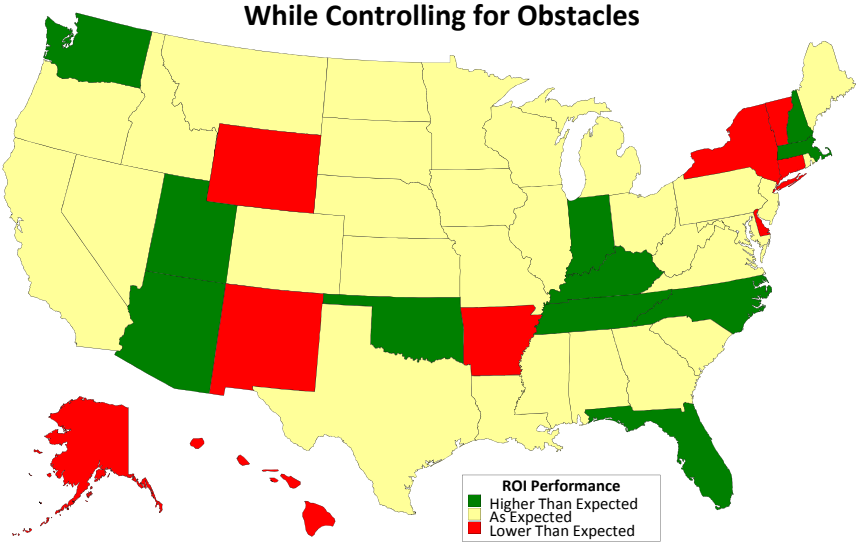
Obstacles	Kentucky	U.S.	Average for Top 16 States†*
Children who have at least one parent with a postsecondary degree (2014)	44.6	48.1	57.2
Children eligible for free and reduced priced lunch (2014)	54.3	50.3	39.2
Students who live in rural areas	41.1	20.2	24.5
Children and teens (10 to 17) who are overweight or obese (2011)	35.7	31.3	28.1
Students with disabilities as a percent of public school enrollment (2014)	14.4	12.9	14.5
Limited English proficiency students as a of total enrollment (2014)	2.9	9.3	5.1
Children (6 to 17) who missed 11 or more school days due to illness/injury (2011)	8.4	6.2	6.2
Children under 17 whose overall health is fair or poor (2011)	3.2	3.2	2.3

†The top 16 states based on the education index are: CT, IA, MA, MD, ME, MN, ND, NE, NH, NJ, PA, UT, VA, VT, WA & WI.
*These percentages are the averages of the state averages—not a weighted average of the top 16 states.

EDUCATIONAL SPENDING ROI

Kentucky's 2015 NAEP results show that, on average, an estimated 37 percent of 4th and 8th graders scored proficient or higher on the math, reading, and science exams. With per pupil expenditures of $11,966 (adjusted for cost-of-living differences across the states), Kentucky gets an estimated 3.1 NAEP proficiency percentage points for every $1,000 in per pupil spending. A 2014 report from the U.S. Chamber of Commerce found that Kentucky's educational return on investment (ROI) was about average. However, the analysis did not account for the relative differences in obstacles to optimal educational performance and/or cost-effective educational spending faced by the states. Using multiple regression analysis to control for the obstacles listed in the table on the facing page, we find that Kentucky and 10 other states perform better than expected. These states achieve higher levels of NAEP proficiency per dollar spent on education (i.e., Educational ROI) than one would expect given the considerable obstacles facing many students. Meanwhile, 9 states perform lower than expected and 30 perform as expected.

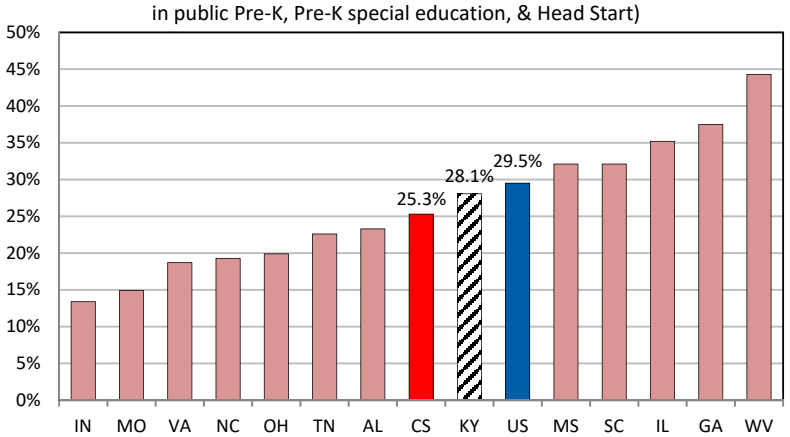
Return on Investment of Educational Spending While Controlling for Obstacles



PUBLIC PRE-K ENROLLMENT

The Kentucky Department of Education Kindergarten Readiness Screener data show that only half (50.1%) of the students who entered kindergarten in 2016 were ready when assessed on three scales: academic/cognitive; language development; and physical development. Moreover, children with Limited English Proficiency (26.9%), those receiving Free or Reduced Price Meals (39.8%), and those with a disability (29.7%) have even lower levels of readiness. Early childhood development programs can help. A 2016 RAND study—*Informing Investments in Preschool Quality and Access in Cincinnati: Evidence of Impacts and Economic Returns from National, State, and Local Preschool Programs*—touts their benefits. "High-quality preschool programs represent a significant investment of resources, but that investment may be paid back through improved outcomes during the school-age years and beyond," said the authors. They found that "credible estimates of the economic return for full-scale high-quality preschool programs range from about $2 to $4 for every $1 invested." Similarly, a 2009 CBER study estimated that in Kentucky "the total estimated benefit is more than $5 for every $1 the state would invest in an expanded pre-k program." According to estimates from the National Institute for Early Education Research, 28.1 percent of Kentucky's 3- and 4-year-olds are enrolled in *public* pre-kindergarden programs.

Estimated Enrollment in Pre-K Programs,
Kentucky, Competitor States and the U.S., 2016
(percent of all children 3- and 4-years-old
in public Pre-K, Pre-K special education, & Head Start)



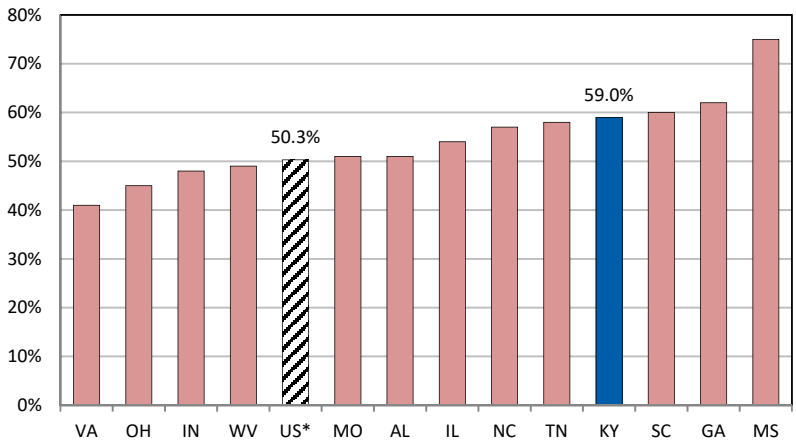
Source: Estimated from The State of Preschool 2016, State Preschool Yearbook, National Institute for Early Education Research. Note: These estimates likely include some double-counted children since some Head Start children are likely in State Pre-K programs too.

FREE- AND REDUCED-LUNCH ELIGIBILITY

Less-advantaged students face many obstacles to educational success. On average, students eligible for free- or reduced-priced lunch in Kentucky follow national trends and do not score as high on standardized tests such as NAEP when compared to students who are not eligible; the same is true for Kentucky's various state-specific assessment tools, such as the Kentucky Performance Rating for Educational Progress (K-PREP). Regardless of the assessment system, less-advantaged students do not perform as well, on average, as more-advantaged students. Researchers at organizations like the Education Trust, for example, have examined the underlying reasons for the achievement gap and identified several systemic causes. A student's eligibility for the so-called free-lunch program is determined by household income and size. During the 2015-2016 school year, Kentucky ranked above the national average with 59 percent of public school students eligible for free- or reduced-priced lunch. The national average is 50.3 percent. Among the 50 states, Mississippi has the highest percentage at 75 percent while New Hampshire has the lowest at 28 percent.

Students Eligible for Free or Reduced-Price Lunch, 2015-16, Kentucky, Competitor States, and the U.S.

(percent of public school students, school year 2015-16)



Source: Common Core of Data, Tabulated from Elementary/Secondary Information System, 11/10/2015: http://nces.ed.gov/ccd/elsi/
Note: US data is for the 2013-2014 school year

PERFORMANCE ON STANDARDIZED TESTS

The National Assessment of Educational Progress (NAEP), commonly known as the "Nation's Report Card," gauges student progress in a variety of subject areas, including reading, mathematics, and science. Here we present the test results for 4th and 8th graders from 2000 to 2015. The percentages of Kentucky 4th and 8th graders scoring proficient or higher on the NAEP exams have generally increased from the early years, but the 2015 results bring just two bright spots—4th grade reading and 4th grade science. Kentucky 4th grades scored significantly higher than the national average on these two exams. While there are 1 to 4 percentage point differences from 2013 to 2015, none of the 2015 percentages are statistically significantly different from the 2013 results. Kentucky's 8th graders continue to struggle evidenced by Kentucky's 8th grade math scores being statistically significantly lower than the national public average for each of the seven NAEP assessments from 2003 to 2015.

Kentucky's Math, Reading, and Science NAEP Results, Percentage Scoring Proficient or Higher, By Subject, Grade, and Year

	2002	2003	2005	2007	2009	2011	2013	2015
Math 4	-	22↓	26↓	31↓	37	39	42	41
Math 8	-	24↓	23↓	27↓	27↓	31↓	30↓	28↓
Reading 4	30	31	31	33	36↑	35	36	40↑
Reading 8	32	34	31	28	33	36↑	38↑	36
Science 4	-	-	-	-	45↑	-	-	44↑
Science 8	-	-	-	-	34↑	34↑	-	35

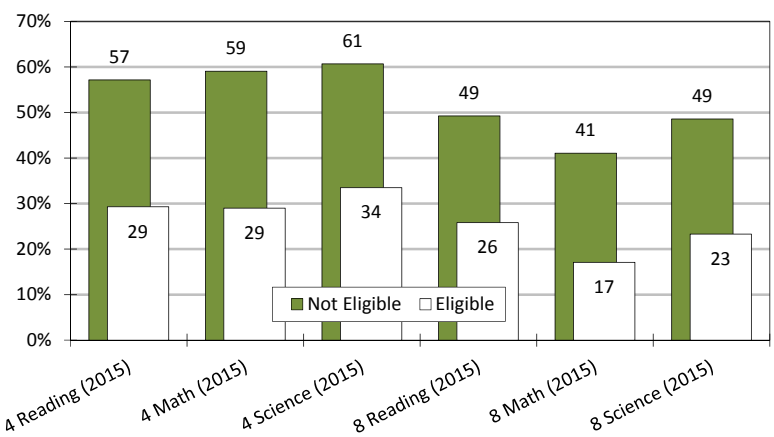
Source: National Center for Education Statistics (NCES), Institute of Educational Sciences (IES), National Assessment of Educational Progress (NAEP), Kentucky State Profile.
Note: A dash (-) in the cell indicates that this test was not taken by Kentucky students. An arrow pointed down (↓) next to a number indicates that the percentage is statistically significantly lower than the National public percentage. Conversely, an arrow pointed up (↑) next to a number indicates that the percentage is significantly higher. No arrow indicates that the Kentucky percentage is not significantly different from the National public.

EDUCATIONAL ACHIEVEMENT GAP

Research published this year by RAND on the economic consequences of the achievement gap in Pennsylvania illustrates the magnitude of these costs for the wider society. In Kentucky, the academic success of disadvantaged children will affect whether the state's future remains one of disproportionate poverty or gives way to rising prosperity. 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. Kentucky has the nation's thirteenth highest population of students eligible for free or reduced-price lunches (54.3%), a reliable proxy for poverty and need. The different outcomes on the National Assessment of Educational Progress (NAEP) exams are stark. The percentage of students scoring at or above proficiency is consistently and markedly lower for less-advantaged students in every subject area. As evident below in the figure, proficiency levels for less-advantaged students are generally less than half the level of more-advantaged students. 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 2015 NAEP Results by Free- and Reduced-Lunch Eligibility

(percent of students scoring at or above proficient)

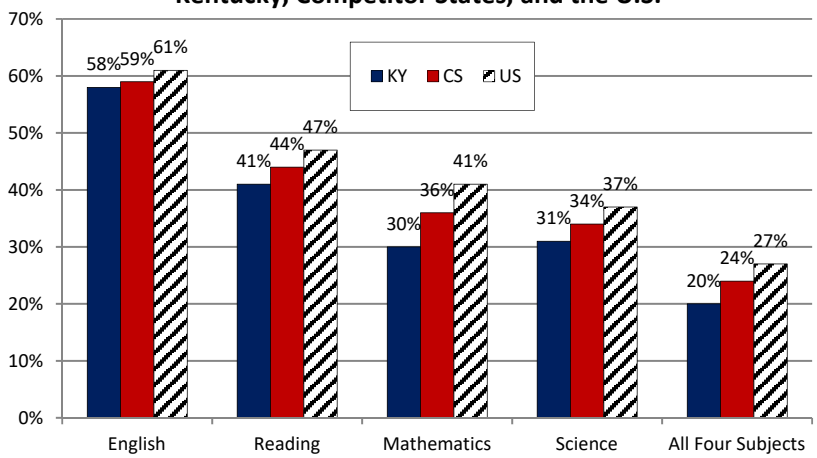


Source: National Center for Education Statistics

COLLEGE READINESS

An estimated 20 percent of Kentucky's recent high school graduates are considered "college ready" in all four of the tested subjects—English, reading, mathematics, and science—the same percentage as last year. The percentage of students nationally and in the competitor states who are "college ready" in all four subjects is higher than it is in Kentucky, 27 and 24 percent respectively (these percentages are up from 2016 when they were 26 and 23 percent). It should be noted that one reason for Kentucky's lower percentage is that since 2009 state law mandates that every 11th grader take the ACT—even those who have no interest or intention of going to college. In contrast, 79 percent of the graduating class in the competitor states and 60 percent nationally took the ACT in 2017. At 56 percent, Massachusetts and New Hampshire have the highest percentages of students "college ready" in all four subjects, but only 29 percent of Massachusetts students and 18 percent of New Hampshire students took the ACT in 2017.

Percent of 2017 ACT-Tested High School Graduates Meeting College Readiness Benchmarks by Subject, Kentucky, Competitor States, and the U.S.

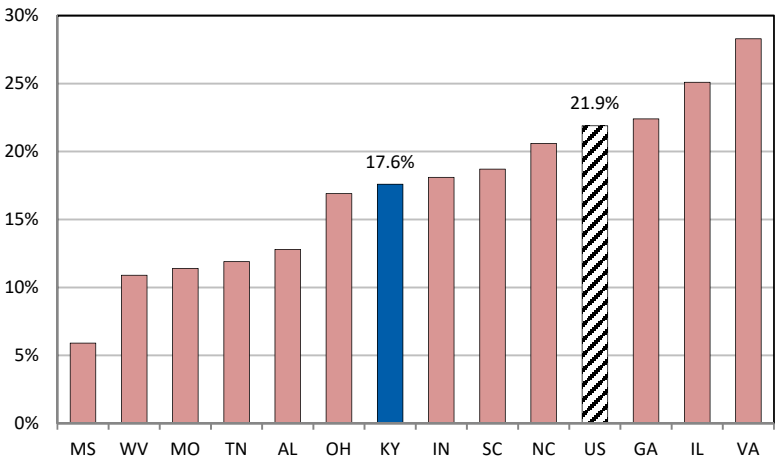


Source: The Condition of College & Career Readiness, 2017, various state reports, ACT, Inc.

ADVANCED PLACEMENT EXAM MASTERY

In order to pass an Advanced Placement (AP) examination, a high school student must demonstrate mastery of college-level material. Indeed, many colleges and universities award college credit for students showing AP mastery (scoring 3+ on an exam). The National Conference of State Legislatures reports that 28 to 40 percent of first-time undergraduates take at least one remedial course. These high percentages highlight the importance of high school students being challenged academically so they are better prepared in college. The College Board, which administers the advanced placement program, offers 35 different AP exams each spring on subjects ranging from Art History to Calculus to Macroeconomics. In 2016, there were 1.1 million U.S. public high school graduates who had taken an AP exam at some point, with 21.9 percent scoring a 3 or higher. This is a substantial increase from the 14.3 percent in 2006. Kentucky's students have also increased their performance on AP exams over the years, from 8.6 percent in 2006 to 17.6 percent in 2016—the tenth highest increase of all the states during this ten year period. Massachusetts had the highest percentage of students in the class of 2016 scoring a 3 or higher on an AP exam during high school—31 percent. Mississippi, at 5.9 percent, was the lowest.

High School Students Scoring 3+ on AP Exams, Kentucky, Competitor States, and the U.S., 2016
(percent of graduating students)

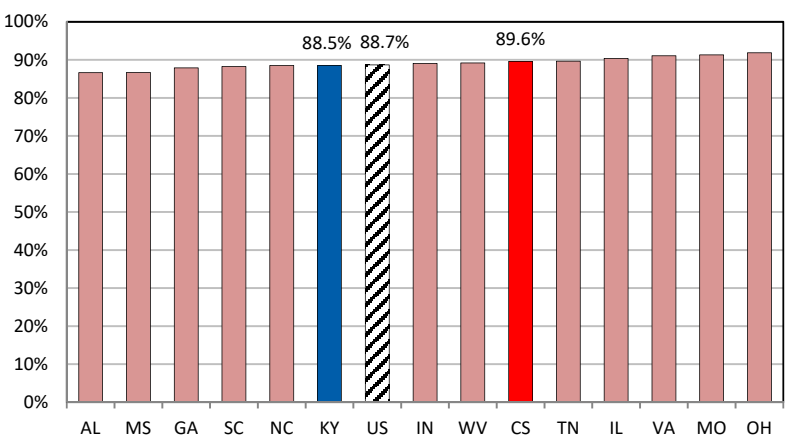


Source: College Board, AP Report to the Nation, various years, and the AP Cohort Data, Graduating Class, 2016

High School Attainment

Kentucky's labor force increasingly competes in a global environment that demands rising levels of educational attainment. At a minimum, today's workers need a high school diploma. Following the education reforms of the early 1990s, Kentucky's adult population (25 and older) made significant gains, as the portion with a high school diploma or higher rose from 65 percent in 1990 to 85.5 percent in 2016. At the same time, the nation improved to 87.4 percent, which is a statistically significant difference from Kentucky's 85.5 percent. Looking just at those individuals 25 to 54—the prime working age group—Kentucky's 88.5 percent is statistically the same as the U.S. average of 88.7 percent, but trails the competitor state average of 89.6 percent—a statistically significant difference. Among the competitor states, Alabama and Mississippi have statistically significantly lower rates, while the five highest states are statistically significantly higher; Georgia, Indiana, North Carolina, South Carolina, and West Virginia are statistically the same as Kentucky. Among all states, 31 are higher, 8 are lower, and 10 are statically the same as Kentucky. California has the lowest high school graduation rate (83.6%) and Hawaii has the highest (95.2%).

High School Graduate or Higher,
Kentucky, Competitor States and the U.S., 2016
(percent of individuals 25 to 54 years old)

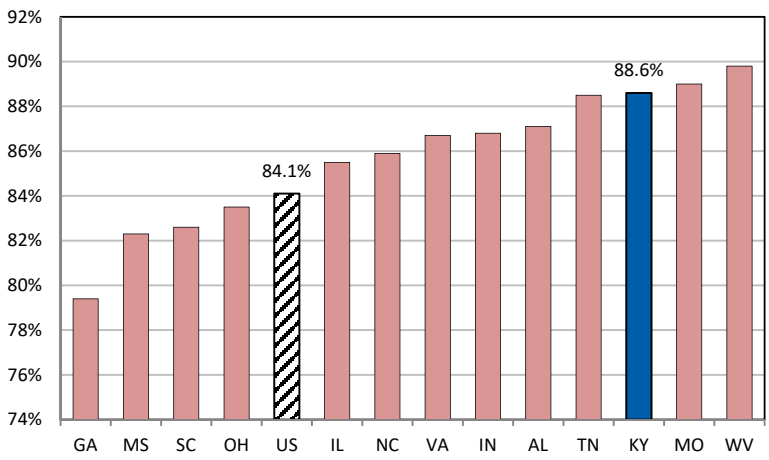


Source: 2016 American Community Survey 1-Year Estimate
Note: CS is the weighted average of the competitor states.

HIGH SCHOOL GRADUATION RATE

High-school graduation rates hit a new high of 84.1 percent in the U.S. in the 2015-16 academic year, according to the Department of Education, continuing a six-year trend of gains in a basic and fundamental credential for gaining employment and access to higher education and training. There are important economic consequences of dropping out of high school—for the individual, of course, but also for the wider community. The U.S. Department of Education data shown in the figure below are the latest data for the competitor states and Kentucky, which are for the 2015-2016 school year. As one can see by the figure, Kentucky is well positioned among the competitor states with a nearly 89 percent adjusted cohort graduation rate (ACGR). At 91.3 percent, Iowa has the highest ACGR in the country while New Mexico has the lowest at 71 percent.

Graduation Rate, 2015-2016 School Year, Kentucky, Competitor States, and the U.S.
(four-year regulatory adjusted cohort graduation rate)

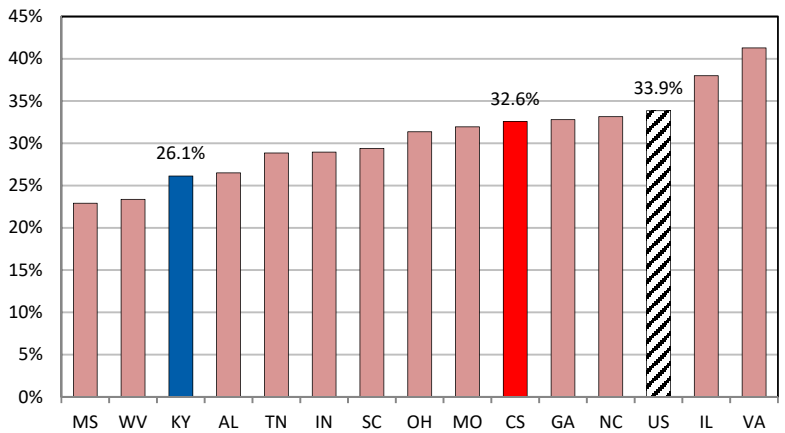


Source: U.S. Department of Education

COLLEGE ATTAINMENT

Kentucky workers face growing competition for low-wage, low-skill jobs, and increasingly for high-skill jobs. Today, any "routine" job and a growing number of high-skill jobs can be automated and outsourced. Competition in such an environment requires providing something that others cannot. That "something" will come from workers who have high levels of education and skill. Essentially, the rigors of the global economy require creative, highly-skilled, college-educated workers. Since 1990, Kentucky has made important progress, as the proportion of adults 25 and older with a four-year degree or higher climbed from 13.6 percent to 23.4 percent in 2016; by comparison, the U.S. percentage in 2015 was 31.3. Among prime working age adults 25 to 54, however, the state continues to significantly lag the competitor states and the nation in educational attainment at the college level—26.1 percent for Kentucky compared to 32.6 and 33.9 percent for the competitor states and U.S. respectively. Virtually all of the competitor states are statistically significantly higher than Kentucky. Alabama is statistically no different from Kentucky, but Mississippi and West Virginia are significantly lower. Massachusetts has the highest rate in the U.S. (47.6%) and West Virginia the lowest (22.8%). Nationally 39 states have statistically significantly higher rates than Kentucky while 5 are lower (5 states are statistically the same as Kentucky).

Bachelor's Degree or Higher,
Kentucky, Competitor States and the U.S., 2016
(percent of individuals 25 to 54 years old)

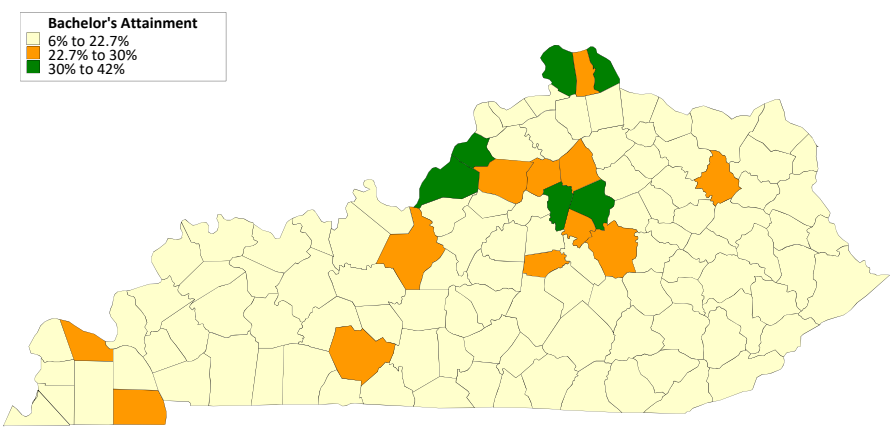


Source: 2016 American Community Survey 1-Year Estimates
Note: CS is the weighted average of the competitor states.

COLLEGE ATTAINMENT BY COUNTY

There are six Kentucky counties where the percentage of the population with a bachelor's degree or higher (using the 2012-2016 five-year estimate) exceeds the U.S. average of 30.3 percent. These five counties anchor the so-called urban triangle—Fayette (41.5%), Oldham (39.8%), Woodford (31.9%), Jefferson (31.8%), Boone (31.1%), and Campbell (30.6%). There are twelve counties that are above the Kentucky average of 22.7 percent but below the U.S. average—ranging from McCracken County's 22.9 percent to Madison County's at 29.2 percent. Kentucky's remaining 102 counties are below the Kentucky average, with several in the single digits. It is extremely difficult for any geographic region—whether a city, a county, a state, or a country—to be globally competitive without a skilled and educated population.

Bachelor's Degree or Higher, 2012-2016

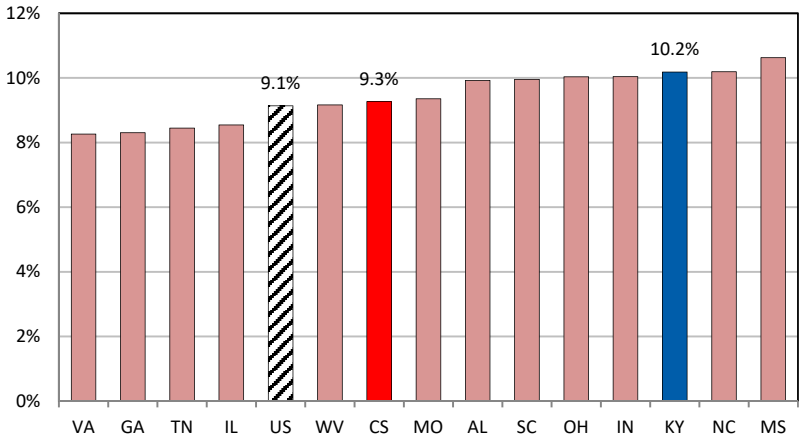


Source: U.S. Census Bureau, 2016 5-Year American Community Survey

ASSOCIATE'S DEGREES

The associate's degree is a terminal degree for many people, while others use it as a springboard toward a bachelor's degree. Our analysis done in 2015 on the economic and societal benefits of postsecondary education shows that an individual with an associate's degree or a bachelor's degree will, on average, have higher income, less unemployment, and better health outcomes—to name a few of the benefits afforded by higher education—than someone with lower levels of education. The percentage of prime working age adults between 25 and 54 years old in Kentucky with an associate's degree is 10.2 percent. Among the competitor states, several are statistically significantly lower (i.e., GA, IL, TN & VA) while the rest of the competitor states are statistically no different from Kentucky. Also, the weighted average of the competitor states (9.3%), and the U.S. (9.1%) are not statistically different from Kentucky. Nationally 8 states are higher, 20 are lower, and 21 are statistically the same as Kentucky. Maryland is the lowest at 6.7 percent and North Dakota is the highest at 15.8 percent.

Associate's Degree Attainment,
Kentucky, Competitor States and the U.S., 2016
(percent of individuals 25 to 54 years old)



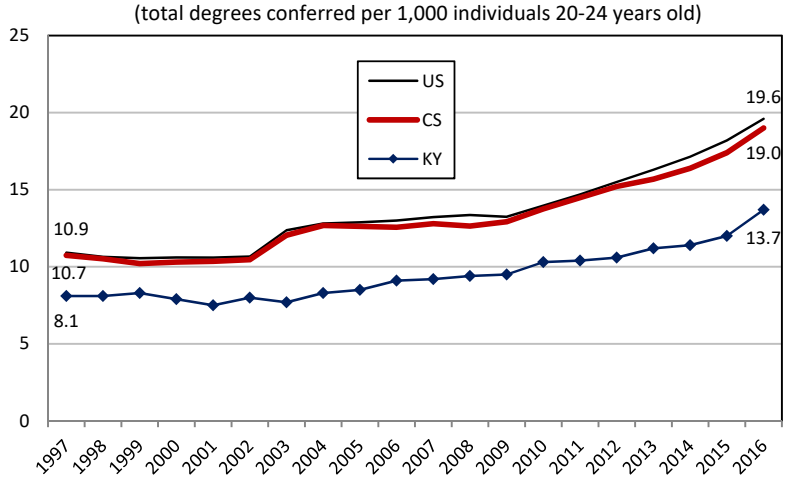
Source: 2016 American Community Survey 1-Year Estimates
Note: CS is the weighted average of the competitor states.

SCIENCE AND ENGINEERING GRADUATES

Being competitive in the global economy depends upon many things—including continuous innovation in products and services and having a highly skilled workforce. It is especially important to have a workforce with a high level of science, technology, engineering, and mathematics (STEM) training and expertise. According to a January 2017 report from the U.S. Bureau of Labor Statistics, *STEM Occupations: Past, Present, and Future*, the national average annual wage for all STEM occupations is $87,570, compared to $45,700 for non-STEM occupations. And not only are wages nearly double for STEM occupations compared to non-STEM occupations, so too is the job growth rate. Employment in STEM occupations grew by 10.5 percent nationally, or 817,260 jobs, between May 2009 and May 2015, compared with 5.2 percent net growth in non-STEM occupations. While remaining substantially below the competitor states and the U.S., the total number of science and engineering degrees conferred per 1,000 individuals from 20 to 24 years old in Kentucky has increased since 1997—from 8.1 to 13.7. By comparison, the competitor states (19.0) and the U.S. (19.6) awarded significantly more STEM-designated bachelor's degrees in 2016. Over the last two decades, the percentage increase in these numbers is greater in the U.S. (79%) and the competitor states (77%) than in Kentucky (68%).

STEM-Designated Bachelor's Degrees Awarded, Kentucky, Competitor States, and the U.S., 1997-2016

(total degrees conferred per 1,000 individuals 20-24 years old)

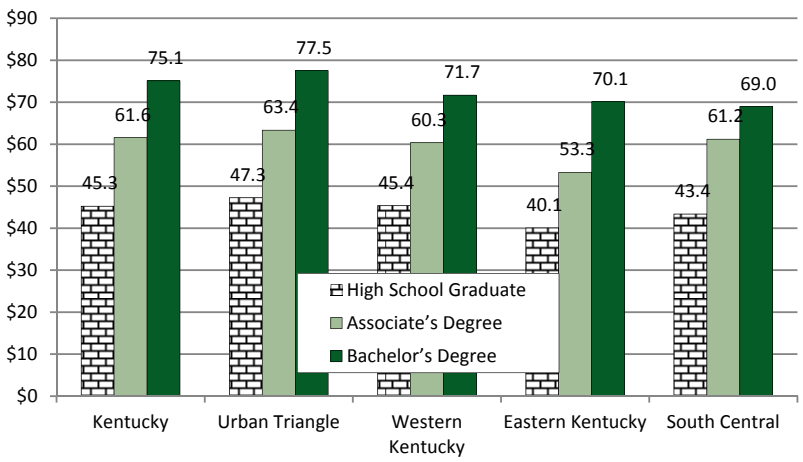


Source: Author's analysis of Integrated Postsecondary Education Data System (IPEDS) data using 2013 designated CIP Codes to identify STEM degrees & U.S. Census data for population estimates

FAMILY INCOME BY EDUCATION

Economists and other researchers have long demonstrated the relationship between education and earnings. Many Kentuckians worry that higher education only pays off if they leave home and move to the metropolitan areas of the state. The figure below examines how family income is affected by the education level of the head of the household in four different regions of the state: the Urban Triangle, Western Kentucky, Eastern Kentucky, and South Central Kentucky. Using data from the American Community Survey (ACS) for the years 2009-2013, statistical methods were implemented to isolate the impact of education on earnings from the many other known factors such as age and gender which affect earnings as well. A family where the head of the household has an Associate's degree has 29% higher total income than a family where the householder is a high school graduate; this trend is present in all four regions of Kentucky. Even more striking, earning a Bachelor's degree leads to a 56% higher family income than the family headed by a high school graduate. The biggest impact on average family income can be seen in Eastern Kentucky, where income jumps from $40,100 to $70,100 per year when the head of household has a high school diploma and Bachelor's degree, respectively.

Estimated Average Annual Family Income by Education Level, Kentucky and its Regions
(thousands $)



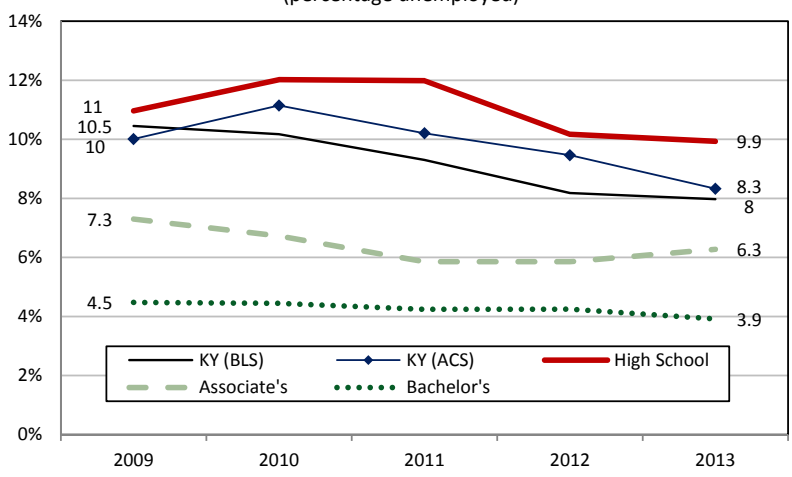
Source: Education Pays Everywhere!, CBER Issue Brief, October 2015

EMPLOYMENT BY EDUCATION

While it is well known that a positive relationship exists between educational attainment and earnings for those who are in the labor market, an important part of how education impacts the well-being of families in Kentucky is the access to employment that it provides. Looking at unemployment rates between 2009 and 2013 for the state of Kentucky, the graph below shows the variation of unemployment rates for the entire state and also by level of education. The official rates, reported by the Bureau of Labor Statistics (BLS), are computed at a monthly level. This is compared to the American Community Survey (ACS) data which is an annual estimate designed so that researchers can examine economic and demographic characteristics of the population at the national, state, and local levels. According to the ACS and BLS data, the approximate unemployment rate in 2013 was in the range of 8.0 to 8.3 percent. In this same year, the rate of unemployment was highest for individuals with a high school diploma (9.9%) and lowest for citizens with a Bachelor's degree (3.9%). Overall, one can conclude from the graph that those with a college degree face a much lower unemployment rate than those with only a high school diploma.

Kentucky Unemployment Rates by Education, 2009 to 2013

(percentage unemployed)

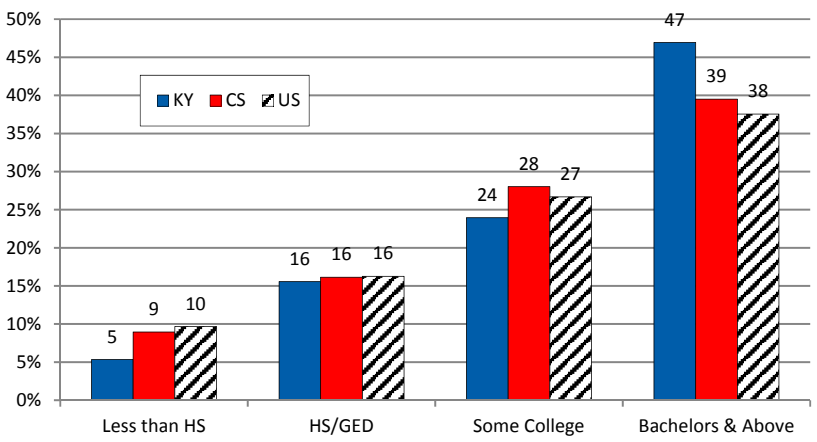


Source: Want a Job? Get a College Degree, CBER Issue Brief, October 2015

VOLUNTEER RATE BY EDUCATION

In the Community section of this report we present data on volunteer rates for Kentucky, its competitor states, and the U.S., and discuss some of the social and economic benefits that result from high levels of community service and volunteerism. In the figure below we present volunteer rates for Kentucky, its competitor states, and the U.S. for four broad education groups: individuals with less than a high school degree, individuals with a high school degree only, individuals with some college (including associates degrees), and individuals with at least a bachelor's degree. The percentages below reflect the net effect of education on volunteering while holding other factors constant, such as income, gender, race, urbanity, and age. Kentucky's volunteer rates shown in the figure are consistent with the U.S. and competitor states for all of the education categories. There is, in addition, a clear and consistent relationship between increasing education levels and higher rates of volunteerism. Individuals with a bachelor's degree volunteer at a significantly higher rate than those with less education. This is important given the social and economic benefits realized from volunteer activities.

Volunteer Rate by Education, 2015
Kentucky, Competitor States and the U.S.
(net effect of educational attainment, ages 25 and older, percentage)

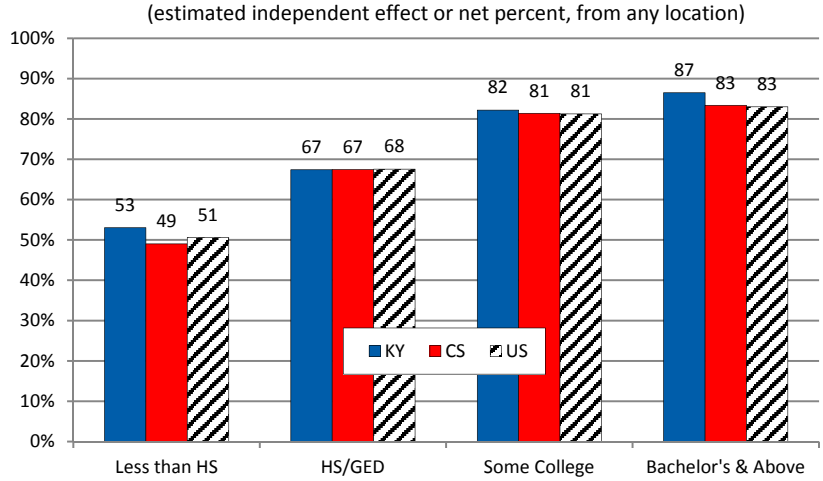


Source: Author's analysis of September 2015 Current Population Survey (CPS) Volunteer Supplement data

TECHNOLOGY USE BY EDUCATION

Research shows that because the Internet 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 the Information Age. Studies suggest that "Internet use increases employment and income, enhances consumer welfare, and promotes civic engagement," (NTIA, 2013), and that enhancing the nation's broadband infrastructure can improve innovation, entrepreneurship, and productivity. The importance of high-speed Internet access promises to become even more important in the future as online education becomes more firmly rooted. Recent analysis conducted by CBER shows that the independent effect of education (holding income, gender, age, race, and urbanity constant) is strong. For example, individuals in Kentucky with a Bachelor's degree or higher have a much higher probability of accessing the Internet (87%), ranging from locations such as home, work, school, library, cafe, a friend's house or some other place, than someone with a high school diploma (67%). This relationship is consistent across all levels of education and all geographic regions shown.

Individuals who Access the Internet by Education, Kentucky, Competitor States, and the U.S., 2015
(estimated independent effect or net percent, from any location)



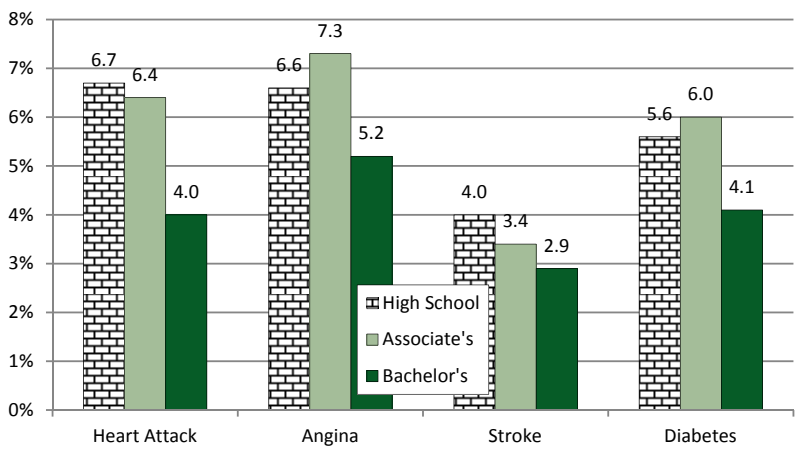
Source: Estimated by the author using CPS July 2015 Computer and Internet Supplement data

HEALTH BY EDUCATION

Higher levels of education are generally associated with healthier behaviors and lower rates of chronic diseases. We analyzed data from the Behavioral Risk Factor Surveillance System (BRFSS) to explore these relationships. These data represent a comprehensive sample of Kentuckians and provide information on the prevalence of these conditions. Our models control for other factors, such as race, gender, age, and employment, and estimate differences in diagnosis rates for four important chronic diseases or symptoms: heart attack, angina, stroke, and diabetes. For each of these four diseases or symptoms, the rates are lower among those with college degrees. Individuals with a college degree reduce their rates of heart attack by 40%, angina by 20%, stroke by 28%, and diabetes by 27% compared to those with a high school diploma. Our models indicate that if Kentucky could increase the rates of Associate's and Bachelor's degrees each by only 1 percentage point, we would reduce rates of heart attack and stroke by 0.3 percentage points, and diabetes by 0.1 percentage points. This could result in a cost savings of over $6 million annually. By achieving education attainment rates comparable to the rest of the U.S., Kentuckians could save nearly $200 million annually in health care related costs. The results are clear: higher levels of education lead to better health outcomes.

Estimated Prevalence of Chronic Diseases or Symptoms by Educational Attainment, Kentucky, 2009-2012

(net effect of education after controlling for other factors)



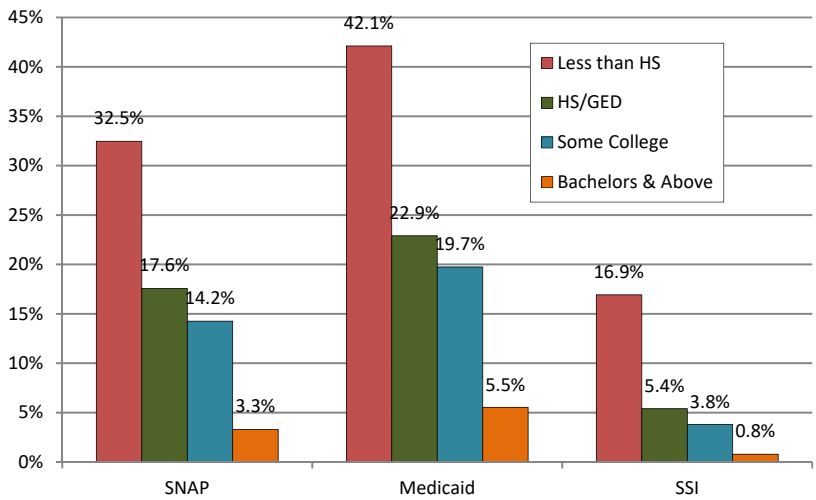
Source: Education for Your Health!, CBER Issue Brief, October 2015

PUBLIC ASSISTANCE BY EDUCATION

In Kentucky, the percentage of *high school graduates* who are the head of a household and at least 25 years old receiving SNAP benefits (the Supplemental Nutrition Assistance Program previously known as Food Stamps), Medicaid health benefits, Supplemental Security Income (SSI), or public assistance income is four times higher than those with a *bachelor's degree or higher*. For example, as illustrated below, the percentage of Kentucky high school graduates (household head and 25 or older) participating in SNAP is 17.6 percent compared to 3.3 percent for those with a 4-year college degree. Importantly, this relationship—higher levels of educational attainment associated with lower levels of public assistance program participation—holds across a range of public assistance programs including, of course, those shown in the chart but not limited to these three programs. Research done, for example, by the College Board and RAND shows a robust relationship across several public assistance programs, such as the National School Lunch Program, Unemployment Insurance, and various housing programs. Our research estimates show that the SNAP, SSI, and Medicaid participation rates all decline as education levels increase (while holding other factors constant). In short, investing in education reduces the need and usage of public assistance programs.

Public Assistance by Education Level, Kentucky, 2016

(head of households, 25 or older, percent receiving assistance)

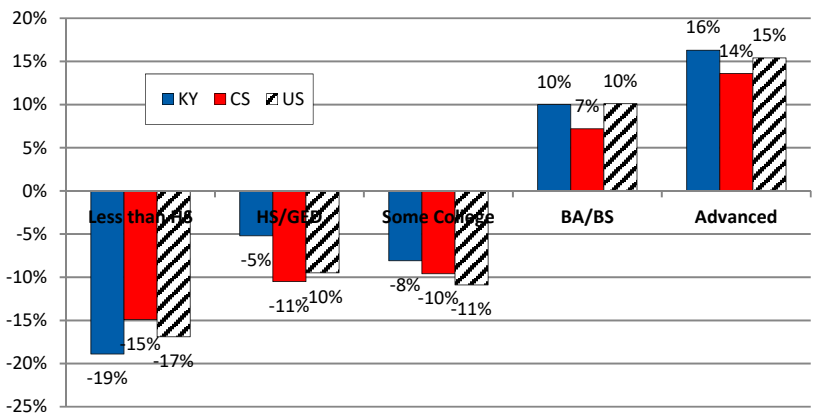


Source: Author's analysis of PUMS, 2016 sample

WAGES AND EDUCATION

Those with higher levels of education have realized wage gains since the 1970s, while those with only a high school credential, or less, have experienced large declines in hourly wages. These data include hourly earnings for workers paid by the hour (*excluding* overtime, tips, commissions, and bonuses), as well as the usual hourly earnings for nonhourly workers (*including* overtime, tips, commissions, and bonuses). The labor market in the U.S. has changed significantly over the last two and a half decades. Real hourly wages (inflation removed) for Kentuckians with only a high school credential declined by 5 percent from the late 1970s to the present. At the same time, the wages of those individuals with a Bachelor's degree increased by 10 percent. As is evident by the chart, the same pattern has played out in the competitor states and across the U.S. The lesson here is clear: to get ahead financially in today's labor market, it is essential to have higher levels of education.

Cumulative Change in Median Real Hourly Wages, 1979-1981 to 2014-2016, by Educational Attainment, Kentucky, Competitor States and the U.S.



Source: Author's analysis of CPS Outgoing Rotation Group (ORG) data using files created by the Center for Economic Policy Research (CEPR), available at http://ceprdata.org/cps-uniform-data-extracts/cps-outgoing-rotation-group/.


ENERGY

Energy

THE IMPLICATIONS OF A SHIFTING ENERGY LANDSCAPE will be felt now and in the future as the Kentucky economy and labor markets are compelled to adapt and react. For example, Toyota, which employs approximately 8,000 in Scott County, is encouraging its manufacturing plants to use increasing amounts of renewable and hydrogen energy as it pursues *Environmental Challenge 2050*, its corporate-level plan of zero CO_2 emissions. Toyota is not alone. Some of the largest corporate employers in Kentucky—GE, UPS, Ford, and Walmart—have environmental and energy plans to reduce greenhouse gases and use more renewable energy. Business is embracing "green," and the role that coal will play in the future is expected to diminish. According to the U.S. Energy Information Administration (EIA) *Annual Energy Outlook 2017*, coal's contribution is about double that of nonhydroelectric renewable energy, but in the base or reference case, the EIA expects U.S. energy production to be "led by growth in natural gas and renewables." The EIA projects that by 2040 nonhydroelectric renewable energy and coal will be making more or less *equal* contributions to the total U.S. energy production. There are important future economic implications

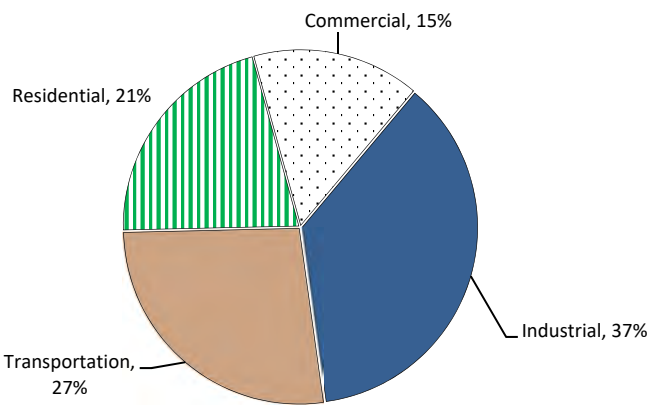
As coal wanes, natural gas waxes.

for Kentucky as a result of this anticipated shift in energy production. As noted in the U.S. Department of Energy, *United States Energy and Employment Report* (USEER), "rising employment in solar, wind, and natural gas coincides with the shift in energy generation by source, especially given recent large-scale distributed and utility-scale solar capacity additions." The changing economics of the coal industry have been widely publicized. Cheaper sources of energy, like natural gas, more stringent air-quality regulations, and weaker-than-expected demand for coal in Asia are leading to decreases in the amount of coal produced in Kentucky. Statewide coal production declined in 2016 to 43 million tons, a 30 percent decrease from 2015; this marks the lowest level of recorded annual production since 1954. As coal plays a lesser role in providing energy, its overall impact on the economy will also be diminished. And while we are acutely aware of the coal mining job losses, the state's manufacturing sector—which employs nearly 250,000—could also be affected, as Kentucky's competitive advantage of lower industrial electricity costs is dampened as coal declines.

ENERGY CONSUMPTION BY END-USE SECTOR

Energy consumption is categorized into four broad sectors: industrial, commercial, residential, and transportation. Industry consumes the bulk of energy in Kentucky, accounting for 37 percent of the total consumption (2015). As noted in the Kentucky Department for Energy Development and Independence, *2015 Energy Profile*, our state has large manufacturing operations like General Electric, Ford, and Toyota, as well as other "energy-intensive manufacturing processes including; aluminum smelting, iron and steel mills, paper mills, chemical production, and glass manufacturing." By comparison, industrial consumption by the competitor states and the U.S. as a percentage of total energy consumption is 30 and 32 percent, respectively. The transportation sector in Kentucky is the second largest consumer of energy, accounting for 27 percent, compared to 27 and 28 percent in the competitor states and the U.S. The residential sector in Kentucky, the competitor states, and the U.S., consumes 21, 23, and 21 percent. And while the commercial sector in Kentucky accounts for only 15 percent, it represents 19 percent of total energy consumption for the competitor states and the U.S. Broadly speaking these distributions suggest that public policies affecting energy usage will be disproportionately felt in Kentucky by industrial users.

Kentucky Energy Consumption by End-Use Sector, 2015

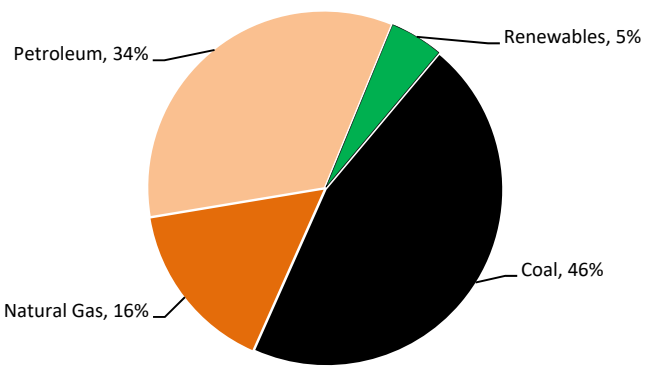


Source: U.S. Energy Information Administration, State Energy Data System

ENERGY CONSUMPTION BY SOURCE

Of the four broad energy sources used in Kentucky—coal, natural gas, petroleum, and renewables—coal accounts for almost half of the total consumption, 45.5 percent (2015). In 2011, this percentage was over half at 52 percent. While the chart below represents energy consumption for all uses, Kentucky relies heavily on coal for electricity generation. According to the Kentucky Department for Energy Development and Independence, *2015 Energy Profile*, "Of the electricity generated in Kentucky in 2014, 92 percent was derived through the combustion of coal." This is expected to change, however, given the many factors affecting coal usage, such as federal environmental regulations, aging coal generators, and low natural gas prices. The upshot is that Kentucky will become increasingly dependent upon natural gas for future electricity generation. By comparison, coal consumption by the competitor states and the U.S. as a percentage of total energy consumption is 23 and 16 percent, respectively, and is declining. Natural gas is about 16 percent in Kentucky (and rising), but much higher as well as rising in the U.S. (29%) and the competitor states (25%). The competitor states and the U.S.—as well as Kentucky—are moving away from coal and toward natural gas.

Kentucky Energy Consumption by Source, 2015
(consumption by fuel type)

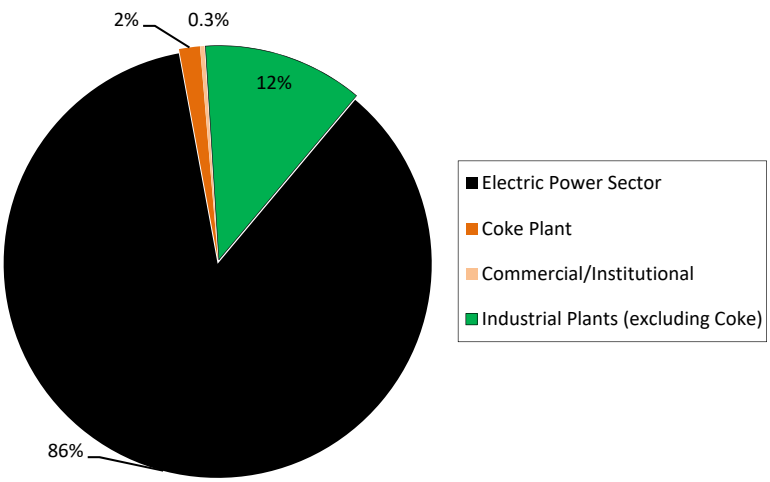


Source: U.S. Energy Information Administration, State Energy Data 2015, Consumption

KENTUCKY COAL DISTRIBUTION

The vast majority of Kentucky coal is used to generate electricity. Of the 41.4 million tons of Kentucky coal produced in 2016, roughly 40 million tons was distributed domestically among the four categories shown below: electric power sector; coke plant; commercial & institutional; and industrial plants (excluding coke). A small amount of Kentucky coal is exported out of the country—roughly 1.4 million tons—and the rest is thought to be stockpiled. Of the Kentucky produced coal that was consumed domestically in 2016, it is estimated that 86 percent went toward electric power generation. However, for a variety of reasons, electrical power plants are moving away from coal and toward natural gas as a fuel source (see the next page), and this has been a major factor in the decline of Kentucky's coal industry.

Kentucky Coal Distribution, 2016
(domestic consumption by end-user type)

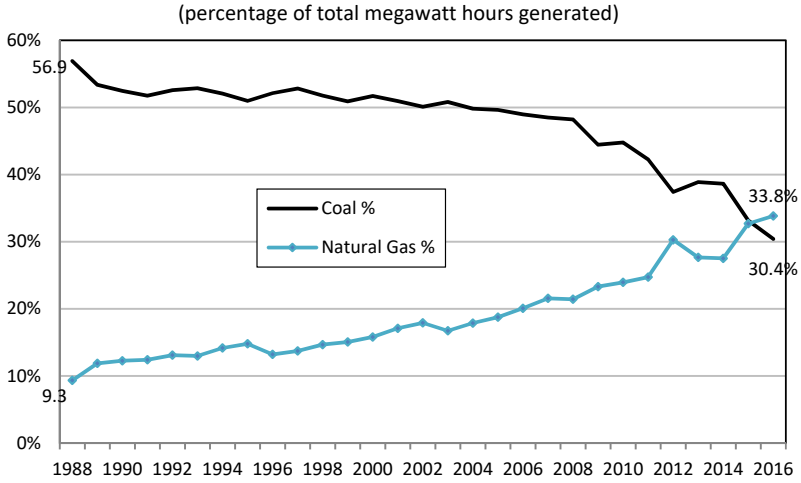


Source: U.S. Energy Information Administration, Annual Coal Distribution Report 2016

NATURAL GAS SUPPLANTING COAL

The use of natural gas to produce electricity—and the concomitant decline in the use of coal—has been going on for about 20 years. In 1988 coal accounted for about 57 percent of the total megawatt hours generated and natural gas accounted for just over 9 percent. This was the high point for coal and the low point for natural gas when viewed over the 66 year period from 1949 to 2016. Since 1988, coal has been declining and natural gas has been increasing, as is readily evident by the line chart below. This is a watershed moment for coal. Natural gas has supplanted coal as the principal source of fuel for generating electricity in the United States—accounting for 33.8 percent; coal, by comparison, accounts for 30.4 percent. Nuclear is another major energy source of electricity in the U.S. at 19.7 percent. The fracking boom has made natural gas a more financially attractive source of fuel for generating electricity. Relatively cheap natural gas, the rising importance of renewable sources, which currently accounts for about 14.9 percent of total net electricity generation in the U.S., and the mounting environmental concerns surrounding coal-fired power plants, are making fundamental changes to the global energy market—which, of course, are being felt in Kentucky's coal regions.

U.S. Electricity Generation, by Source, Coal and Natural Gas, 1988-2016
(percentage of total megawatt hours generated)

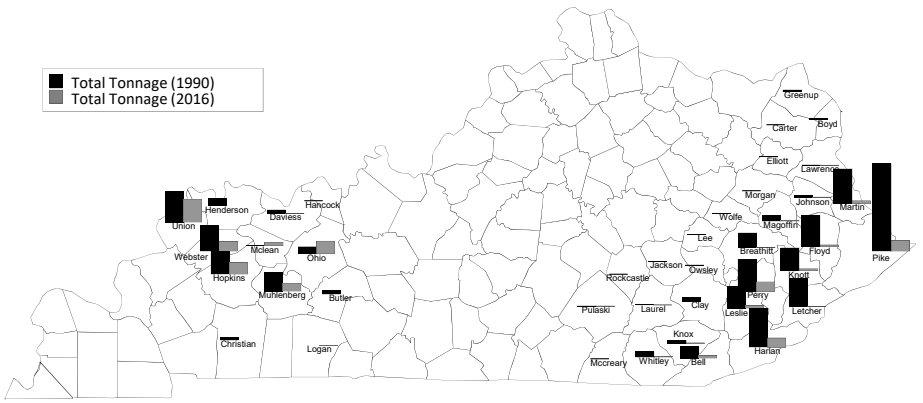


Source: Energy Information Adminstration, State Energy Data System

COAL PRODUCTION

The changing economics of the coal industry have been widely publicized. Cheaper sources of energy, like natural gas and renewables, more stringent air-quality regulations, and weaker-than-expected demand for coal in Asia are leading to decreases in the amount of coal produced in Kentucky. Statewide coal production declined in 2016 to 43 million tons, a 30 percent decrease from 2015; this marks the lowest level of recorded annual production since 1954. The high point of coal production in the state was in 1990 when 179 million tons was mined in 40 Eastern and Western Kentucky counties. Coal production has been declining since that time, evidenced by the 2016 production total as well as the lower number of counties (25) reporting some level of production. The map below shows the 1990 and 2016 production levels, with every county except three—Logan, McLean, and Ohio—experiencing a decline over that 26-year period. As is evident by the map, the declines in the Eastern Kentucky counties have been much steeper than those experienced in Western Kentucky. The *decline* in coal production has temporarily halted in 2017 with coal production more or less unchanged in the first three quarters compared to the first three quarters of 2016—evidenced by a miniscule 0.5 percent drop in production.

Kentucky Coal Production, by County, 1990 & 2016



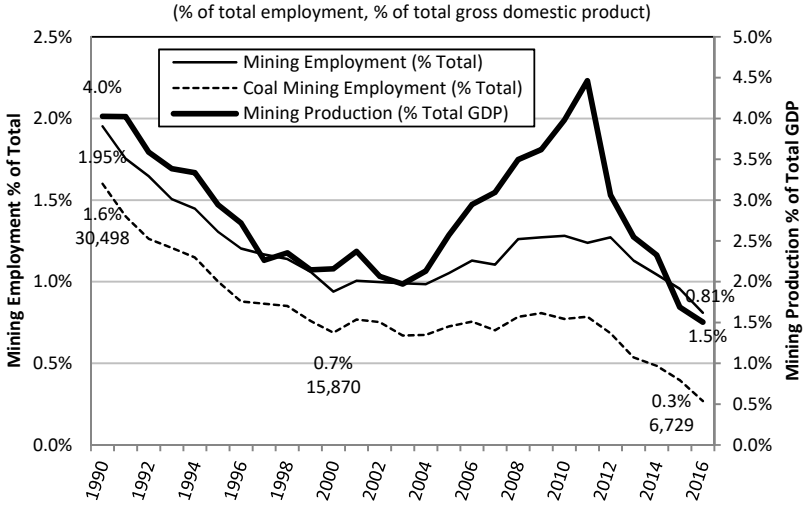
ource: Kentucky Coal Facts, 2nd Edition & 17th Edition, available at energy.ky.gov

MINING & COAL

As of September, 2017, an estimated 6,438 persons were employed at Kentucky coal mines—the lowest level recorded since 1898 when there were an average of 6,399 coal miners. While Kentucky mines a significant amount of coal in both Western and Eastern Kentucky, the bulk of the job losses have been in Eastern Kentucky. When viewed within the context of the state's wider economy, mining employment and coal mining employment are 0.81% and 0.3% of total employment, respectively. Similarly, mining production accounts for 1.5% of Kentucky's gross domestic product. While the effects of declining production and loss of jobs are small relative to the size of the state's overall economy, the communities where these jobs are concentrated have been hit extremely hard. According to the latest employment numbers from the Kentucky Energy and Environment Cabinet, in the third quarter of 2017 (July to September), coal mining employment was 3,896 in Eastern Kentucky and 2,542 in Western Kentucky. These employment numbers include all employees engaged in production, preparation, processing, development, maintenance, repair, shop or yard work at mining operations, mining operations management and all technical and engineering personnel (these numbers also include office workers).

Kentucky Mining Employment & Production, 1990-2016

(% of total employment, % of total gross domestic product)



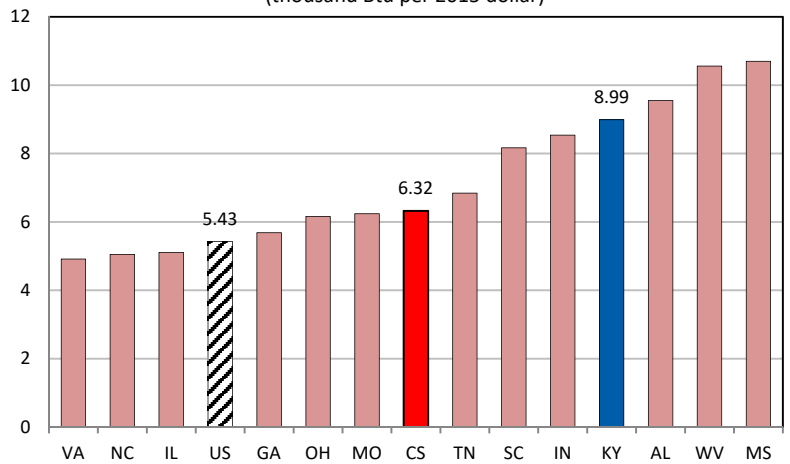
Source: Bureau of Economic Analysis & Energy Information Administration, Annual Coal Report, various years, and Kentucky Coal Facts, various years

ENERGY CONSUMPTION PER GDP

Kentucky has an energy intensive economy. To generate $1 in state gross domestic product, Kentucky consumes about 8,990 Btu (2015). By comparison, the U.S. average is around 5,430 Btu and the competitor state average is 6,320 Btu. This difference is driven, in part, by Kentucky's larger than average manufacturing sector, which, of course, depends greatly upon energy as a production input. One implication of this higher dependence on energy as an economic input is that, compared to most of the competitor states, Kentucky's economy is more sensitive to energy prices.

Energy Consumption per Real Dollar of GDP, 2015, Kentucky, Competitor States, and the U.S.

(thousand Btu per 2015 dollar)

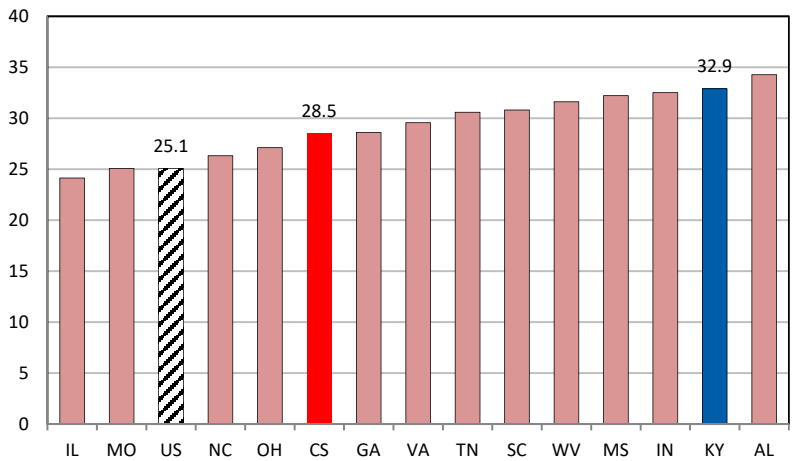


Source: Calculated using data from the U.S. Energy Information Administration and Bureau of Economic Analysis

ENERGY EFFICIENCY

This variable is an indicator of energy efficiency and conservation. It is the number of megawatt hours of electricity sold to all customers; it is inclusive of residential, commercial, industrial, and transportation sales and customers. It is not a perfect measure of energy efficiency, since it is affected by the industrial mix in a state. If we limited this to only residential sales and customers, then Kentucky's energy usage/efficiency improves somewhat when compared to the competitor states and the U.S. For example, while Kentucky has the second highest usage when including all sales and customers (see below, comparing competitor states only), it is the sixth highest when only examining *residential* usage/efficiency. Kentucky's megawatt usage per residential customer is 13.5 (in thousands of megawatt hours), which is below Tennessee (14.9), the highest competitor state; Illinois is the lowest competitor state using the residential measure (8.8). The residential only competitor state average is 12.4 while the U.S. average is 10.8—both lower than Kentucky's residential per customer usage. Part of the reason for Kentucky's higher-than-average per customer usage at the residential level is surely due to the state's relatively low electricity costs.

Megawatt Hours per Energy Customer, 2016, Kentucky, Competitor States, and the U.S.
(thousands of megawatt hours)



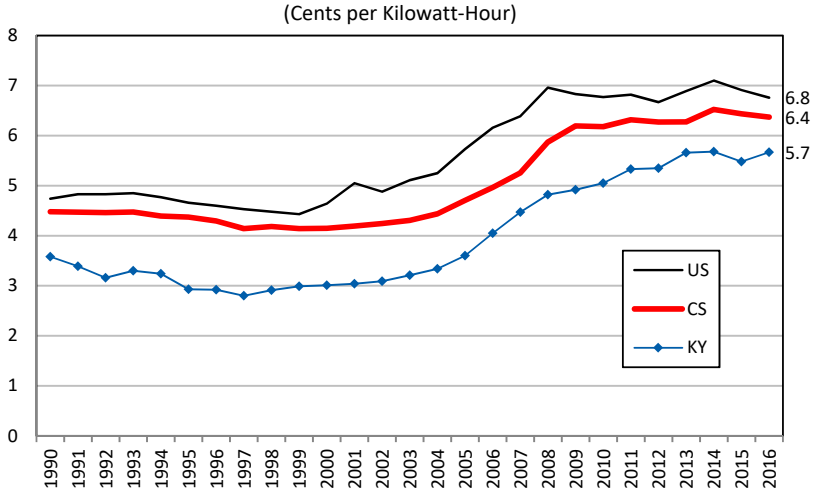
Source: Calculated using data from the U.S. Energy Information Administration

INDUSTRIAL ELECTRICITY COSTS

Frequently cited as an important factor to recruit new industries to Kentucky as well as keep existing industries competitive, electricity prices here are consistently below the U.S. and competitor state averages. Kentucky's industrial rates are lower because of an abundance of coal and coal-fired power plants in the state and region. However, the average retail price of electricity to industrial customers increased in Kentucky by 103 percent from its nadir of 2.8 cents in 1997 to 5.7 cents in 2016. As prices have increased so too have the worries that Kentucky is losing its comparative advantage in low-cost utility rates; price increases for the U.S. and competitor states during the same time period have been about 50-55 percent compared to Kentucky's 103 percent. Nonetheless, in 1990 Kentucky had the seventh lowest industrial rate in the country and in 2016 the sixth lowest—trailing only Louisiana, Montana, Oklahoma, Texas, and Washington. And among the competitor states Kentucky's industrial rates are the lowest. Kentucky's annual rate in 2015—at 5.7 cents per kilowatt-hour—was well below the U.S. (6.8) and competitor states (6.4).

Average Retail Price of Electricity, Industrial Customers, Kentucky, Competitor States, and the U.S., 1990-2016

(Cents per Kilowatt-Hour)

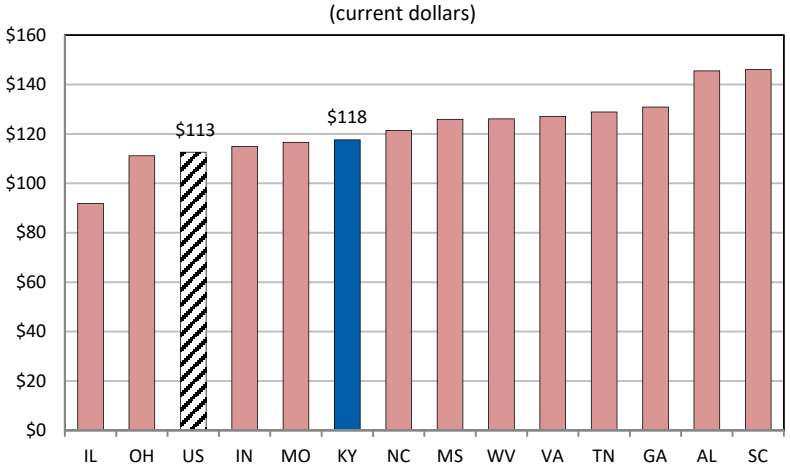


Source: U.S. Energy Information Administration

RESIDENTIAL ELECTRICITY COSTS

According to the U.S. Census Bureau, Consumer Expenditure Survey, the typical "consumer unit" had $57,311 in average annual expenditures in 2016—with annual electricity expenses of $1,444. In the South Region of the U.S.—where Kentucky and eight of the competitor states are located—average annual expenditures were $52,674 and annual electricity expenses were $1,696. Electricity costs range in these two examples from 2.5 to 3.2 percent of total expenditures. Using data from the U.S. Energy Information Administration, residential average monthly electricity bills, among the competitor states, ranged from a low of $92 in Illinois to a high of $146 in South Carolina. At $118, Kentucky's average monthly bill is virtually the same as the U.S. average. Like industrial customers of electricity, Kentucky's residential customers enjoy somewhat lower rates than most competitor states.

Residential Average Monthly Electricity Bill, 2016, Kentucky, Competitor States, and the U.S.
(current dollars)



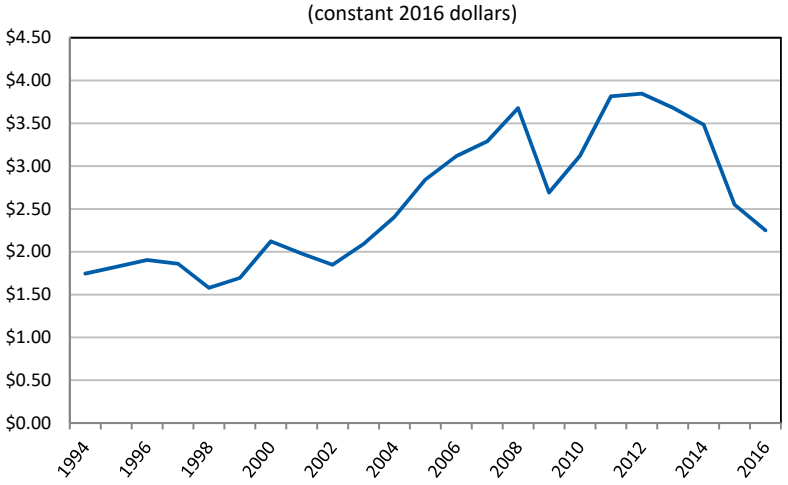
Source: U.S. Energy Information Administration

MOTOR GASOLINE EXPENDITURES

The typical American "consumer unit," what most would consider the average household, spent $57,311 on various products and services in 2016 according to the Consumer Expenditure Survey; "gasoline and motor oil" accounted for $1,909 of the total—about 3.3 percent of the total; this represents a decline from recent years when it was 5.1 percent in 2013, 4.6 percent in 2014, and 3.7 percent in 2015. In 2016, the average price for a gallon of gas in the U.S. was about the same as it was in 2003-2004 (in constant 2016 dollars).

U.S. All Grades, All Formulations, Retail Gasoline Prices, Dollars per Gallon, 1994-2016

(constant 2016 dollars)

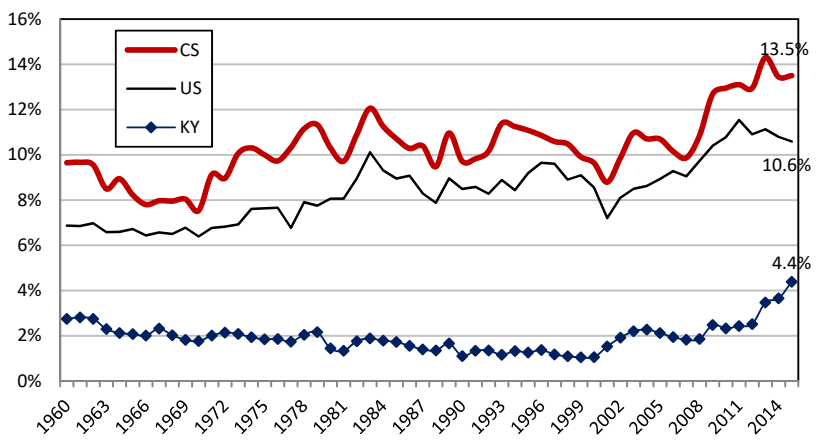


Source: Energy Information Adminstration, State Energy Data System

RENEWABLE ENERGY PRODUCTION

Renewable energy sources include biomass, geothermal, wind, solar, and hydropower. The U.S. Energy Information Administration (EIA) considers multiple scenarios given the uncertainties of estimating future energy production. Currently, according to the EIA *Annual Energy Outlook 2017*, coal's contribution is about double that of nonhydroelectric renewable energy, but in the base or reference case, the EIA expects U.S. energy production to be "led by growth in natural gas and renewables." The EIA projects that by 2040 nonhydroelectric renewable energy and coal will be making more or less *equal* contributions to the total U.S. energy production. There are important future economic implications for Kentucky as a result of this anticipated shift in energy production. As noted in the U.S. Department of Energy, *United States Energy and Employment Report* (USEER), "rising employment in solar, wind, and natural gas coincides with the shift in energy generation by source, especially given recent large-scale distributed and utility-scale solar capacity additions." Because Kentucky lags behind in renewable energy production, as evidenced in the chart below, it is likely that it also lags behind in employment levels for this growing industry. Of Kentucky's total energy production, only 4.4 percent is from renewable sources, compared to 10.6 and 13.5 percent, in the U.S. and competitor states respectively.

Renewable Energy Production,
Kentucky, Competitor States, and the U.S., 1960 to 2015
(expressed as a percentage of total energy production)



Source: U.S. Energy Information Administration, State Energy Data Production, State Energy Data System (SEDS), 1960-2015 estimates, https://www.eia.gov/state/seds/

ENVIRONMENT

Environment

PUBLIC POLICY DEBATES about the current and future status of Kentucky's coal industry illustrate the connections between the economy, the environment, and global energy markets—including the tensions between them. The Shaping Our Appalachian Region (SOAR) initiative to rejuvenate the Eastern Kentucky economy, in the wake of the precipitous decline of the coal industry, illustrates in its *Regional Blueprint for Economic Growth* how we are forced to reckon with, and ultimately reconcile, what *can be* competing policy objectives. The *Blueprint* calls for an increase in natural resource extraction *and* establishing the region as a tourism destination. Our economic development policies and practices can, and do, affect the quality of the air, water, land, and other environmental assets of the state. At the same time, a body of literature has emerged demonstrating how community amenities, such as a clean and beautiful environment, can be used as a tool for attracting and retaining entrepreneurs and innovators—who can also be job creators. Environmental regulations are important considerations for CEOs exploring sites for industrial expansion or relocation—but so are "quality of life" considerations, which might include a

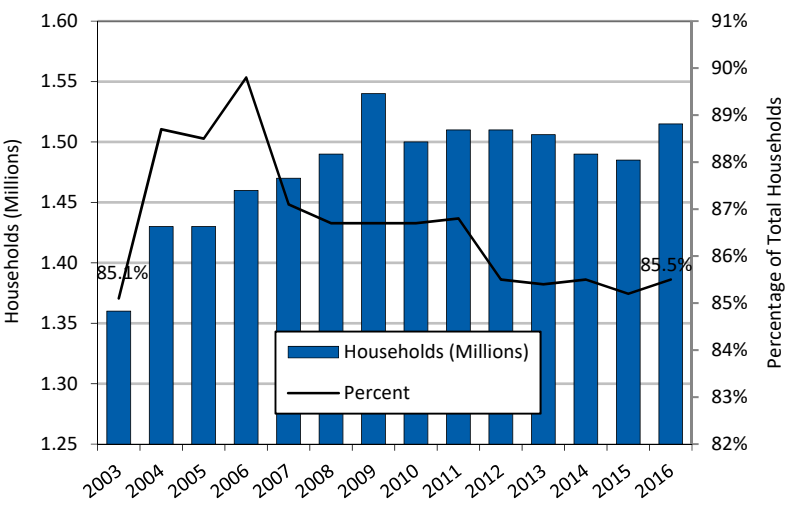
The typical Kentuckian is breathing cleaner air and drinking cleaner water than ever before.

clean environment. For example, choosing from a list of 28 different factors, ranging from labor costs to environmental regulations, the single most important factor for respondents to the latest *2016 Annual Survey of Corporate Executives and Consultants on Site Selection* was highway accessibility, evidenced by 94.4 percent ranking it as either "important" or "very important." By comparison, "environmental regulations" ranked 14th on the list at 70.8 percent while "quality of life" factors ranked 10th at 76.4 percent. At a time when the broad-based threats to the environment resulting from climate change appear to be gaining traction as an important public-policy issue around the globe, the typical Kentuckian is breathing cleaner air, drinking cleaner water, and being more responsible with solid waste than ever before. Our state still has areas that are currently designated nonattainment or marginal areas for all criteria pollutants by the U.S. Environmental Protection Agency (EPA), compares poorly to competitor states and the U.S. on the level of cancer-causing toxic releases, and is allowing a larger portion of out-of-state solid waste disposal to be dumped in our landfills, but many of the environmental quality trends are moving in a positive direction.

SOLID WASTE

Beginning in 2002, state law required waste haulers and recycling haulers to register and report to each county in which they provide service, thereby providing data on the number of households that participate in municipal solid waste collection (MSW). The 2016 statewide household participation rate for MSW collection was 85.5 percent. The Kentucky Division of Waste Management (DWM) estimates that another 5-10 percent of households either legally self-haul their waste to transfer stations or are otherwise not counted in these numbers because they use dumpsters in multi-unit housing complexes. Consequently, the real percentage of households participating in municipal solid waste collections is likely 90 to 95 percent according to the DWM. The remaining 5 to 10 percent of households are thought to illegally dump their waste.

Kentucky Households Participating in Muncipal Solid Waste (MSW) Collection, 2003-2016



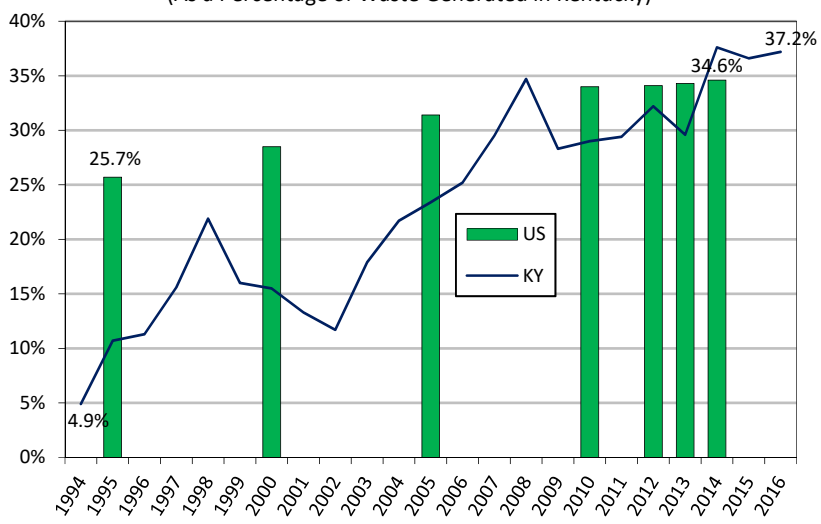
Source: Kentucky Division of Waste Management Annual Reports, various years

RECYCLING

According to the Kentucky Division of Waste Management, Kentuckians recycled 37.2 percent of common household recyclables in 2016 (e.g., aluminum, cardboard, steel, plastic, newspaper, glass, and paper). As one can see in the figure, the percentage of generated waste that is recycled has climbed steadily over the last two decades. And, according to the U.S. Environmental Protection Agency (EPA), Americans generated about 258 million tons of trash in 2014 and recycled (or composted) approximately 89 million tons of this material—resulting in a 34.6 percent recycling rate. Americans generate around of 4.40 pounds of individual waste per person each day and recycled or composted 1.5 pounds of it. Kentucky was slow to the recycling movement, but has gathered momentum supporting this initiative, now matching the U.S. average. Interestingly, the EPA states that "recycling and composting of MSW results in greenhouse gas (GHG) emissions reduction," with the 89 million tons of recycled and composted MSW providing "an annual reduction of over 181 million metric tons of carbon dioxide equivalent emissions, comparable to the annual emissions from over 38 million passenger cars."

Recycling Rates, Kentucky and the U.S., 1994-2016

(As a Percentage of Waste Generated in Kentucky)

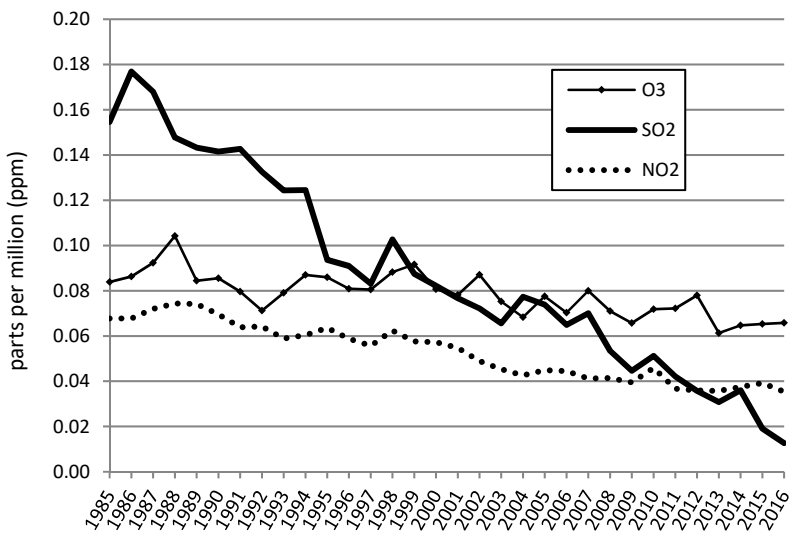


Source: Kentucky Division of Waste Management, Annual Report, Fiscal Year 2017

AIR QUALITY

The Kentucky Division for Air Quality reports that Kentuckians are breathing cleaner, healthier air. The Division points out that "this improvement is a direct result of reduced air pollution. For example, emissions of sulfur dioxide (SO_2) from Kentucky coal-fired power plants totaled 1.5 million tons in 1976. In 2015, those emissions had dropped to 131,696 tons – a remarkable 91 percent reduction." The Division notes that the "decrease is all the more dramatic considering Kentucky's population and economy have grown significantly during that same time period. New air pollution control technologies, improved vehicle fuel economy, and a growing emphasis on energy efficiency have all contributed to cleaner air." The pollutants shown in the figure below are Ozone (O_3), Sulfur Dioxide (SO_2), and Nitrogen Dioxide (NO_2). While individual pollutants oscillate from year to year, overall the trend shows a decline in pollution levels from 1984 to 2016. The pollutants are shown in terms of parts per million (ppm). Other important air pollutants, expressed in both parts per million and micrograms per cubic meter (µ/m3) are shown on the facing page. This graph shows generalized pollution trends through time. It does not show trends for specific sites nor does it demonstrate attainment for any particular area. While individual pollutants may spike in certain years, overall trends show declines in pollution levels.

Kentucky Air Quality Trends, 1985 to 2016
(O_3, SO_2, NO_2)



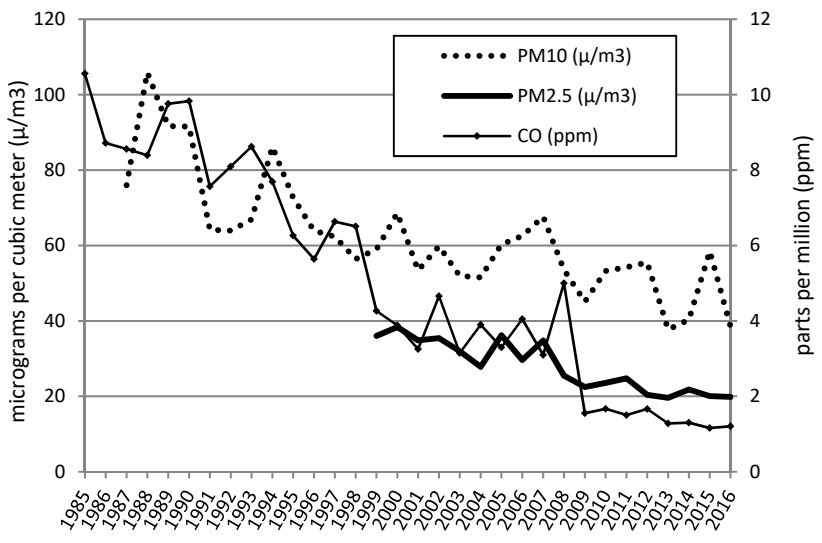
Source: Kentucky Energy and Environment Cabinet, Division for Air Quality

AIR QUALITY

As noted on the facing page, the Kentucky Division for Air Quality reports that Kentucky's air is getting cleaner. The pollutants shown in the figure below are Carbon Monoxide (CO), Particulate Matter (PM_{10}), Fine Particulate Matter ($PM_{2.5}$). And, just like with Ozone (O_3), Sulfur Dioxide (SO_2), and Nitrogen Dioxide (NO_2) shown on the previous page, the pollutants in the graph below have been declining gradually over the time period shown. This graph shows generalized pollution trends through time. It does not show trends for specific sites nor does it demonstrate attainment for any particular area. While individual pollutants may spike in certain years, overall trends show declines in pollution levels.

Kentucky Air Quality Trends, 1985 to 2016

($PM_{2.5}$, PM_{10}, CO)

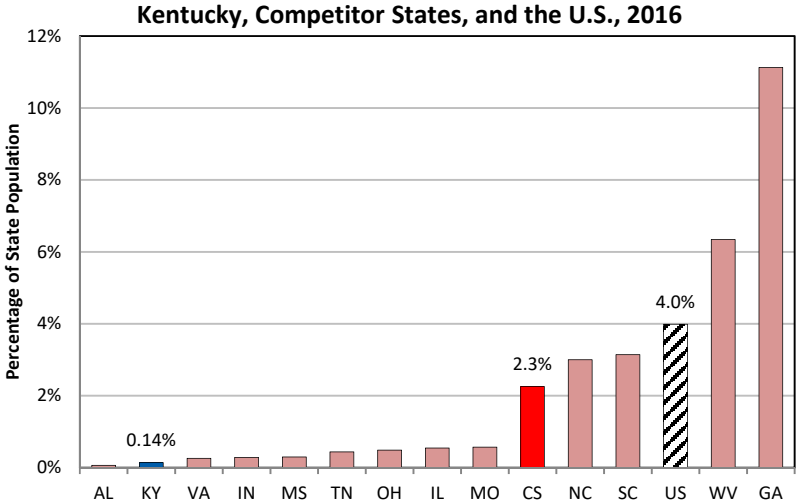


Source: Kentucky Energy and Environment Cabinet, Division for Air Quality

LEAD & COPPER RULE VIOLATIONS

The United States enjoys one of the safest and most reliable supplies of drinking water in the world. Clearly, the Safe Drinking Water Act of 1974 plays an important role in maintaining high standards for quality. While the water supply is generally violation-free, in 2016 there were over 75,000 violations of the Safe Drinking Water Act among community water systems that served around 72.4 million people, which represents about 22.4 percent of the U.S. population. Of these 75,000 violations, an estimated 7,094 were violations of the Lead and Copper Rule, affecting approximately 12.9 million people. Lead water pipes have been used for many years, but exposure to lead is extremely serious and can cause life-altering consequences, especially for children. A 2017 NBER Working Paper by Anna Aizer and Janet Currie, *Lead and Juvenile Delinquency: New Evidence from Linked Birth, School, and Juvenile Detention Records*, finds strong connections between childhood lead exposure and antisocial behavior, leading to increased school suspension rates as well as increased incarceration rates later in life. With three violations of the Lead and Copper Rule in 2016, Kentucky experienced a relatively small number, affecting an estimated 0.14 percent of the state population. The competitor state and U.S. averages were higher, at 2.3 and 4 percent, respectively.

Population Served by a Community Water System with a Safe Drinking Water Violation of the Lead & Copper Rule, Kentucky, Competitor States, and the U.S., 2016

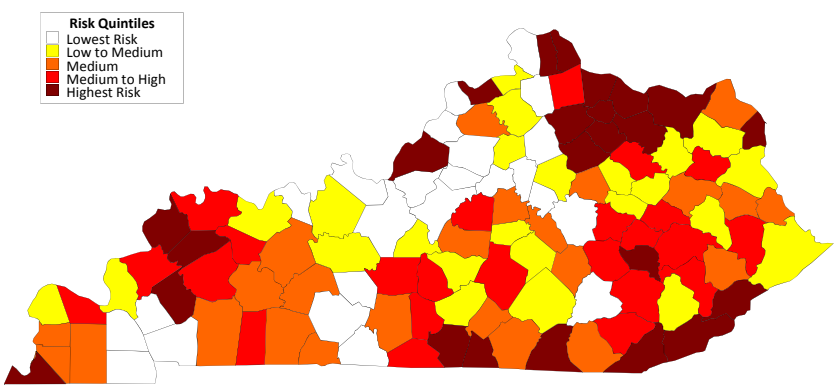


Source: Author's analysis of EPA SDWIS data.

Lead Risk

Lead poisoning has serious health consequences. According to the Mayo Clinic, "Exposure to even low levels of lead can cause damage over time, especially in children. The greatest risk is to brain development, where irreversible damage may occur. Higher levels can damage the kidneys and nervous system in both children and adults. Very high lead levels may cause seizures, unconsciousness and possibly death." Using a method developed by epidemiologists from the Washington State Department of Public Health, we produced a county-level map of Kentucky showing the *estimated* relative risk for lead exposure. This method, which has been widely embraced by environmental health experts associated with the Center for Disease Control and the American Public Health Association, uses two variables to assign relative risk: the age of the houses (which predicts the likelihood of lead paint) and poverty; the environmental health literature finds that kids are more likely to come into contact with lead in older houses and that living in conditions of poverty elevates the risk. Risk levels are not uniform within a county; that is, not everyone in Jefferson County will be at the highest level of risk. Likewise, not everyone in Warren County will be at the lowest level. Instead, the map illustrates the *estimated* average lead risk level at the county level.

Lead Risk by Kentucky County

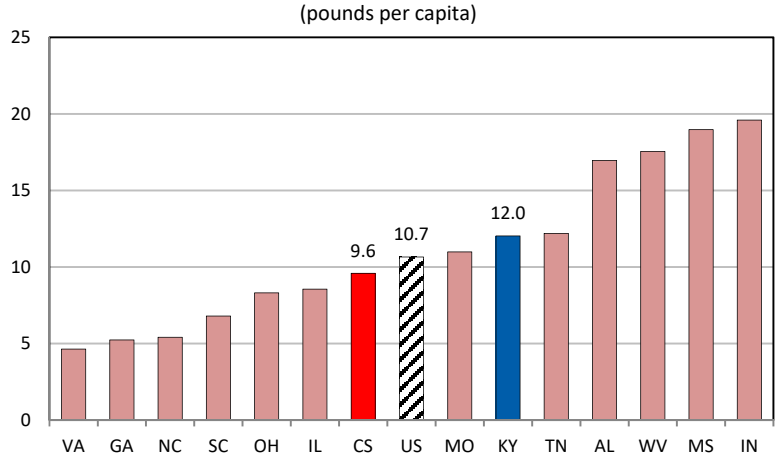


Source: Estimated by Rex Bray and Timothy Bianco using a method developed by Vox and Rad Cunninghnam, Washington State Dept. of Health <http://www.vox.com/a/lead-exposure-risk-map>.

TOXIC RELEASES

Toxic pollutants can cause cancer or other serious health effects, such as reproductive or birth defects, as well as adverse ecological and environmental consequences. The Environmental Protection Agency (EPA) provides data to help communities identify chemical disposal facilities and other toxic release patterns that warrant public vigilance. Combined with hazard and exposure information, these data can be valuable in risk identification. Given that toxic releases are often by-products of the manufacturing process, it is not surprising that Kentucky, which is home to an above-average manufacturing base, reported 12 pounds of toxic releases per capita in 2016, an estimate that exceeds the national average (10.7 pounds) and most peer states. Kentucky, however, lags behind the competitor states of Indiana (19.6), Mississippi (19.0), West Virginia (17.5), Alabama (17.0), and Tennessee (12.2).

Toxic Chemicals Disposed of or Otherwise Released, 2016
Kentucky, Competitor States, and the U.S.
(pounds per capita)



Source: United States Environmental Protection Agency. (2017). TRI Explorer (2016 Dataset, released October 2017) [Internet database]. Retrieved from https://www.epa.gov/triexplorer, (November, 2017).
Note: CS is the weighted average of the competitor states.


HEALTH

Health

POPULATION HEALTH has significant economic consequences. At the most basic level, good health enables workers to be more productive. Indirectly, higher levels of health facilitate, for example, more education and schooling, which directly affects economic outcomes. Conversely, poor health can lead to premature death, lower workforce participation, higher public assistance costs, and less-than-optimal worker productivity. Studies have found, for instance, that labor time lost due to health reasons totals in the billions of dollars per year in lost economic output. Moreover, given the importance of workforce quality on firm location decisions, communities with high disability rates and poor health status are at a competitive disadvantage. For these reasons, investments in improving the health outcomes of individuals and communities can and do have vital and long-lasting economic benefits. Kentucky's health shortcomings are well known—*America's Health Rankings 2016*, delineates our high rates of drug overdose deaths, chronic disease, and disability, ranks the state 45th. A record number of Kentuckians died from drug overdoses in 2016—much of it fueled by opioids. While the growing opioid crisis garners increased attention,

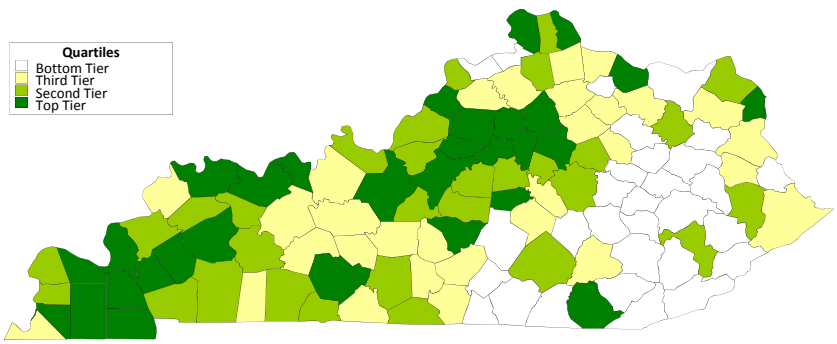
Kentucky's poor health outcomes have large economic effects and societal consequences.

chronic diseases are responsible for 7 of 10 deaths each year and drive most of the nation's health care costs. Among Kentucky's prime working-age adults, smoking (31%), obesity (38%), and physical inactivity (26%) put many at risk for chronic disease. Overall, nearly 28 percent of Kentucky's prime working-age adults exhibit multiple chronic disease causing behaviors, and these risk factors lead to higher absenteeism and employer costs. The Milken Institute has estimated that the economic toll of chronic disease on the Kentucky economy measured in the billions of dollars, reflecting the cost of treating avoidable medical expenses as well as the resulting lower labor force productivity and subsequent lower economic growth rates. Factors like job stability, educational attainment, and neighborhood safety exert a strong influence over health outcomes. By addressing the place-based, social determinants of health present in Kentucky communities, policymakers have the opportunity to improve the health of, and by extension economic outcomes for, citizens of the Commonwealth. The findings are clear—poor health can have deleterious economic effects, while good health can improve earnings, employment, and one's quality of life.

Social Determinants of Health

The health of individuals is affected by many factors, including, of course, individual behaviors regarding diet and exercise, but also including community characteristics. The U.S. Department of Health and Human Services advances a "place-based" framework under the auspices of the *Health People 2020* initiative to explain and understand the factors affecting health outcomes. This framework includes five principal areas that constitute the *social determinants of health*: economic stability; education; social and community context; health and health care; and neighborhood and built environment. Using 24 separate factors organized into these five categories, we estimate the strength of the social determinants of health at the county level. Using a technique known as principal component analysis, we rank Kentucky's 120 counties into quartiles, or four equal groups, by analyzing variables that include, but are not limited to, the poverty rate, the rate of successful transition to adult life after high school graduation, the number of community associations, the number of various types of health care providers, and environmental conditions such as air and water quality. Together, these factors reflect critical elements in our social and physical environments that affect individual health. Counties in Central and Western Kentucky show the best outcomes, with less favorable outcomes in Eastern Kentucky.

Social Determinants of Health by Kentucky County



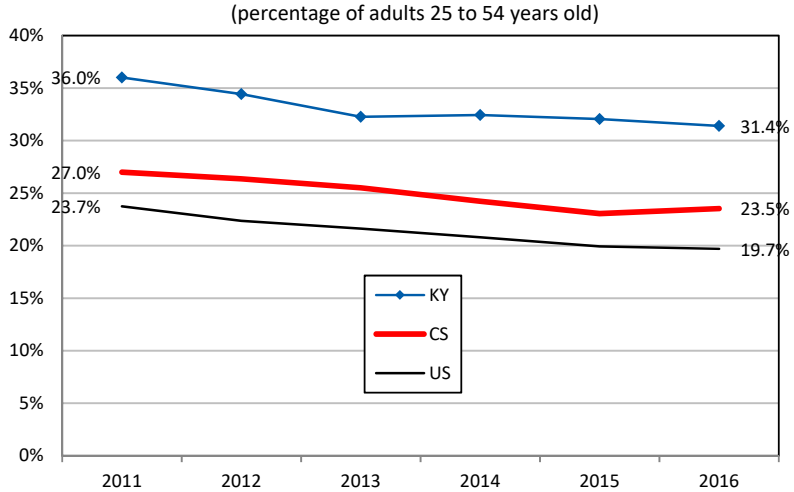
Source: Data collection and analysis performed by Timothy Bianco, Rex Bray III, and Michael Childress.

CURRENT SMOKERS

Smoking is the leading preventable cause of death in the United States. Nonetheless, Kentucky has one of the highest adult smoking rates in the nation. As a consequence, smoking-related causes of death, including lung cancer and heart disease, take a disproportionately high toll here. With a smoking rate among prime working-age adults (25 to 54 years old) of 31.4 percent, Kentucky is well above the national average of 19.7 percent. Kentucky is statistically tied with Arkansas (29.3%), Missouri (28.1%), and West Virginia (32.0%) for the highest rate. The other 47 states, DC, as well as the competitor state and U.S. average, have statistically significant lower rates. The economic costs associated with smoking are high. The Centers for Disease Control and Prevention (CDC) report that smoking-related illness in the United States costs more than $300 billion annually, which includes $170 billion for direct medical care for adults and more than $156 billion in lost productivity. According to November 2017 estimates from the Kentucky Coalition for a Smoke-Free Tomorrow, $1.92 billion is spent annually in Kentucky on health care costs related to smoking and 8,900 adults die each year from smoking. By comparison, there were 1,404 drug overdose deaths in Kentucky in 2016, with many of these caused by opioids—something that was declared a public health emergency by President Trump in October 2017.

Prime Working-Age Adults Who are Current Smokers, Kentucky, Competitor States, and the U.S., 2012-2016

(percentage of adults 25 to 54 years old)

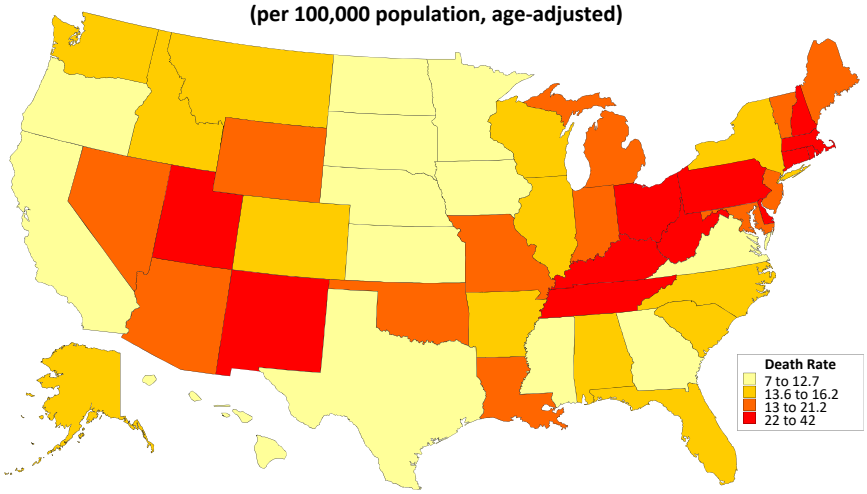


Source: Author's analysis of CDC Behavioral Risk Factor Surveillance System data, various years

Drug Overdose Death Rate

The United States is in the midst of public health crisis due to drug misuse and abuse. Drug overdoses are now the leading cause of death among Americans under 50. Much of this, but not all, is fueled by opioids. According to the U.S. Surgeon General's 2016 Report on Alcohol, Drugs, and Health, *Facing Addiction in America,* the genesis of the opioid crisis was the over-prescription of opioid pain relievers in the 1990s which led to increased heroin use and more recently fentanyl abuse. However, while opioids account for a growing number of drug overdose deaths (63% in the U.S. and nearly 70% in Kentucky), there are many other contributing drugs. In total, an estimated 52,404 Americans died from drug overdoses in 2015. Based on data released in August 2017, the 2016 estimate is over 64,000, representing the largest annual increase ever experienced in the United States. Kentucky, unfortunately, has one of the highest drug overdoese death rates in the country. In 2015, nearly 30 Kentuckians per 100,000 population died from a drug overdose. Only one state had a statistically significant higher rate–West Virginia (41.5). Drug overdose death rates in New Hampshire, Rhode Island, and Ohio were statisitcally no different from Kentucky, with the remaining 46 states and DC statisitically lower than Kentucky.

Drug Overdose Death Rate, 2015
(per 100,000 population, age-adjusted)

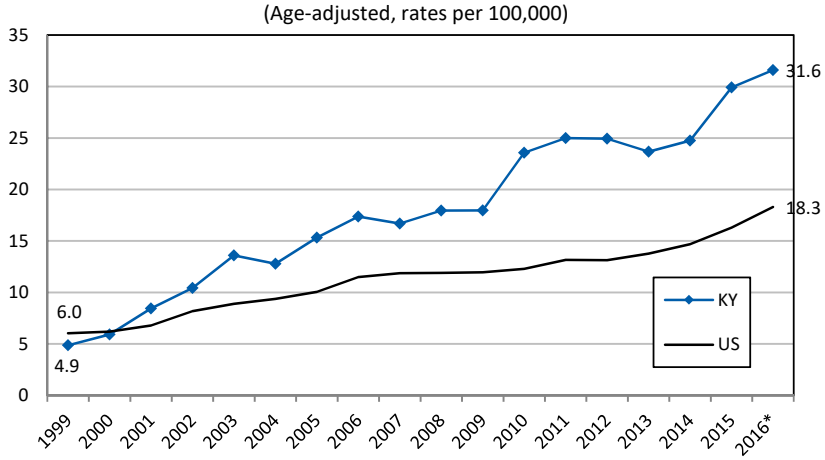


Source: Author's analysis of data from Centers for Disease Control and Prevention, National Center for Health Statistics. Compressed Mortality File 1999-2015 on CDC WONDER Online Database, released December 2016. Data are from the Compressed Mortality File 1999-2015 Series 20 No. 2U, 2016, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. Accessed at http://wonder.cdc.gov/cmf-icd10.html on Jun 26, 2017 3:21:46 PM

DRUG OVERDOSE DEATH RATE

A record number of Kentuckians died from a drug overdose in 2016. The primary culprit is opioid abuse, especially heroin and fentanyl. According to the *2016 Overdose Fatality Report* from the Kentucky Office of Drug Control Policy, there were 1,404 overdose deaths in 2016, up from 1,248 in 2015. The drug overdose death rate tripled in the U.S. from 1999 to 2016, but increased six-fold in Kentucky. Averaged over a five-year period from 2012 to 2016, the highest drug overdose death rates (per 100,000) within Kentucky were in Eastern Kentucky (Leslie, Bell, and Powell Counties with rates of 66.3, 58.5, and 56.5 respectively) and Northern Kentucky (Gallatin and Campbell Counties with rates of 56.2 and 52.1). These upward trending drug overdose death rates put significant financial stress on local governments and exert an economic impact on communities. To deal with the financial stress associated with the opioid epidemic, one city council member in Ohio has proposed a three-strike rule on 911 calls for individuals overdosing on drugs–no ambulance after overdosing twice previously. Taking into account direct healthcare costs, loss productivity, and the stress on the criminal justice system, one study has estimated the total economic burden of prescription opioid overdose, abuse, and dependence to be $78.5 billion annually (Curtis S. Florence, et al., *Medical Care*, 2016).

Drug Overdose Death Rates,
Kentucky and the U.S., 1999-2016
(Age-adjusted, rates per 100,000)



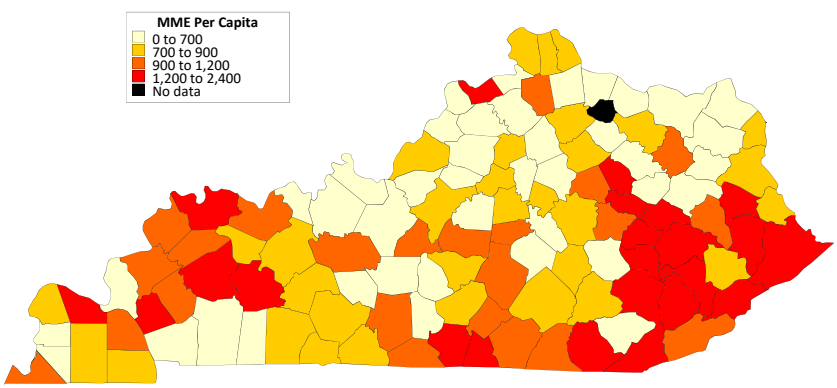
Source: Author analysis of data from the Centers for Disease Control and Prevention (CDC), National Center for Health Statistics, Multiple Cause of Death 1999-2015 on CDC WONDER Online Database.
**The 2016 estimates are based on data from the Kentucky Office of Drug Control Policy (not age-adjusted) and a New York Times analysis of U.S. data from multiple sources (see notes section in this report).*

OPIOID PRESCRIPTION RATE

A critical factor that will determine the state's future economic growth is to identify and successfully implement programs that increase the labor force participation rate, particularly for prime working-age adults. These strategies include, but are not limited to, programs to lower opioid abuse. Research published in 2017 by Princeton University economist Alan Krueger found that from 1999 to 2015 up to 20 percent of the national drop in the labor force participation rate among prime working-age men and 25 percent of the drop among women is due to the use and abuse of opioids. These two factors, opioid abuse and the labor force participation rate, are strongly associated. As one can see by the map below, the level of prescribed opioids (morphine milligram equivalents, MME) on a per capita basis is signficantly higher in portions of Eastern, Southeast Kentucky, and Western Kentucky.

Opioid Prescription Rate by Kentucky County, 2015

(morphine milligram equivalents (MME) per capita)



Source: *Alan B. Krueger, Where have all the workers gone? An inquiry into the decline of the U.S. labor force participation rate*. Brookings, Sept. 2017

YOUTH ALCOHOL AND DRUG USE

A range of behavioral risks can compromise the health and well-being of young people. Here, we illustrate trends in two such behaviors. While down sharply in recent years, a disturbing share of Kentucky high school students—17.5 percent of males and 18 percent of females—still report episodic heavy drinking (five or more drinks of alcohol in a row within a couple of hours on at least one day during the 30 days before the survey). There is not a statistically significant difference between Kentucky and the U.S. The percentage of Kentucky youth who reported using marijuana one or more times in the past month is lower than the U.S. percentages of 20.1 percent for females and 23.2 percent for males—but also are not statistically significantly different from the Kentucky rates. Importantly, measures of youth smoking, which we do not illustrate here, suggest Kentucky youth are turning away from the addiction most smokers acquired as teens. Overall, 5.7 percent of the state's youth, compared with 3.4 percent nationally, reported smoking cigarettes on 20 or more days in the past 30 days in 2015, compared to 28 percent in 1997.

Percent of Kentucky High School Students* Who Abused Alcohol or Used Marijuana in Past 30 Days, Selected Years**

	Alcohol Abuse**		Marijuana Use***	
Year	Male	Female	Male	Female
1993	41	27	19	11
1997	43	30	34	23
1999	40	34	26	22
2001	40	31	30	22
2003	33	32	22	20
2005	27	23	18	13
2007	29	26	17	15
2009	27	21	20	13
2011	25	21	21	17
2013	23	15	20	15
2015	18	18	18	17

* Grades 9-12
** Drank five or more drinks of alcohol in a row (within a couple of hours on at least 1 day during the 30 days before the survey)
*** Currently used marijuana (one or more times during the 30 days before the survey)
Source: Centers for Disease Control and Prevention, High School Youth Risk Behavior Survey, various years

RISK BEHAVIORS AND CHRONIC DISEASE

According to the Centers for Disease Control and Prevention (CDC), more than 75 percent of health care costs are due to chronic conditions such as heart disease, cancer, stroke, diabetes, and arthritis. Many patients have multiple chronic conditions and their care costs up to seven times as much as those with one chronic condition. Much of the chronic disease is caused by four *preventable* health risk behaviors—lack of exercise, poor nutrition, smoking, and heavy alcohol consumption. When compared to the U.S. as well as states that are widely considered to be Kentucky's competitors for economic development prospects, *prime working-age* (25 to 54 years old) Kentuckians are more likely to smoke, be obese, and not engage in regular physical activity—but look similar to the U.S. and competitor states with respect to heavy alcohol consumption.

Four Risk Behaviors that Contribute to Chronic Disease, U.S., Competitor States, and Kentucky, 2016
(prime working-age adults)

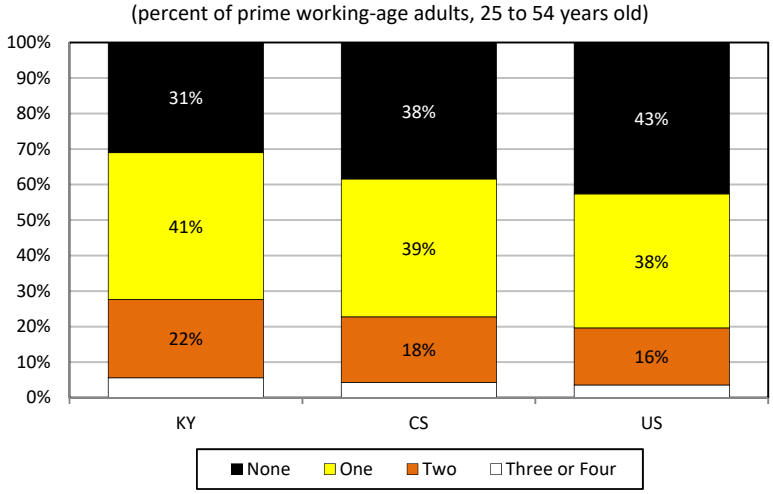
Adults, 25 to 54 years old	US (%)	CS (%)	KY (%)
Current Smoker	20*	24*	31
Obese	32*	35*	38
Lack of Physical Activity	22*	24*	26
Heavy Alcohol Consumption	7	7	7

Source: Authors' 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, 2016
Note: The competitor states are AL, GA, IL, IN, MO, MS, NC, OH, SC, TN, VA, & WV.
**These percentages are statistically different from the Kentucky percentages (alpha=.05).*

NUMBER AT RISK FOR CHRONIC DISEASE

Overall, nearly 28 percent of Kentucky's prime working-age (25 to 54 years old) adults engage in multiple chronic disease causing behaviors. About 31 percent have none of the risk factors of smoking, obesity, inactivity, or heavy drinking, and 41 percent have one. However, 22 percent have two and nearly 6 percent exhibit three or four. Much of chronic disease is caused by these four risk factors and it is estimated that 75 percent of health care costs are due to chronic conditions such as heart disease, cancer, stroke, diabetes, and arthritis. Compared to the competitor states and the U.S., prime working-age adults in Kentucky are more likely to have one or more chronic disease risk factors. These risk factors, particularly smoking, physical inactivity, and obesity, are linked to higher absenteesim and employer costs. Research published in 2016 found that "Absenteeism costs associated with chronic diseases and health risk factors can be substantial. Employers may incur these costs through lower productivity, and employees could incur costs through lower wages." This association brings the health status of the state's workers to the forefront when considering strategies for improving Kentucky's economic prospects.

Number of Key Chronic Disease Causing Behaviors, 2016, Kentucky, Competitor States, and the U.S.
(percent of prime working-age adults, 25 to 54 years old)



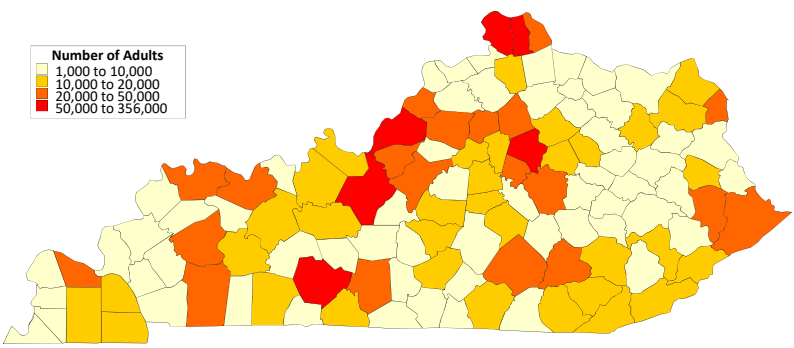
Source: Author's analysis of Behavioral Risk Factor Surveillance System data

CHRONIC DISEASE BY COUNTY: NUMBER

One-quarter of Kentucky adults 18 and older exhibit multiple chronic disease causing behaviors. These behaviors or resulting outcomes include smoking, obesity, inactivity, and heavy drinking. We estimate that 40 percent have one of these behaviors, 21 percent have two, and 4 percent exhibit three or four. The map below and the one on the next page illustrate different facets of this problem. Because most of the state's population live in the urban triangle region, the vast majority of the people at risk for chronic disease are concentrated in this region—even though they represent a comparatively lower percentage of the population in these counties. Jefferson County has the highest number of adults at risk for chronic disease at nearly 355,000. When developing approaches and allocating resources to address chronic disease across Kentucky, it is important to consider the sheer number at risk as well as the percentage.

Kentucky Adults Exhibiting Behaviors Putting Them At Risk for Chronic Disease, 2012-2016

(estimated number of adults 18 and older)



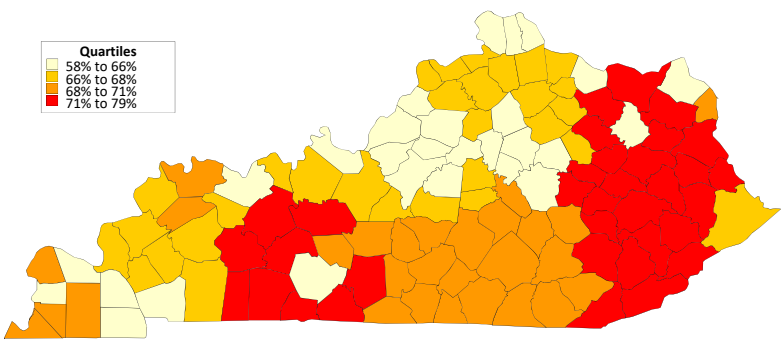
Source: Author's analysis of data from Kentucky Department for Public Health (KDPH) and Centers for Disease Control and Prevention (CDC). Behavioral Risk Factor Surveillance System Survey Data. Frankfort, Kentucky: Cabinet for Health and Family Services, Kentucky Department for Public Health, 2012 to 2016

CHRONIC DISEASE BY COUNTY: PERCENT

A very different picture of chronic disease is shown on this map. While the map on the previous page shows that the estimated absolute number of those at risk for chronic disease is relatively small in Eastern Kentucky, it is relatively large when viewed as a percentage of the county population. Likewise, the number at risk in the urban triangle is quite large, but it is comparatively small as a percentage of the population.

Kentucky Adults Exhibiting Behaviors Putting Them At Risk for Chronic Disease, 2012-2016

(estimated percentage of adults 18 and older)

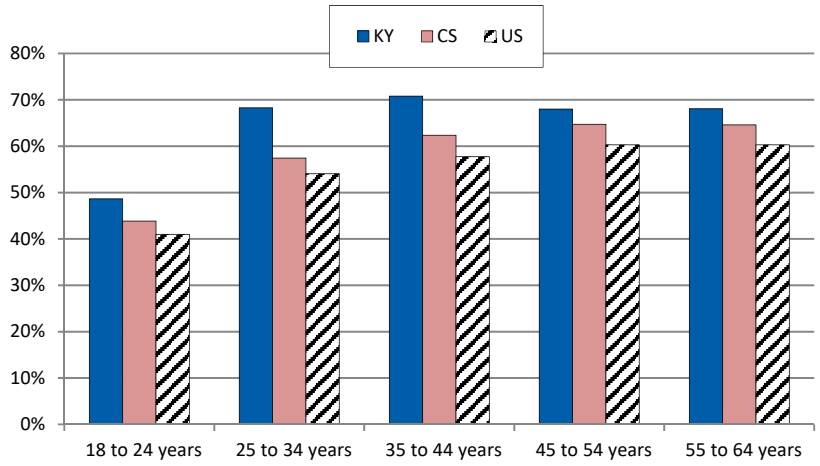


Source: Author's analysis of data from Kentucky Department for Public Health (KDPH) and Centers for Disease Control and Prevention (CDC). Behavioral Risk Factor Surveillance System Survey Data. Frankfort, Kentucky: Cabinet for Health and Family Services, Kentucky Department for Public Health, 2012 to 2016

CHRONIC DISEASE RISK BY AGE GROUP

An estimated 69 percent of Kentucky adults demonstrate at least one of the four behaviors that put them at risk of developing a chronic disease—smoking, obesity, physical inactivity, or heavy alcohol consumption—compared to 62 percent in the competitive states and 57 percent in the United States. These rates have been consistent and stable for at least the last decade—an indication of how difficult it is to change chronic disease causing activities, not only in Kentucky but across the United States. And in Kentucky, the uninsured—currently about 5 percent of the population—are more likely to be at risk of developing a chronic disease (74%) than the insured (64%). The chronic disease risk does not change much across the age groups for those *25 and older*. In Kentucky, 69 percent of adults in the prime working age group—25 to 54 years old—exhibit behavior that puts them at risk for developing a chronic disease. By comparison, an estimated 62 percent and 57 percent of prime working age adults exhibit behaviors putting them at risk for chronic disease in the competitor states and U.S., respectively.

Chronic Disease Risk by Various Age Groups, Kentucky, Competitor States, and the U.S.
(percent of individuals at risk for chronic disease, 2016)

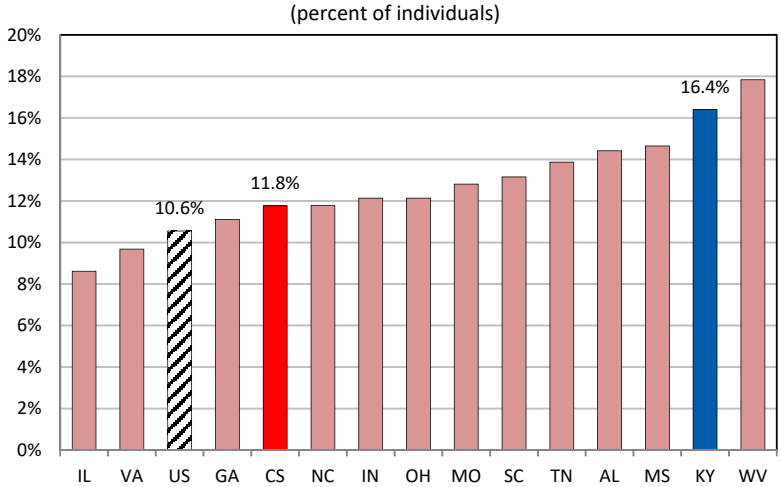


Source: Author's analysis of Behavioral Risk Factor Surveillance System data

DISABILITY

The Census Bureau asks six questions to determine the types and prevalence of disabilities. They include the following: Hearing Disability—Is this person deaf or does he/she have serious difficulty hearing?; Visual Disability—Is this person blind or does he/she have serious difficulty seeing even when wearing glasses?; Cognitive Disability—Because of a physical, mental, or emotional condition, does this person have serious difficulty concentrating, remembering, or making decisions?; Ambulatory Disability—Does this person have serious difficulty walking or climbing stairs?; Self-Care Disability—Does this person have difficulty dressing or bathing?; and, Independent Living Disability—Because of a physical, mental, or emotional condition, does this person have difficulty doing errands alone such as visiting a doctor's office or shopping? Kentucky has the nation's second highest rate of disability (16.4%) among adults 18 to 64 years old. The U.S. average is 10.6 percent and the competitor states average is 11.8 percent. The prevalence of the six disability types among persons between 18 and 64 in Kentucky is: Visual—3.3 percent; Hearing—3.3 percent; Ambulatory—8.8 percent; Cognitive—7.5 percent; Self-Care—2.8 percent; and Independent Living Disability—5.9 percent.

Disabled Individuals 18 to 64 Years, 2016
Kentucky, Competitor States and the U.S.
(percent of individuals)

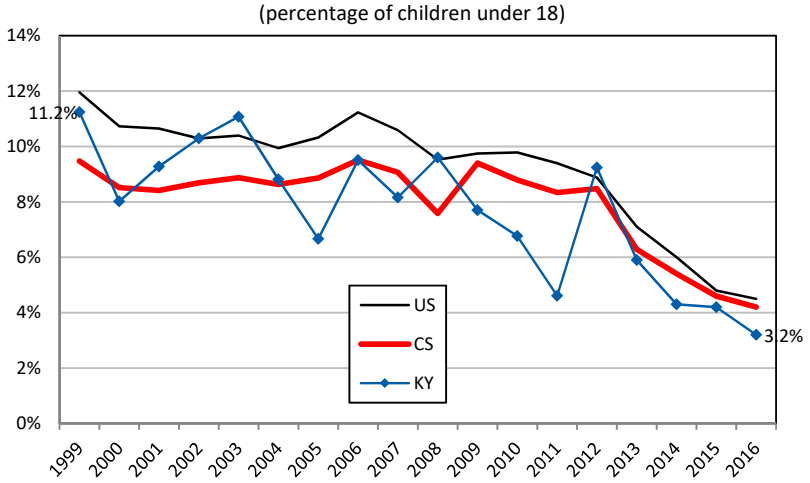


Source: 2016 American Community Survey 1-Year Estimates

HEALTH INSURANCE COVERAGE: CHILDREN

An estimated 32,000 Kentucky children under 18 years old were not covered by health insurance in 2016, or about 3.2 percent of children. The percentage of uninsured children, which was 11.2 percent in 1999, has been generally declining as children were added to the Kentucky Children's Health Insurance Program (KCHIP) or Medicaid. The Kentucky Children's Health Insurance Program is free or low-cost health insurance for children. KCHIP is for children younger than 19 who do not have health insurance and whose family income is at or less than 200 percent of the federal poverty level. For example, a family of four can earn up to $42,400 a year and qualify for KCHIP. The percentages we cite are from the U.S. Census Bureau and represent children *under* 18, and therefore do not include those who are 18 years old. The percentage of uninsured children (under 18) in the competitor states and U.S. are 4.2 and 4.5 percent (2016), respectively.

Children without Health Insurance Coverage,
Kentucky, Competitor States, and the U.S., 1999-2016
(percentage of children under 18)

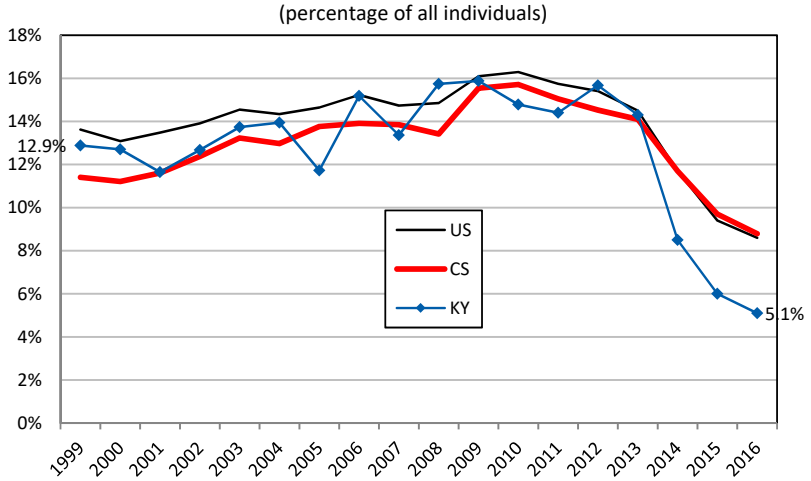


Source: U.S. Census, Health Insurance Historical Tables - HIB Series (1999-2012) and American Community Survey, 1-Year Estimates (2013-2016)

HEALTH INSURANCE COVERAGE: EVERYONE

Though 27.3 million Americans were without health insurance in 2016, both the number and the percentage of uninsured people declined from the prior year. In Kentucky, 223,400, or 5.1 percent of the total state population, did not have health insurance in 2016. Medicaid has historically played a key role in providing health coverage for disproportionately poor Kentuckians, insuring an estimated 28 percent of the population here in 2016, compared to about 20 percent in the competitor states and 23 in the U.S. The implementation of the Affordable Care Act has increased the number of individuals on Medicaid over the past few years.

Individuals without Health Insurance Coverage, Kentucky, Competitor States, and the U.S., 1999-2016
(percentage of all individuals)



Source: U.S. Census, Health Insurance Historical Tables - HIB Series (1999 to 2012) and American Community Survey, 1-Year Estimates (2013-2016)

Youth Health-Related Behaviors

Research shows important links between health-related behaviors and educational outcomes. Specifically, lower academic achievement among high school students is associated with a lack of physical activity and inadequate nutrition. Based on data from the CDC's 2015 Youth Risk Behavior Survey (YRBS), researchers examined the linkages between several dietary, physical activity, sedentary risk behaviors, and students' grades in school. The findings show that, when compared to students with lower grades (mostly D's/F's), students who reported higher grades (mostly A's) are: more likely to engage in physical activity; play on at least one sports team; eat breakfast; eat fruits and vegetables as well as drink 100% fruit juice; drink milk; and *not* drink soda. Furthermore, the better students were less likely to watch television for extended periods, or play video games or use a computer 3 or more hours per day. The table below shows how Kentucky high school students compare to the U.S. and selected surrounding states. In general, Kentucky students get less physical activity, evidenced by statistically significant differences. In addition, compared to the U.S., Kentucky students generally have poorer dietary practices. Improving the health of today's high school students can help create a healthier and better prepared workforce in the future.

Health-Related Behaviors Among High School Students, U.S., Selected States, and Kentucky, 2015

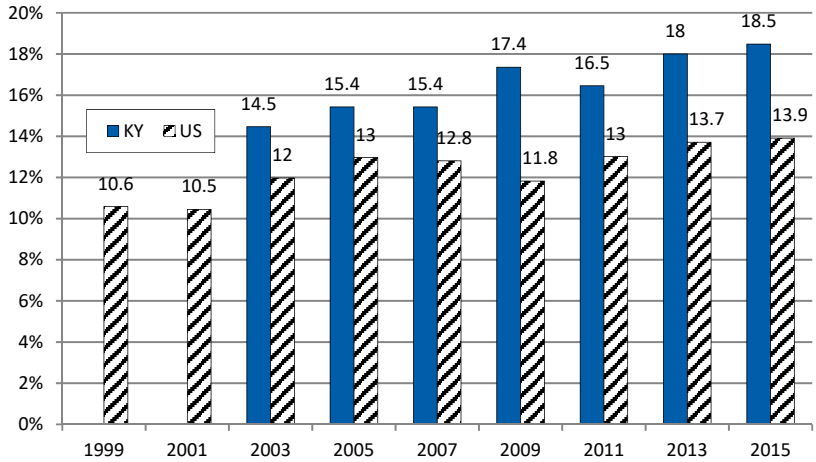
9th through 12th graders	US (%)	SS (%)	KY (%)
Ate breakfast on all 7 days before the survey	36.3	32.9	34.8
Ate fruit or drank 100% fruit juices one or more times per day during the 7 days prior to the survey	63.3*	54.9	52.7
Ate vegetables one or more times per day during the 7 days before the survey	61.0*	55.2	57.1
Drank one or more glasses per day of milk during the 7 days before the survey	37.5*	31.4	30.3
Did not drink a can, bottle, or glass of soda or pop during the 7 days before the survey	26.2*	25.4	23.6
Physically active at least 60 minutes per day on 5 or more days during the 7 days before the survey	48.6*	44.7*	37.0
Played on at least one sports team during the 12 months before the survey	57.6*	53.9*	50.8
Watched television 3 or more hours per day on an average school day	24.7	25.5	25.5
Played video or computer games or used a computer 3 or more hours per day on the average school day	41.7	39.2	40.1

Source: Authors' analysis of data from Centers for Disease Control and Prevention (CDC), Youth Risk Behavior Surveillance System Survey Data, Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2015
Note: The selected states (SS) are AL, IL, MO, MS, SC, TN, VA, & WV. These are weighted averages.
**These percentages are statistically different from the Kentucky percentages (alpha=.05).*

YOUTH OBESITY

Some research findings indicate that being significantly overweight or obese can lower a student's academic achievement. Overweight or obese students, it is argued, are more likely to suffer from adverse health consequences, such as asthma, type 2 diabetes, depression, and sleep apnea, which can then lead to higher absenteeism and negatively affect their academic performance. According to a 2007 study, obesity is a stronger predictor of school absenteeism than race, socioeconomic status, age, or gender. The obesity rate for Kentucky high school students in 2015 was one of the highest in the country. There was not a state with a statistically significant higher rate, while there were 22 states with statistically significant lower rates (out of 39 states that participated in the survey). There is a statistically significant difference between Kentucky's youth obesity rate and the U.S. rate in every year shown in the graph below. Kentucky's 2015 rate of 18.5 percent is statistically higher than those in 2003, 2005, and 2007, but not statistically different from those more recently, 2009 to 2013.

Obese High School Students,
Kentucky and the U.S., 1999 to 2015
(percent of individuals in grades 9 through 12)



Source: Author's analysis of CDC Youth Risk Behavior Survey data, various years.

ORAL HEALTH

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. While real public health gains have been made in oral health here, Kentucky's overall status can best be termed as below average. A higher percentage of Kentucky prime working-age adults between the ages of 25 and 54 are missing 6 or more teeth, or all teeth, (9.3%) compared to the U.S. (6.0%) or competitor states (7.4%). Similarly, an estimated 4.5 percent of Kentuckians are missing all teeth, which is statistically higher than the U.S. (1.8%) and competitor states (2.7%).

Oral Health Indicators, U.S., Competitor States, and Kentucky, 2016
(prime working-age adults, 25 to 54 years old)

Oral Status	US (%)	CS (%)	KY (%)
Missing 1 to 5 permanent teeth	29.2*	29.3	27.5
Missing 6 or more teeth, but not all	6.0*	7.4*	9.3
Missing all teeth	1.8*	2.7*	4.5
Visited dentist in last 12 months	63.8	62.8	62.9

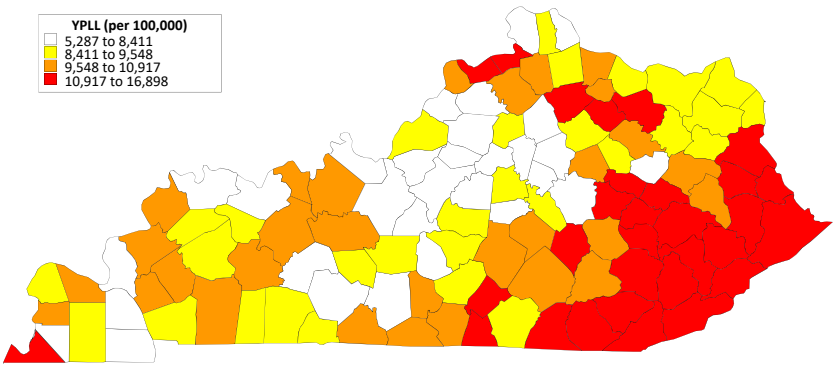
Source: Author's analysis of data from Centers for Disease Control and Prevention (CDC), Behavioral Risk Factor Surveillance System Survey Data, Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2016
Note: The competitor states are AL, GA, IL, IN, MO, MS, NC, OH, SC, TN, VA, & WV.
**These percentages are statistically different from the Kentucky percentages (alpha=.05).*

PREMATURE DEATH

These county-level estimates of premature death are indicative of the state's health status. Comparing the map below to the one on the facing page reinforces the importance of the social determinants of health. There is a clear and discernible pattern that is especially evident in the Urban Triangle and in Eastern Kentucky. Where the social determinants of health are weak, there is more premature death, and vice versa. Premature deaths occur before a person reaches an expected age, which in this case is 75 years old. The belief is that many of these deaths are preventable. The numbers represent the potential years of life lost due to premature death—adjusted to facilitate comparisons across all U.S. counties. The data categories in the map below reflect quartiles, or four groups of 30 counties each. According to the 2017 *County Health Rankings* report, the years of potential life lost measure (YPLL) "is age-adjusted to the 2000 U.S. population to allow comparison between counties and is reported as a rate per 100,000 people." The results of these calculations are shown in the map below, with the highest YPLL values in counties of Eastern Kentucky. For comparison, the median for all U.S. counties is around 7,740 and the median for all Kentucky counties is about 9,540. The range of values for Kentucky counties is 5,287 (Oldham County) to 16,897 (Breathitt County).

Estimated Premature Death, 2017

(Age-Adjusted Years of Potential Life Lost (YPLL) Rate per 100,000)

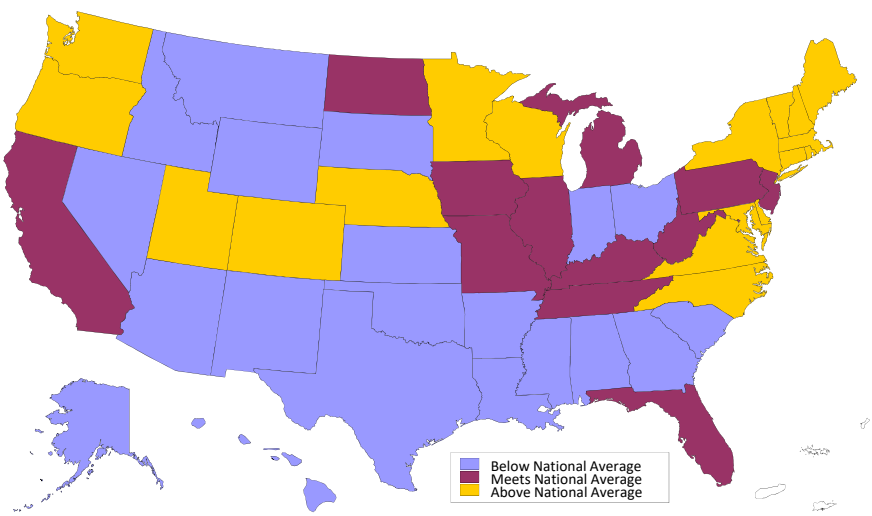


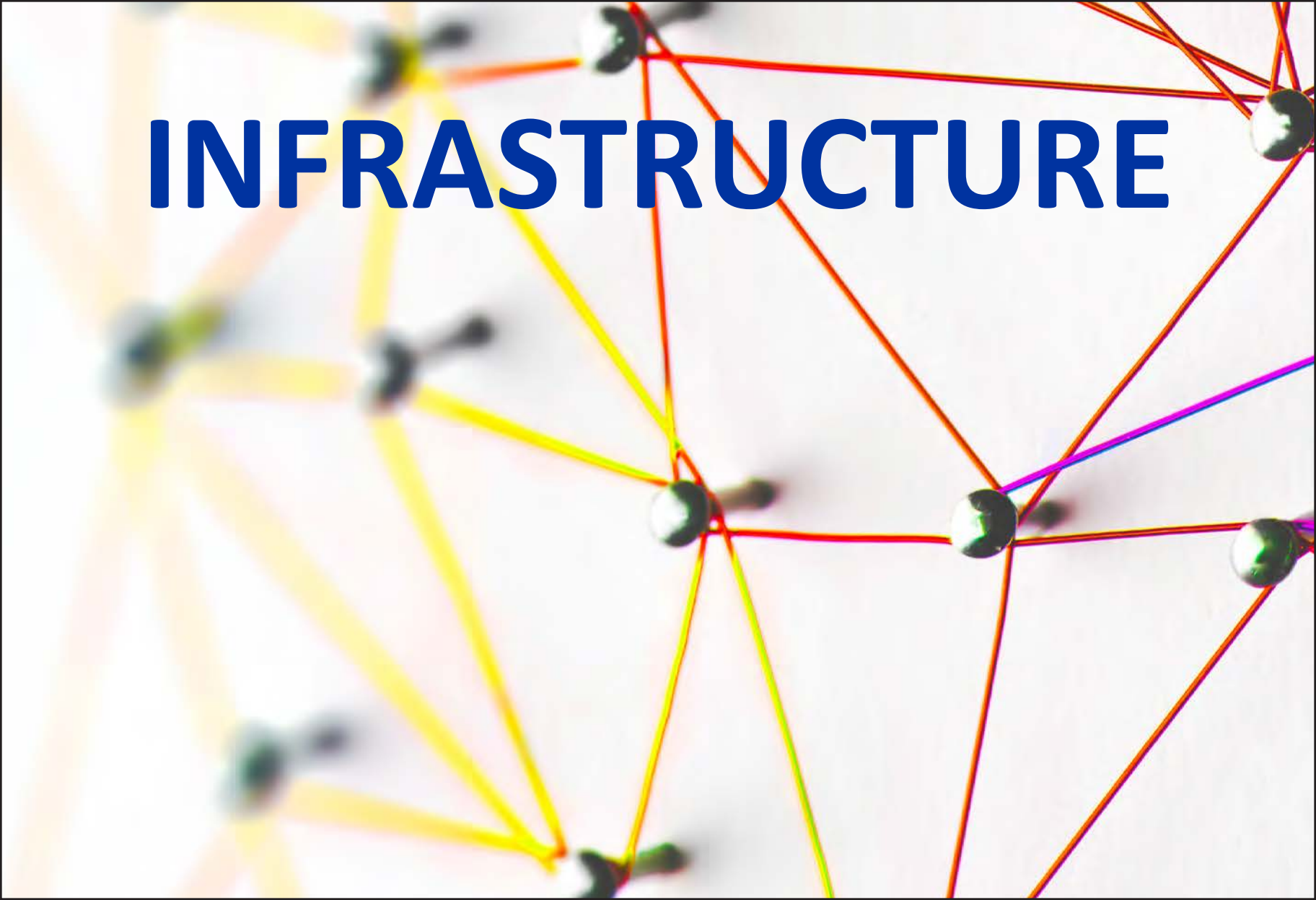
Source: Robert Wood Johnson Foundation and the University of Wisconsin Population Health Institute, County Health Rankings 2017, www.countyhealthrankings.org

Health Security and Preparedness

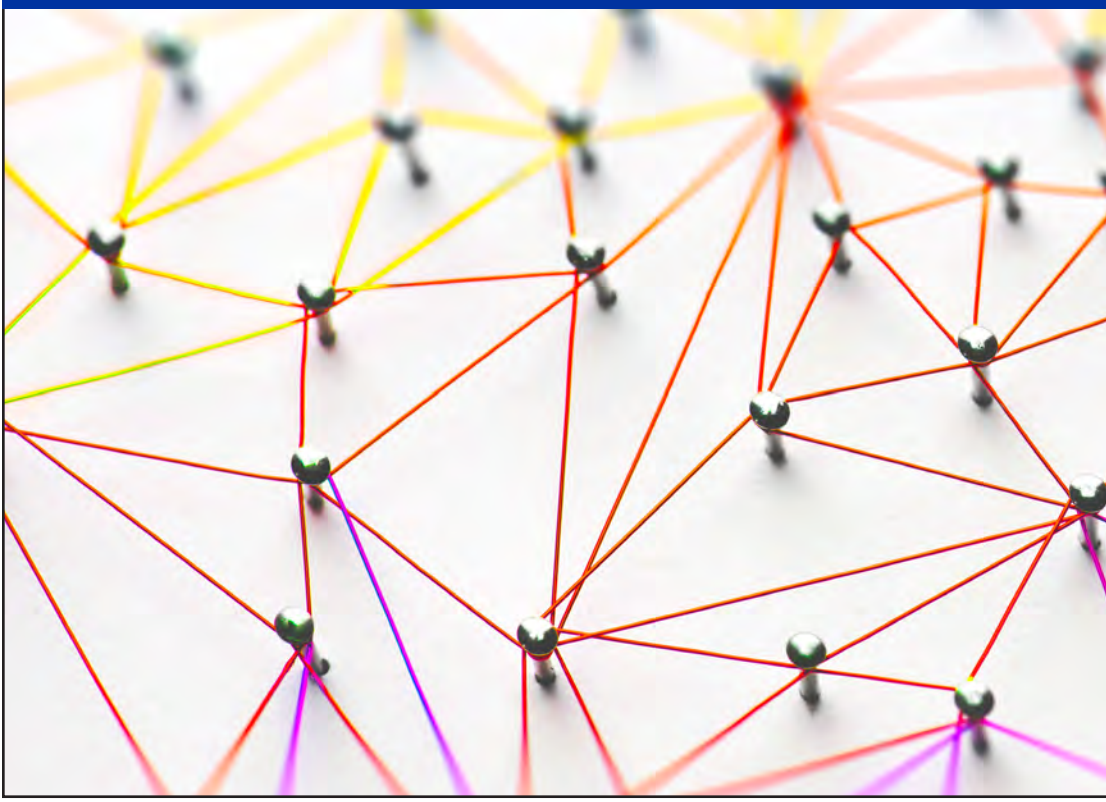
Hurricanes, fires, and widespread flooding in the U.S. over the last few months of 2017 show how disasters affect the economy, business, and communities. Company policies can support a healthy workforce and minimize the impact of unplanned absences, as well as help the wider community prepare for and quickly recover from a disaster. Results from the National Health Security Preparedness Index clearly demonstrate that health security is not simply a governmental responsibility. Individual businesses and the private sector at large contribute to many of the health security measures that comprise the Index, such as offering paid time off and telecommuting options for employees, promoting vaccination coverage in the workforce, supporting workers who train and volunteer for their local Medical Reserve Corps, and participating in emergency planning and exercises organized by regional healthcare coalitions and networks. Other ways businesses can strengthen health security include: leveraging the supply chain to prepare for events by collaborating on contingency plans to avoid large-scale business disruptions; and increasing awareness about the need for preparedness plans among the business community. The map below shows that Kentucky is within the national average for health security and preparedness. Kentucky has a 6.7 on a 10-point scale, indicating that improvement is needed.

National Health Security Preparedness Index, 2016



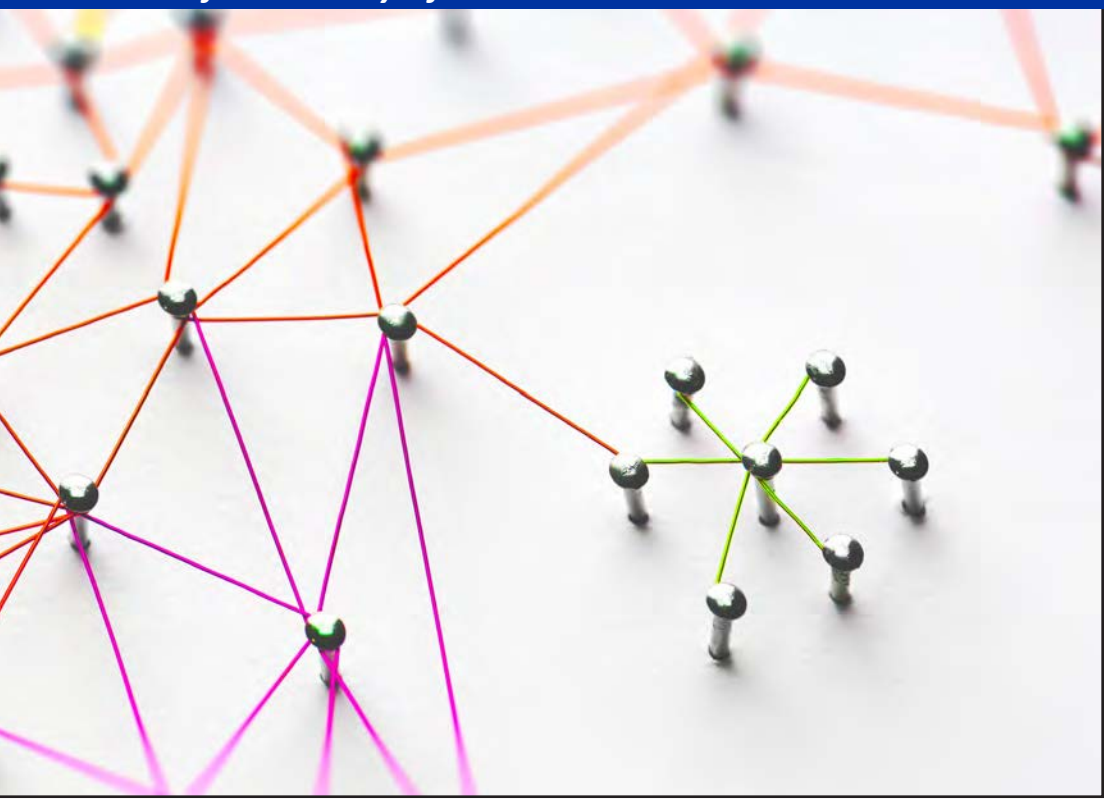

INFRASTRUCTURE

Infrastructure



PROMISES TO INVEST IN AMERICA'S INFRASTRUCTURE were front and center during the 2016 presidential campaign, and for good reason. Kentucky received a "C" on the *2013 Report Card for America's Infrastructure*, which is produced every four years by the American Society of Civil Engineers (ASCE); the U.S. got a "D+." While the states went ungraded in the 2017 update, the U.S. held steady with a "D+." The engineers evaluate 16 separate categories from aviation to waste water according to capacity, condition, funding, future need, operation and maintenance, public safety and resilience. The 2017 highlights for Kentucky note that "driving on roads in need of repair in Kentucky costs each driver $331 per year, and 8.1% of bridges are rated structurally deficient. Drinking water needs in Kentucky are an estimated $6.2 billion, and wastewater needs total $6.24 billion. 182 dams are considered to be high-hazard potential. The state's schools have an estimated capital expenditure gap of $453 million." Surveys of CEOs and consultants who are involved in industrial site selection decisions show that infrastructure considerations play an important role in their decision-making. For example, choosing from a list

Infrastructure development is fundamentally important for Kentucky's future economic advancement.

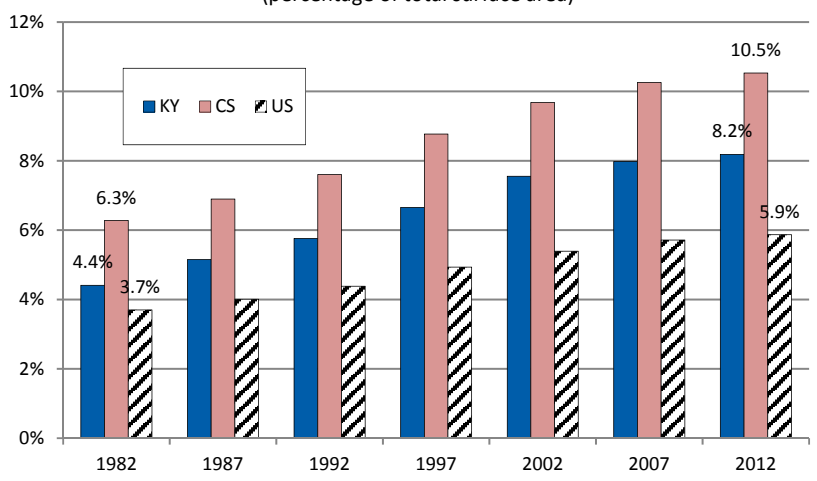


of 28 different factors, ranging from labor costs to environmental regulations, the single most important factor for respondents to the latest *Annual Survey of Corporate Executives and Consultants on Site Selection* was highway accessibility, evidenced by 94.4 percent ranking it as either "important" or "very important." Maintaining—let alone expanding—Kentucky's existing infrastructure, whether school buildings or roads, requires a tremendous amount of money. In today's budgetary environment, finding the necessary funds is challenging. Generating the resources to maintain and expand the state's basic infrastructure will not only continue to be a challenge, it will also be an important factor in keeping the state economically competitive for all forms of industry. Our analysis of state and local government infrastructure investments as a percentage of gross domestic product from 1995 to 2015 shows that Kentucky has invested slightly more (3.0%) than the competitor states (2.7%)—but about the same as the U.S. (2.9%). To date, no major infrastructure initiative has been launched by the federal government despite the 2016 campaign rhetoric. It is still possible, however, that infrastructure modernization and development will emerge as a national priority.

DEVELOPED LAND

Developed land includes a combination of land cover and use categories, such as large urban and built-up areas, small built-up areas, and rural transportation land. The manner in which communities develop and grow can, and does, have important public finance implications—particularly with regard to infrastructure needs. More developed land requires more roads, sewers, water systems, and other infrastructure needed to support a growing and/or shifting population. From 1982 to 2012, developed land as a percentage of total surface area nearly doubled in Kentucky, from 4.4 percent to 8.2 percent; this represents an increase of 86 percent in developed land in Kentucky, which is a higher rate than the competitor states (68%) or the U.S. (59%). However, the rate of change was minimal from 2007 to 2012—in Kentucky, the competitor states, and the U.S. overall—probably reflecting the impact of the Great Recession. State and local government infrastructure expenditures increased in Kentucky, on a per capita basis, from 1995 to 2013 by 34 percent (using constant 2015 dollars), compared to 14 percent in the competitor states and 22 percent in the U.S.

Developed Land, Selected Years,
Kentucky, Competitor States, and the U.S.
(percentage of total surface area)

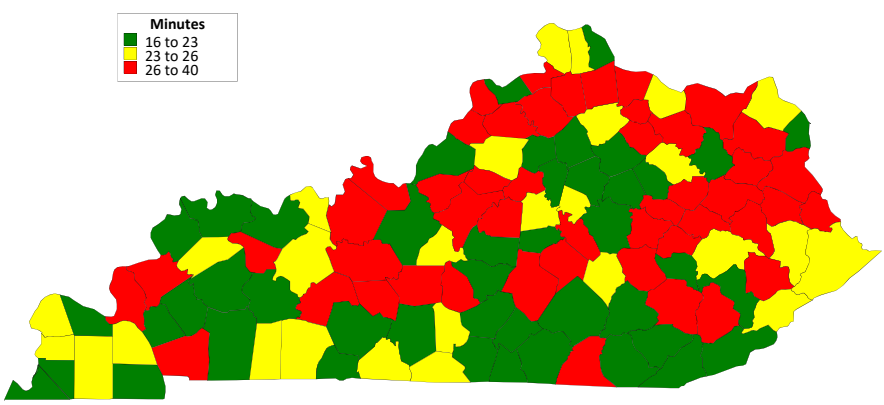


Source: U.S. Department of Agriculture, Natural Resources Conservation Service, National Resources Inventory

COMMUTING

An estimated 76.4 percent of Americans 16 years and older drive to work alone, which is near an all-time high. By comparison, carpooling is around 9.3 percent and public transportation accounts for about 5.1 percent. The rest use some other form of transportation, like biking, or work from home. Reflecting both economic centers of gravity as well as the state of the infrastructure network, the map below illustrates Kentucky's county-level average travel times to work. An estimated 82.2 percent of Kentuckians drive to work alone. Kentucky's statewide average of 23 minutes is less than the U.S. average of 26.1 minutes (based on 5-year pooled 2012-2016 data). The counties in the map are divided into one of three categories: below the Kentucky average; above the Kentucky average but below the U.S. average; and above the U.S. average. Christian County in Western Kentucky has the lowest average travel time at 16.5 minutes, while Martin County, located in Eastern Kentucky near the West Virginia border, is the highest at 38.5 minutes. The *Wall Street Journal* reported in November 2017 that traffic congestion incurred a $1,400 cost on each driver in the U.S. last year due to wasted fuel, lost time, and decreased productivity (Inrix Annual Scorecard). New York City led the way in congestion, and has an average travel time to work of 35.9 minutes, which is less than Martin and Bracken (36.6) Counties.

Average Travel Time to Work, 2012-2016
(Workers 16 Years and Older)

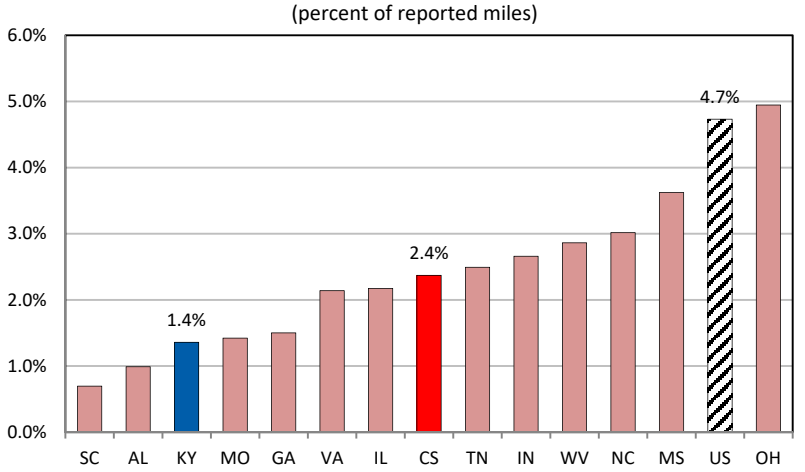


Source: U.S. Census Bureau, 2016 5-Year American Community Survey

ROAD CONDITION

Ideas, innovation, and intellectual capital form the foundation of the evolving knowledge economy. But Kentucky, like most states, is still centered on making and growing things, extracting and transporting raw materials, and moving people and products to markets and workplaces. Thus, the traditional transportation infrastructure—the road system—is still an essential piece of the economic development puzzle. Around 26 percent of Kentucky's economy is in goods-producing industries that are highly dependent on transportation, compared to about 18 percent nationally. And even as the nation's economy evolves over the next few decades, the movement of freight along the country's highways, a quintessential "old economy" activity, will continue to grow. An extensive and efficient transportation system, both now and in the future, can facilitate lower industry production costs and consumer prices, widen access to commodities for businesses and consumers, and broaden the pool of workers for business while creating more job opportunities. The bottom line: roads and road quality still matters. In the figure below, whether a road is in poor condition depends on pavement roughness, with only a small percentage (1.4%) of Kentucky's roads in poor condition.

Roads in Poor Condition, 2015
Kentucky, Competitor States and the U.S.
(percent of reported miles)

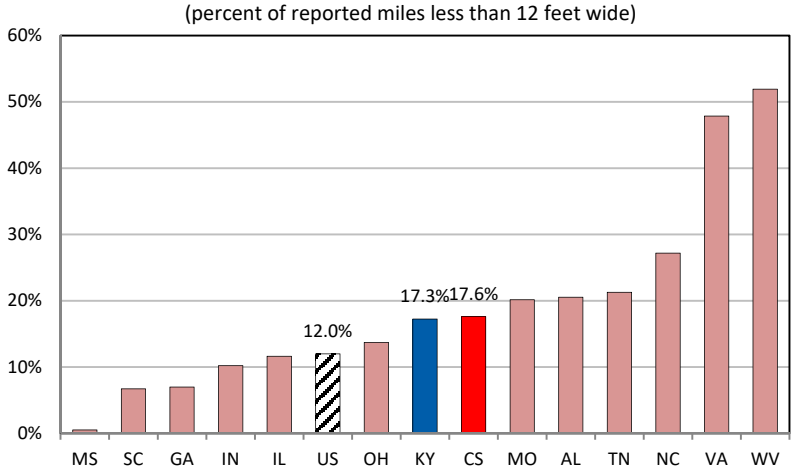


Source: Author's calculations based on Table HM-64, Highway Statistics 2015, Federal Highway Administration.
CS is the weighted average of the competitor states.

NARROW ROADS

This is a measure of lane width for "other principal arterial" roads, not interstates, other freeways, or expressways. A narrow lane is one that is less than 12 feet wide. Obviously, the more narrow the lane, the more difficult it is to move products and material with large trucks. Consequently, economic development decisions can be affected by the state and condition of the transportation infrastructure. Here we focus on rural roads, not urban. An estimated 17.3 percent of Kentucky's other principal arterial rural roads are narrow, compared to 12 percent nationally and 17.6 percent for the competitor states.

Narrow Rural Roads, 2015
Kentucky, Competitor States and the U.S.
(percent of reported miles less than 12 feet wide)

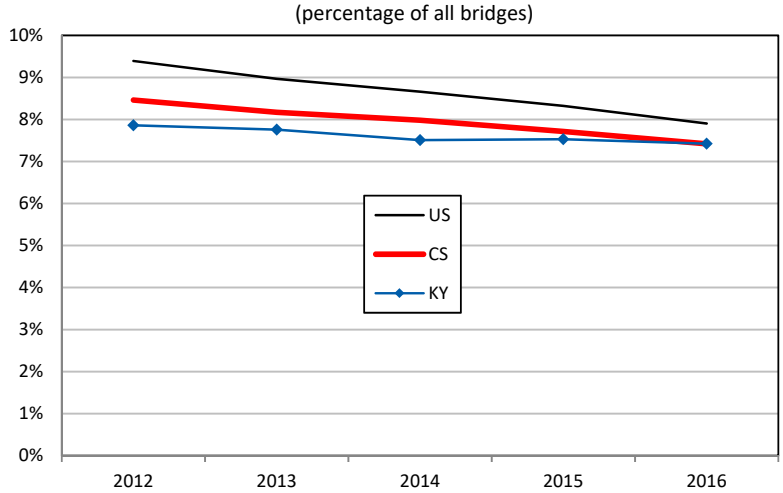


Source: Author's calculations based on Table HM-53, Highway Statistics 2015, Federal Highway Administration.
CS is the weighted average of the competitor states.

BRIDGES

The Federal Highway Administration (FHWA) categorizes the country's bridges using a "Good-Fair-Poor" condition framework, outlined in the Pavement and Bridge Condition Performance Measures final rule, which was published in January of 2017. Of the 14,265 bridges in Kentucky, 7.4 percent of them are considered to be in poor condition, which is the same as the competitor states (7.4%), but slightly lower than the U.S. (7.9%). The real difference between Kentucky, the competitor states, and U.S. lies in the distribution of bridges in the other two categories—good and fair. The percentage of Kentucky bridges deemed to be in good condition (38.4%) is much lower than the competitor states (48.0%) or the U.S. (47.4%); and, is much higher in the "fair" category (54.2%) compared to the competitor states or the U.S., where both are at 44.6 percent. While 92.6 percent of Kentucky bridges are considered to be in good or fair condition in 2016, Kentucky had only the 24th highest percentage among all states. Texas is the highest with 98.8 percent and Rhode Island the lowest with 75.1 percent.

Bridges in Poor Condition,
Kentucky, Competitor States, and the U.S., 2012-2016
(percentage of all bridges)

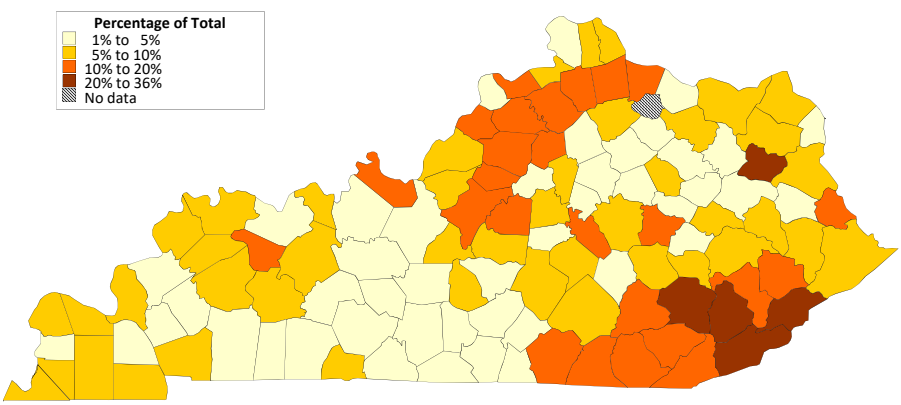


Source: U.S. Department of Transportation, Federal Highway Administration, Office of Bridges and Structures

PROBLEM BRIDGES BY COUNTY

This map shows that the highest concentration of structurally deficient bridges are located in the southeastern part of the state. Counties are divided into four groups: 1 to 5 percent of the bridges are structurally deficient (45 counties across the state); 5 to 10 percent (44); 10 to 20 percent (25); and 20 to 36 percent (5). Leslie County has the highest percentage in the state, with 35.7 percent of its bridges categorized as structurally deficient.

Structurally Deficient Bridges in Kentucky, 2016

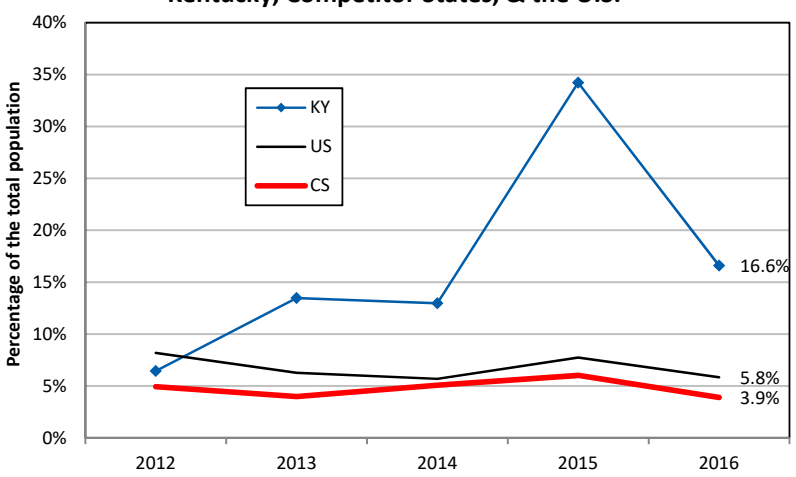


Source: U.S. Department of Transportation, Federal Highway Administration, Office of Bridges and Structures

WATER QUALITY

The United States enjoys one of the safest and most reliable supplies of drinking water in the world. The Safe Drinking Water Act of 1974 sought to preserve the nation's water supply while maintaining high standards for quality. Most Americans get their water from a community water system (CWS), nearly 50,400 of which served approximately 306 million people nationally in 2016, according to the Environmental Protection Agency. Over the past few years, around 6 to 7 percent of the U.S. population received its water from a community water system that reported at least one health-based violation, while just under 5 percent of those living in one of Kentucky's competitor states did. In Kentucky, this percentage ranged between 6.4 percent in 2012 to nearly 35 percent in 2015 to 16.6 percent in 2016. Among the competitor states in 2016, Kentucky's 16.6 percent was the highest, followed by Ohio at 12.4 percent and West Virginia at 8.7 percent. A May 2017 report from the Natural Resources Defense Council, *Threats on Tap: Widespread Violations Highlight Need for Investment in Water Infrastructure and Protections*, shows that for the U.S. overall "the EPA and states took formal enforcement action in 21.2 percent of the 12,137 health-based violations reported in 2015. (And) a little more than one out of every five cases (20.5 percent or 2,488 violations) returned to compliance by the end of the year."

Population Served by a Community Water System with a reported Health-Based Violation, Kentucky, Competitor States, & the U.S.

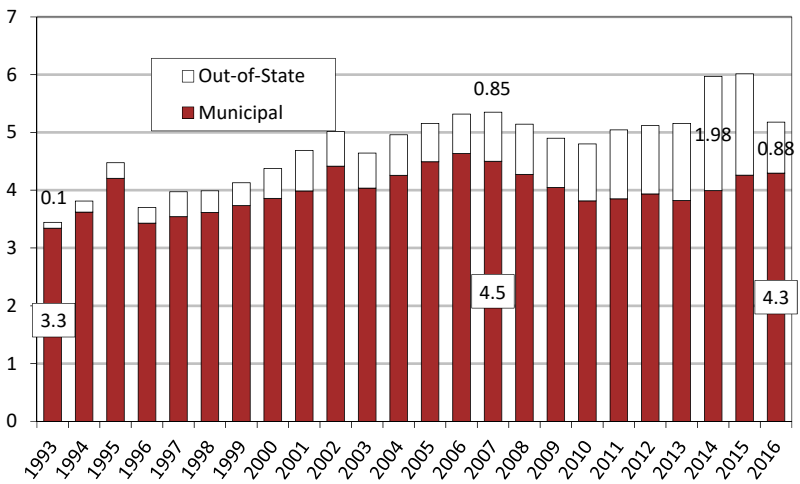


Source: Author's analysis of EPA SDWIS data.

SOLID WASTE DISPOSAL

In 1992, the Kentucky General Assembly set the ambitious goal of reducing the amount of municipal solid waste (MSW) deposited in Kentucky landfills in each subsequent year—but waste continues to mount. While the total amount of solid waste deposited in Kentucky landfills trended downward from its peak of 5.35 million tons in 2007 to just over 5 million tons in 2013, the amount deposited in 2014 and 2015 increased to around 6 million tons. A growing portion of the total, as evidenced in 2014 and 2015, is solid waste from *out-of-state sources*; it reached a record high of almost 2 million tons in 2014 and remained high in 2015 with 1.75 million tons, a significant increase since the early to mid-1990s. As a result of this growing trend, out-of-state solid waste constituted 33 percent of the total amount of waste deposited in Kentucky's landfills in 2014—compared to less than 5 percent in the early to mid-1990s. However, there was a sudden decrease in 2016, evidence by the decline to just under a million tons (0.88). Landfills, "landfarms," and other specially designated areas for solid waste disposal are expensive to open, maintain, operate, monitor, or close. Policies, actions, and incentives to reduce waste disposal are economically beneficial.

Solid Waste Disposed in Kentucky Landfills, 1993-2016
(millions of tons)



Source: KY Division of Waste Management

HIGH-SPEED INTERNET

Access to and use of the internet appear to be increasingly important for anyone becoming politically informed, socially integrated, and economically successful in the Information Age. Studies suggest that enhancing the nation's broadband infrastructure can improve innovation, entrepreneurship, and productivity (Brookings, 2013). However, according to the Federal Communications Commission (FCC), access to advanced telecommunications capability (i.e., at least 25 Mbps download/3 Mbps upload) is not uniformly available. The FCC's *2016 Broadband Progress Report* states that it "is not being deployed to all Americans in a reasonable and timely fashion...especially in rural areas..." As shown in the table below, an estimated 96 percent of Americans in urban areas have access to high-speed internet while only 61 percent of rural residents do. Compared to the U.S. overall, the estimated percentage of individuals who have adopted high-speed internet is especially low in Kentucky (8% vs. 37%). Finally, at 21.1 megabits per second (Mbps), Kentucky's estimated median download speed is about half as fast as the U.S. estimate of 39 Mbps. All of these data suggest that Kentucky is lagging in its internet infrastructure, especially in rural areas. The *KentuckyWired* initiative, however, should help improve the state's internet infrastructure.

High-Speed Internet Access, Adoption & Speed Indicators, U.S., Competitor States, and Kentucky, 2015
(percent of population)

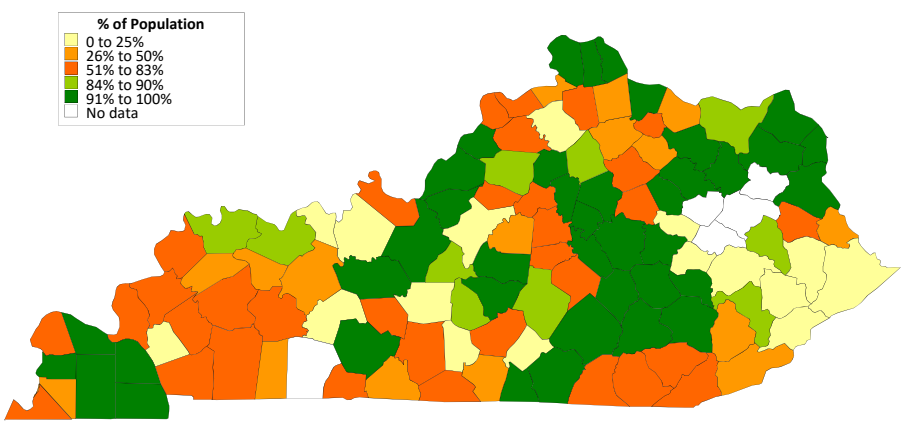
Area	Access Overall	Urban	Rural	25 Mbps/ 3 Mbps Adoption	Median DL Speed (Mbps)
US	90	96	61	37	39.0
AL	80	94	59	25	26.7
GA	91	96	75	35	35.0
IL	91	96	44	40	42.9
IN	83	95	48	30	35.3
KY	**84**	**97**	**66**	**8**	**21.1**
MS	66	91	40	26	*
MO	80	95	39	27	22.3
NC	93	99	80	16	35.9
OH	92	98	69	11	21.9
SC	82	92	62	23	31.1
TN	87	98	66	40	41.8
VA	89	97	62	53	43.2
WV	70	90	52	46	*

Source: Data in columns 2-5 are from the Federal Communications Commission (FCC), 2016 Broadband Progress Report, January 2016, while data from column 6 is from the FCC's 2016 Measuring Broadband in America Fixed Broadband Report.
Note: The "" indicates that sample sizes were too small in Mississippi and West Virginia to estimate the median download speeds.*

HIGH-SPEED INTERNET BY COUNTY

The Federal Communications Commission notes in its *2016 Broadband Progress Report* that "there continues to be a significant disparity of access to advanced telecommunications capability across America with more than 39 percent of Americans living in rural areas lacking access to advanced telecommunications capability, as compared to 4 percent of Americans living in urban areas," and Kentucky's urban (97%)—rural (66%) percentages are similar. A June 2017 *Wall Street Journal* article, "Rural America is Stranded in the Dial-up Age," describes the importance of high-speed internet for the economic prospects of rural communities: "Counties without modern internet connections can't attract new firms, and their isolation discourages the enterprises they have: ranchers who want to buy and sell cattle in online auctions or farmers who could use the internet to monitor crops. Reliance on broadband includes any business that uses high-speed data transmission, spanning banks to insurance firms to factories. Rural counties with more households connected to broadband had higher incomes and lower unemployment than those with fewer, according to a 2015 study..." There are a number of Kentucky counties that will continue to face significant economic challenges without access to high-speed internet.

Access to Fixed Advanced Telecommunications Capability by Kentucky County, 2015

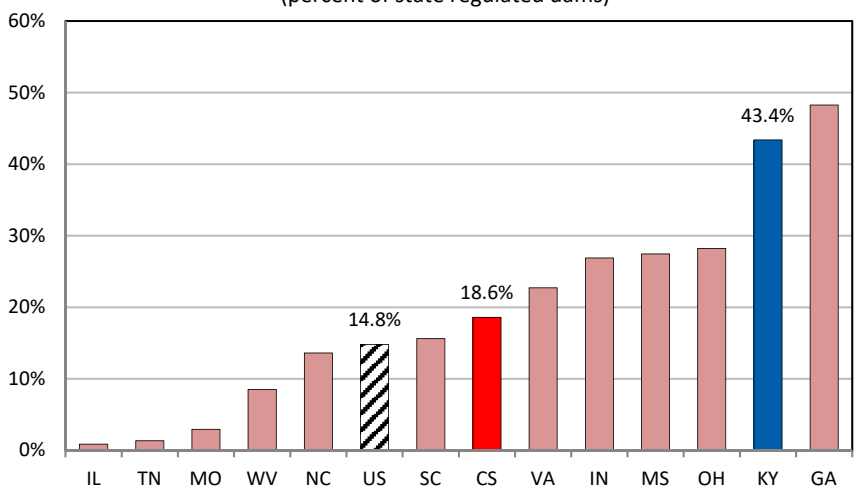


Source: FCC 2016 Broadband Progress Report,https://apps.fcc.gov/edocs_public/attachmatch/FCC-16-6A2.xlsx

DAMS

The Oroville Dam in Northern California captured the national headlines in February 2017 when the threat of its failure forced the evacuation of almost 200,000 people. Of Kentucky's 1,107 dams, 275 are classified as "high hazard potential." Dams are assigned to one of three categories (high, moderate, or low hazard potential) by Dam Safety Program engineers based on the likely loss of human life, level of property damage, environmental destruction, and economic loss that would likely ensue *if* the structure failed. A high hazard dam is one that, if it failed, may cause loss of life or serious damage to houses, industrial or commercial buildings, important public utilities, main highways or major roads. Not all Kentucky dams are regulated by state government since some are under federal control and oversight. But of the state's 275 high hazard dams, 182 are regulated by the state. Of these 182 dams, 79 are deemed to be in "poor" condition based on a classification scheme that has the following categories: satisfactory, fair, poor, or unsatisfactory (not rated is also an option). At 43 percent, Kentucky has the fifth highest percentage of dams in poor or unsatisfactory condition among the states and is significantly higher than the U.S. (15%) or competitor state (19%) percentages (see figure below).

High-Hazard Potential Dams
in Poor or Unsatisfactory Condition, 2016
(percent of state regulated dams)



Source: Author's calculations based on from the National Inventory of Dams and data from the Association of State Dam Officials. Note: Alabama not shown in figure since it has no state dam safety regulatory program.

INNOVATION

Innovation

KENTUCKY IS RANKED 47th in the *State Technology and Science Index: Sustaining America's Innovation Economy*, which combines several indicators that reflect a state's research and development inputs, risk capital and entrepreneurial infrastructure, human capital investments, technology and science workforce, and technology concentration and dynamism. In another index, the Kauffman Foundation's *Index of Growth Entrepreneurship*, which is based on three factors, the rate of startup growth, the share of scaleups, and the density of high-growth companies, Kentucky is ranked 39th. Since the peak of the previous economic expansion in 2007, Kentucky has lost ground to itself—evidenced by a lower index value in 2016 compared to 2007—but its standing among the states has remained the same, ranking 39th in both 2007 and 2016. Our examination of high-technology establishments over the period of 2003 to 2015 shows that Kentucky has consistently trailed the competitor states and the U.S. In 2015, 9.2 percent of establishments in competitor states and 9.8 percent in the U.S. are considered "high-tech." In the same year only 7.4 percent of Kentucky establishments are considered "high-tech." Why should anyone care

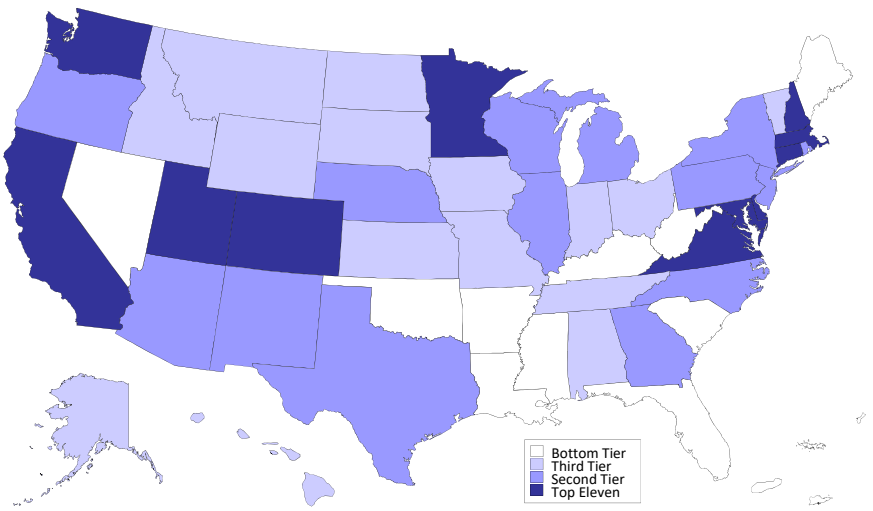
We need good ideas, adequate finances, and energetic human capital to support high-growth enterprises.

about startups, innovations, and the funding for research and development that powers them? The answer is simple: over the long term our collective standard of living will likely depend on it. John Fernald at the Federal Reserve Bank of San Francisco and Charles Jones at Stanford have found that around three-fourths of U.S. economic growth since 1950 was fueled by just two factors—rising educational attainment and research intensity—with the later accounting for nearly 60 percent of the growth. Despite the tight connections between research intensity, economic growth and job creation, total research and development expenditures as a percentage of gross domestic product are significantly lower in Kentucky (0.95%) compared to the competitor states (1.9%) and the U.S. (2.8%). As federal research and development funds become more limited, the nation's universities can and should do more to realize their tremendous innovation and commercialization potential. Moreover, as government budgets tighten, policy makers, as well as taxpayers, increasingly expect a positive return on investment from scarce public resources. Kentucky needs good ideas, adequate finances, and energetic human capital to create and nurture high-growth enterprises.

SCIENCE & TECHNOLOGY INDEX

Combining several indicators that reflect a state's research and development inputs, risk capital and entrepreneurial infrastructure, human capital investments, technology and science workforce, and technology concentration and dynamism, the Milken Institute has ranked the states according to their science and technology prowess in a 2016 report, *State Technology and Science Index: Sustaining America's Innovation Economy*. Kentucky is ranked 47th, which is a few spots lower than its previous ranking of 44th in 2014. The top state is Massachusetts, followed by Colorado, Maryland, California, Washington, Connecticut, Minnesota, Utah, Virginia, and Delaware.

State Technology and Science Index 2016

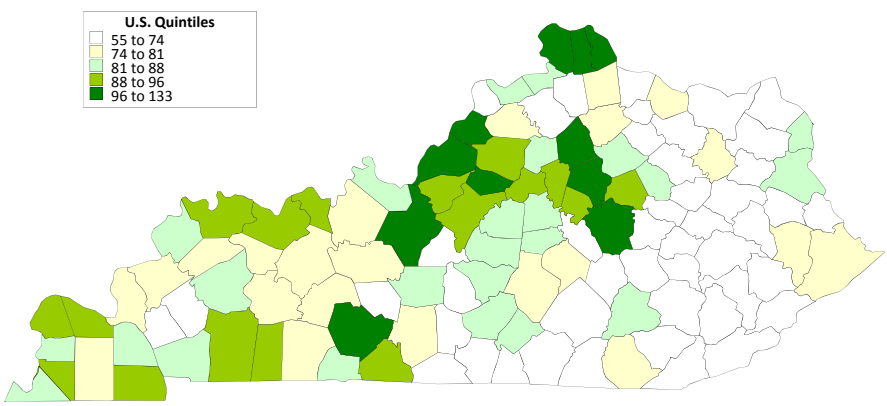


Source: Milken Institute 2016 State Technology and Science Index

COUNTY-LEVEL INNOVATION INDEX

Kentucky's county-level results from the *Innovation 2.0 Index* are illustrated on the map below, with the highest innovation index values anchoring the three angles of the urban triangle (i.e., the Louisville area, Northern Kentucky, and the Fayette County area) and extending west to Hardin and Warren Counties. The index is based on five broad categories and includes 57 different variables. The five broad categories include Human Capital and Knowledge Creation, Business Dynamics, Business Profile, Employment and Productivity, and Economic Well-Being. Some of the variables include educational attainment, high-technology employment, broadband adoption, venture capital investments, patent creation, worker productivity, proprietor income, the poverty rate, and per capita income. The highest ranked Kentucky county is Boone at 111. San Mateo County, California—which is Silicon Valley—has the highest value of any county in the United States at 133.4; Issaquena County, Mississippi, has the lowest index value in the country at 54.8. The map below shows Kentucky's counties distributed within categories representing the national quintiles, or five equal categories. That is, by taking all counties in the U.S. and ranking them lowest to highest, eleven Kentucky counties are in the top quintile or upper 20 percent of counties nationally. There are 55 Kentucky counties in the bottom quintile.

Innovation Index by Kentucky County

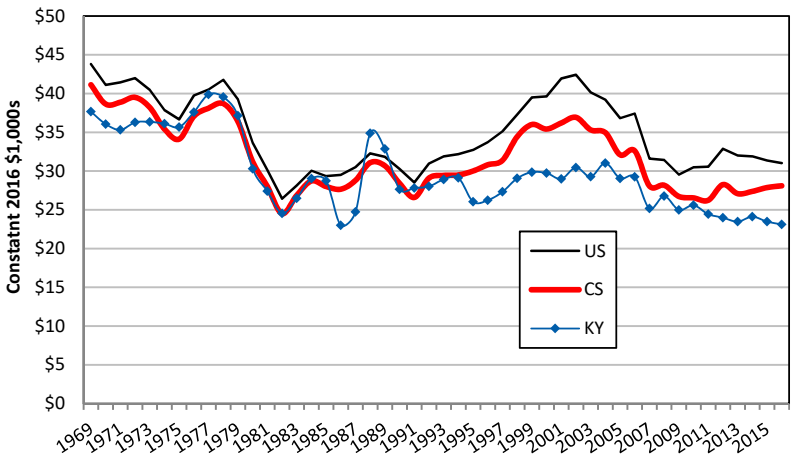


Source: Indiana Business Research Center. "Driving Regional Innovation: The Innovation Index 2.0." August 2016. http://statsamerica.org/ii2/reports/Driving-Regional-Innovation.pdf.

ENTREPRENEURIAL DEPTH

Entrepreneurship is a particularly promising vehicle for economic development, as reflected in the January 2012 update of the Kentucky Cabinet for Economic Development *Strategic Economic Development Plan*. Entrepreneurs help create new jobs, and generate wealth and new growth. They are innovative users of assets and resources and appear to be a critical mechanism for bringing new ideas and innovations to the marketplace. The depth of entrepreneurship can be gauged by examining the value created by entrepreneurs in a region as measured by the ratio of self-employment income to the number of self-employed workers in an economy. Unlike breadth which measures the number of entrepreneurs in a region, depth examines the value. High-value entrepreneurs clearly earn more, add more value, and enhance regional growth and prosperity more than other entrepreneurs. Kentucky has generally trailed the United States and competitor states in entrepreneurial depth. In 2016, Kentucky lagged the U.S. and competitor states by approximately $7,900 and $5,000 respectively.

Average Self-Employment Income,
Kentucky, Competitor States, and the U.S., 1969-2016
(nonfarm proprietor income/nonfarm proprietor employment)

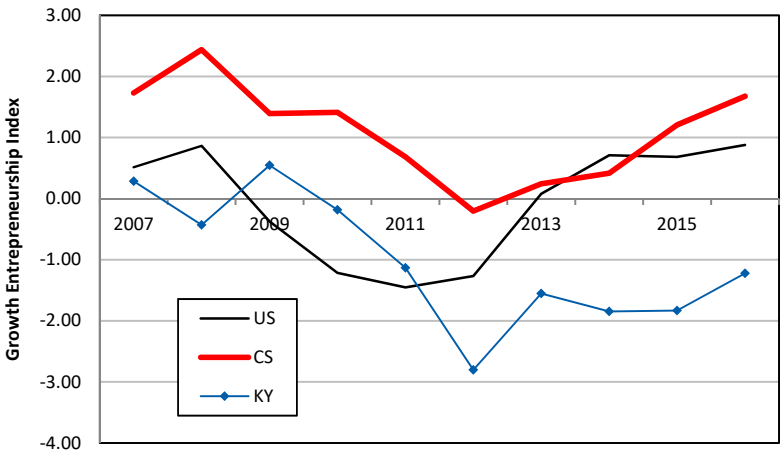


Source: U.S. Department of Commerce, Bureau of Economic Analysis

ENTREPRENEURIAL BREADTH

The Kauffman Foundation Index of Growth Entrepreneurship is based on three factors: the rate of startup growth, which measures the average employment growth in a firm's first five years; the share of "scaleups," which is the prevalence of firms that started with less than 50 people but employ at least that many by the tenth year of operation; and the density of high-growth companies, which is the prevalence of companies with a minimum of $2 million in annual revenue that also experience 20 percent annualized growth over a three-year period. This Index "is a composite measure of entrepreneurial business growth in the United States that captures growth entrepreneurship in all industries and measures business growth from both revenue and job perspectives." Since the peak of the previous economic expansion in 2007, Kentucky has lost ground to itself—evidenced by a lower index value in 2016 compared to 2007—but its standing among the states has remained the same, ranking 39th in both 2007 and 2016. Both the U.S. and the competitor states have similar index values in 2016 as they had in 2007.

Kauffman Index of Growth Entrepreneurship, 2007-2016, Kentucky, Competitor States, and the U.S.

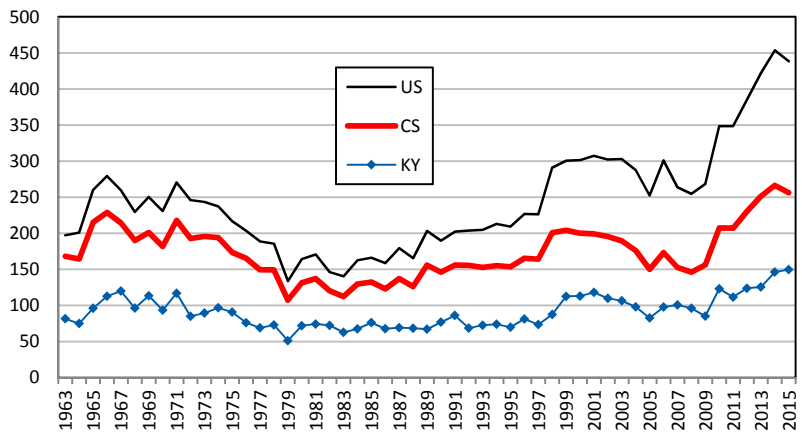


Source: Kauffman Foundation, 2017 Growth Entrepreneurship Index
Note: CS is an average of Kentucky's competitor states, calculated by the author

PATENTS

Innovation, as measured by the number of patents issued, is widely regarded as a measure of a state's entrepreneurial energy. Research finds that innovation, along with education, has a significant impact on a state's per capita income. A study by the Federal Reserve Bank of Cleveland shows that states which spawn innovation, as measured by patents, can reap economic rewards that endure for generations. The authors conclude, "A state's knowledge stocks (as measured by patents and education levels) are the main factors explaining a state's relative per capita income." In other words, Kentucky's much lower-than-average patent stock—which has trailed the U.S. as well as the competitor states for the last 50 years—along with lagging educational attainment rates, are why the state's per capita income has been languishing at just over 80 percent of the U.S. average for the last several decades.

Number of Patents,
Kentucky, Competitor States, and the U.S., 1963-2015
(per 1 million population)

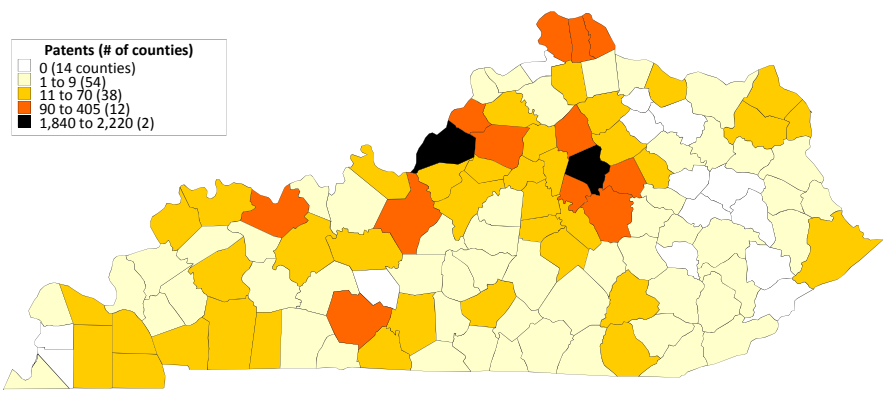


Source: US Patent and Trademark Office and U.S. Census Bureau

PATENTS BY COUNTY

From 2000 to 2015, Kentucky businesses and individuals acquired 7,639 utility patents, which are patents for invention. Of this total, 4,066 or 53 percent were from two counties: Fayette and Jefferson. The next 12 counties account for 2,310 or 30 percent. The county-level map illustrates the concentrated nature of patent generation in Kentucky.

Utility Patents by County, 2000-2015

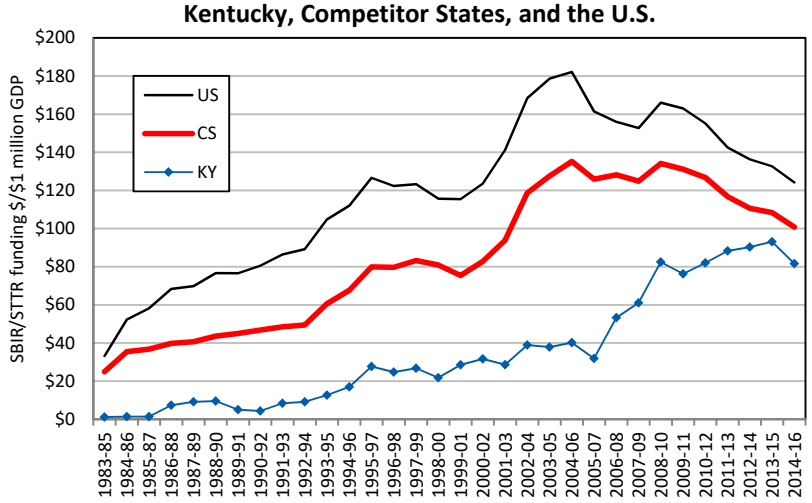


Source: U.S. Patent and Trademark Office, U.S. State Patenting, Breakout by Regional Component, Count of 2000-2015 Utility Patent Grants

SMALL BUSINESS INNOVATION RESEARCH

Small Business Innovation Research (SBIR) and Technology Transfer (STTR) funding is available to companies with 500 or fewer employees; it is designed to stimulate high-technology innovation and facilitate the commercialization of scientific and technological discoveries. According to the National Science Foundation, "a high value indicates that small business firms in a state are doing cutting-edge development work that attracts federal support." When compared to competitor states and the U.S. average, Kentucky has consistently lagged behind—but this appears to be changing. Over the last 10 years, SBIR/STTR funding as a percentage of gross domestic product has been generally declining in the U.S. and competitor states while steadily increasing in Kentucky. However, as the figure shows, Kentucky's $82 per $1 million in state gross domestic product during 2014-16 period declined from the previous time period. Kentucky has made up a lot of ground in the last decade, but is still below the U.S. ($124) and competitor states ($101).

Small Business Innovation Research (SBIR)
& Technology Transfer (STTR) Funding, 1983-2016,
Kentucky, Competitor States, and the U.S.

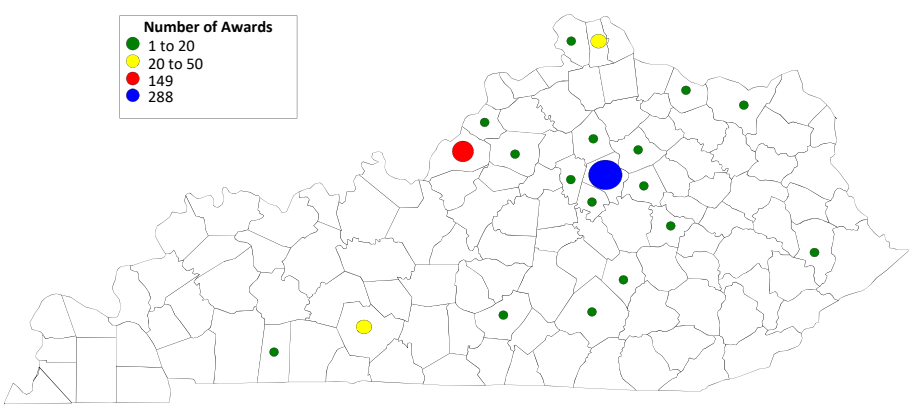


Source: Author's analysis of SBIR/STTR data

SBIR/STTR AWARDS BY COUNTY

Of all the dollars invested through the SBIR and STTR programs from 1983 to 2016, the majority went to ventures in two counties: Fayette and Jefferson. There were approximately 561 awards in Kentucky during this time and 288 were in Fayette County, representing 46 percent of the total *funding*. Jefferson County was the second highest recipient with 149 awards and around 33 percent of the total funding. Kenton, Woodford, and Warren Counties received 78 awards and 14.3 percent of the total funds. These five counties account for virtually all of Kentucky's SBIR/STTR awards during this period (93%), which is indicative of the geographic concentration of Kentucky's innovation ecosystem.

Kentucky SBIR/STTR Awards by County, 1983-2016

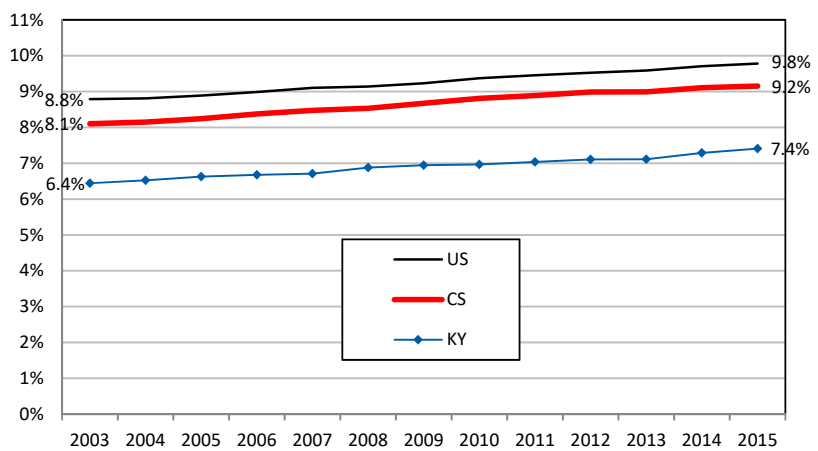


Source: Authors' analysis of data from www.sbir.gov

HIGH-TECHNOLOGY ESTABLISHMENTS

According to the National Science Foundation (NSF), high-technology industries have at least twice the number of scientific, engineering, and technical occupations compared to the average for all industries. These workers have extensive education and training in the sciences, mathematics, and engineering. We use 50 different industries (at the 4-digit NAICS level) to identify high-technology establishments. Using the 46 sectors identified by NSF and four additional identified by the Milken Institute, we calculate the number of high-technology establishments as a percentage of total establishments. Dating back to 2003 Kentucky has consistently trailed the competitor states and the U.S. In 2015, 9.2 percent of establishments in competitor states and 9.8 percent in the U.S. are considered "high-tech." In the same year only 7.4 percent of Kentucky establishments are considered "high-tech," ranking it 43rd nationally. The top ranked state is Virginia with 13.6 percent (DC is higher at 18.4%), and South Dakota is ranked last with 6.3 percent.

High-Technology Establishments,
Kentucky, Competitor States, and the U.S., 2003-2015
(as a percent of total establishments)

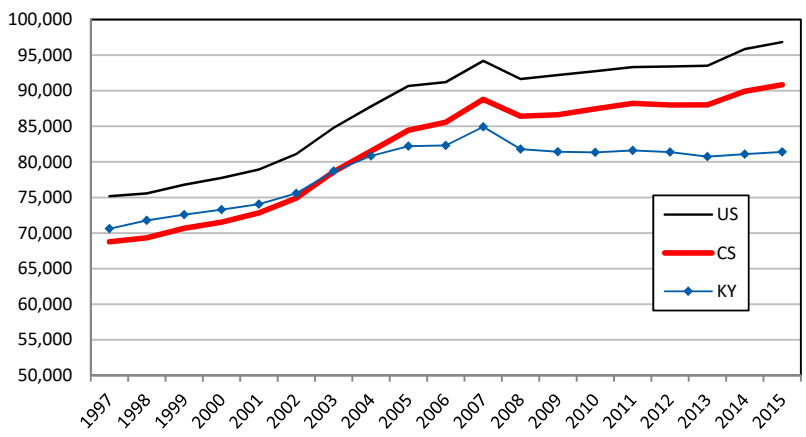


Source: Author's analysis of County Business Patterns, U.S. Census Bureau, various years

NONEMPLOYER ESTABLISHMENTS

This is a measure of self-employment. According to the Census Bureau, "A nonemployer business is one that has no paid employees, has annual business receipts of $1,000 or more ($1 or more in the Construction industry), and is subject to federal income taxes." Some examples of these businesses are beauty salons, child-care providers, landscaping services, barber shops, real estate agents, tax preparers, and electricians—just to name a few. These types of small enterprises grew steadily from the late 1990s until the Great Recession in 2008, when the growth rate stalled. Since then, the U.S. and the competitor states have rebounded and are now slightly above their pre-recession rates. Historically, Kentucky's rate has been lower than the competitor states and the U.S., and since the Great Recession Kentucky's rate has been essentially flat.

Nonemployer Establishments,
Kentucky, Competitor States, and the U.S., 1997-2015
(per 1 million noninstitutionalized civilian population)

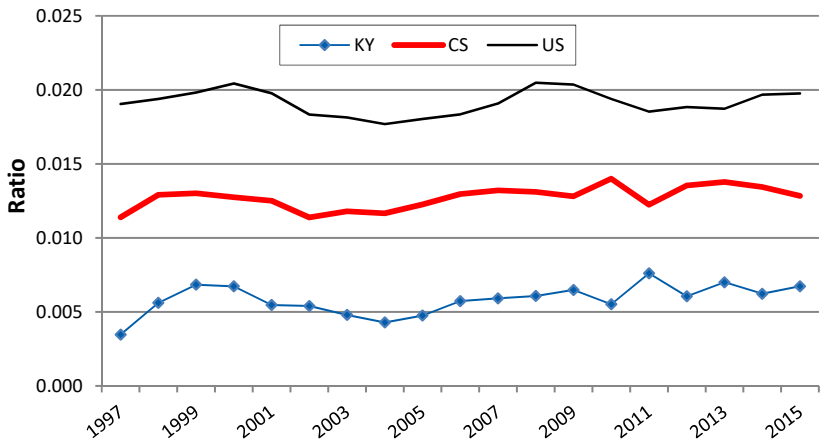


Source: Author's analsyis of data from the U.S. Census Bureau

INDUSTRIAL RESEARCH & DEVELOPMENT

A January 2012 report by Regional Technology Strategies, Inc., *Innovation Capacity: Calibrating Kentucky*, which was prepared for the Kentucky Science and Technology Corporation, states that "while a raft of diverse indicators and metrics are often employed to build a profile of a state's innovation support capacity, the single most important measure is generally held to be industry R&D." The report notes that in 2008 Kentucky was ranked 40th among the states on this measure when expressed as a percentage of total worker earnings. Nationally, funds spent by industry constituted over half of all funding for research and development. It is believed that these funds are directly related to productivity gains and innovation capacity. In Kentucky, the ratio of industrial research and development funds relative to gross domestic product was 0.00673. By comparison, the competitor state average in 2015 was nearly twice as high (0.01284) and the U.S. average was almost three times higher (0.01976). Massachusetts has the highest amount nationally at 0.04392 and Alaska the lowest with 0.00124. In terms of the highest amount expended in absolute dollars among the competitor states, Illinois registered $12.7 billion—compared to Kentucky's $1.3 billion.

Funds for Industrial R&D Performance,
Kentucky, Competitor States, and the U.S., 1997-2015
(ratio of funds relative to gross domestic product)

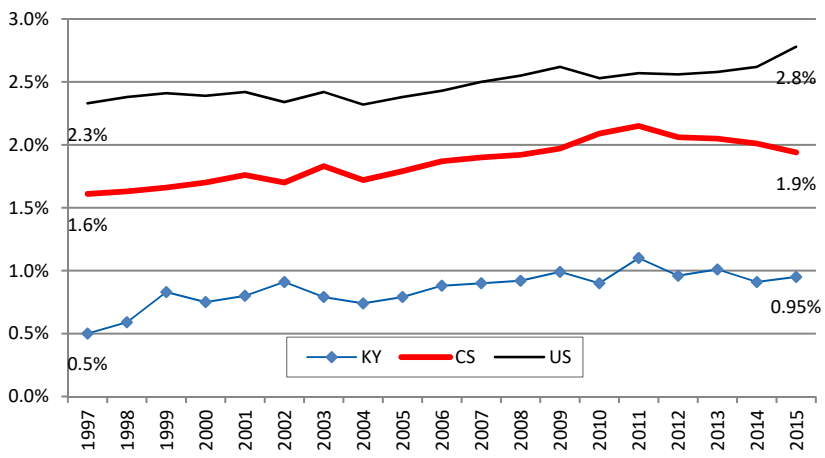


Source: National Science Foundation, Business and Industrial R&D, various years
Note: Missouri data are not available for 2011.

TOTAL RESEARCH & DEVELOPMENT

While industrial research and development performance accounts for close to 72 percent of the national total, colleges and universities, non-profits, federal and state government agencies account for the rest. According to the National Science Foundation (NSF), "a high value indicates that a state has a high intensity of R&D activity, which may support future growth in knowledge-based industries." NSF also points out that "states with high rankings on this indicator also tended to rank high on S&E (science and engineering) doctorate holders as a share of the workforce." When expressed as a percentage of state gross domestic product, the competitor state average in 2015 was just under 2 percent, compared to Kentucky's value of just under 1 percent (0.95%); the U.S. average was about 2.8 percent.

Total Research and Development Expenditures, Kentucky, Competitor States, & the U.S., 1997 to 2015
(as a percentage of state gross domestic product)

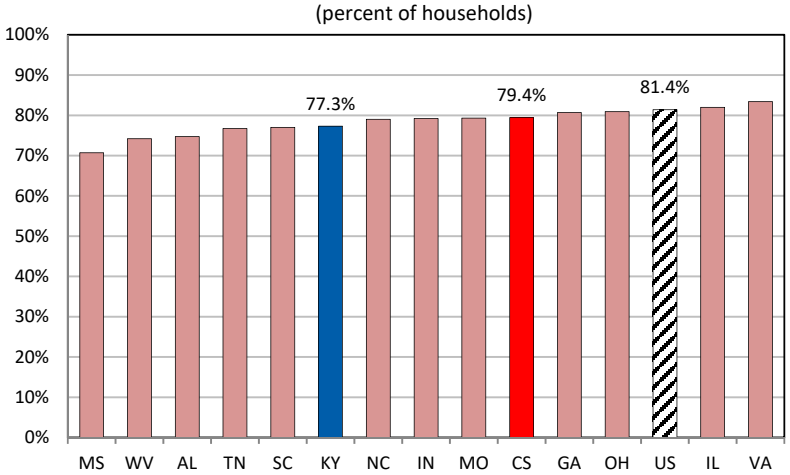


Source: National Science Foundation/National Center for Science and Engineering Statistics. National Patterns of R&D Resources, various years. Note: Missouri data are interpolated for 2011.

High-Speed Internet

The nearly instantaneous data transfers enabled by broadband or high-speed internet has accelerated globalization of the economy. 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. Access to and use of the internet appear to be increasingly important for anyone becoming politically informed, socially integrated, and economically successful in the Information Age. Studies suggest that enhancing the nation's broadband infrastructure can improve innovation, entrepreneurship, and productivity (Brookings, 2013). Indeed, numerous studies have identified measurable economic benefits associated with widespread access to high-speed Internet. In the United States, an estimated 81.4 percent of the households have a broadband connection, compared to 79.4 percent for the competitor states and 77.3 percent for Kentucky. Mississippi, West Virginia, and Alabama have statistically significant lower rates than Kentucky, while Tennessee, South Carolina, and Kentucky are statistically the same (using a 90 percent confidence interval). The rest of the states shown in the bar chart below, as well as the competitor state and U.S. averages, are statistically higher than Kentucky.

Broadband Internet Access from Home, 2016, Kentucky, Competitor States and the U.S.
(percent of households)

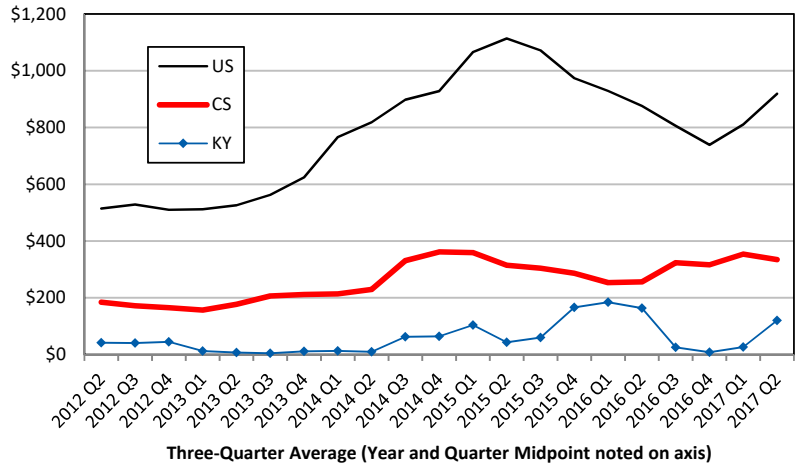


Source: American Community Survey, Table GCT2801 2016 1-Year Estimate
Note: "CS" is the weighted average of the competitor states.

VENTURE CAPITAL

According to the Kauffman Foundation, most young companies are started from the savings of their founders and then sustained by positive cash flow. The next largest source of capital for young companies is credit cards, followed by borrowed money from family and friends, banks, and then venture capital. Research also shows that less than 20 percent of the fastest growing companies in the United States took any venture money. Moreover, venture capital investments are typically concentrated in a just few states, such as California, New York, and Massachusetts. Nevertheless, the level of venture capital in a state's economy is frequently used as an indicator of innovation capacity and entrepreneurial energy. In 2016, venture capital investments in Kentucky were $126 per $1 million of state gross domestic product—which was substantially lower than the competitor states ($307) and the U.S. average ($823).

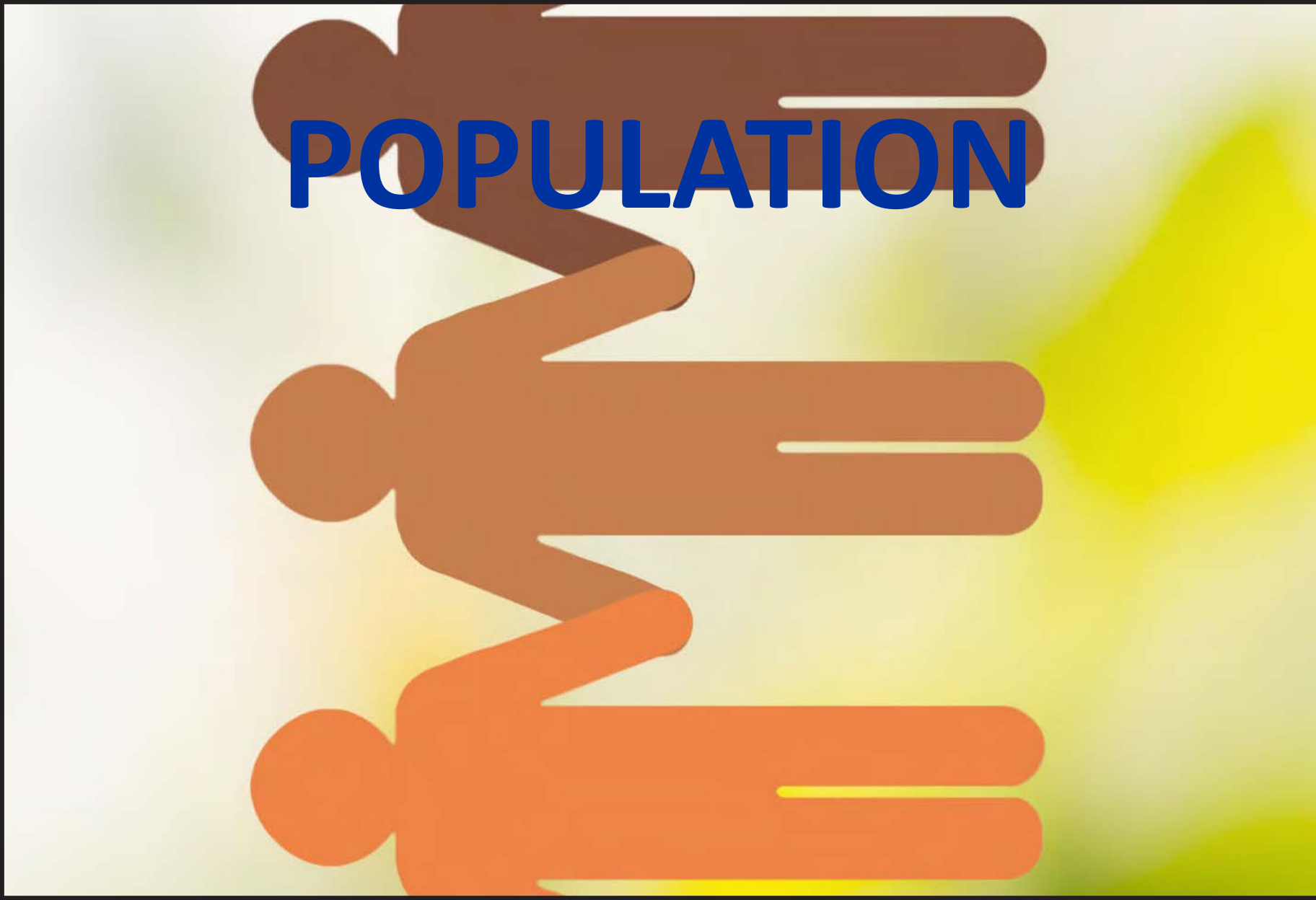
Venture Capital Investments,
Kentucky, Competitor States, and the U.S., 2012-2017
(Current dollars, per $1 million/state GDP)



Three-Quarter Average (Year and Quarter Midpoint noted on axis)

Source: Author's analysis of data from PricewaterhouseCoopers and Bureau of Economic Analysis

POPULATION



Population

BECAUSE KENTUCKY IS GENERALLY more rural, has fewer minority citizens, and is somewhat older, the population has grown more slowly here compared to the U.S. Moreover, a state's population growth rate is indicative of its economic energy. Between the peak of the last economic expansion, which was during the fourth quarter of 2007, and the "present" (2016), Kentucky experienced slower population growth (4.2%) than the U.S. (7.3%) or the competitor state averages (5.5%). During this time period, there were marked regional differences within the state. Kentucky's Urban Triangle experienced a 7.6 percent increase, and South Central Kentucky is not far behind at 5.2 percent. However, the population in Western Kentucky grew less than 1 percent and in Eastern Kentucky it declined 2.8 percent. And there are several counties with population levels lower in 2016 compared to 2007. In fact, 61 counties, largely in Eastern Kentucky, but several in the Western Kentucky, lost population during this time. The five largest declines were in Lee (-16.2%), Fulton (-9.9%), Harlan (-9.3%), Martin (-9.2%), and Leslie (-9.0%) Counties; with another 18 counties experiencing declines ranging from 4 to 8 percent, mainly in the traditional coal

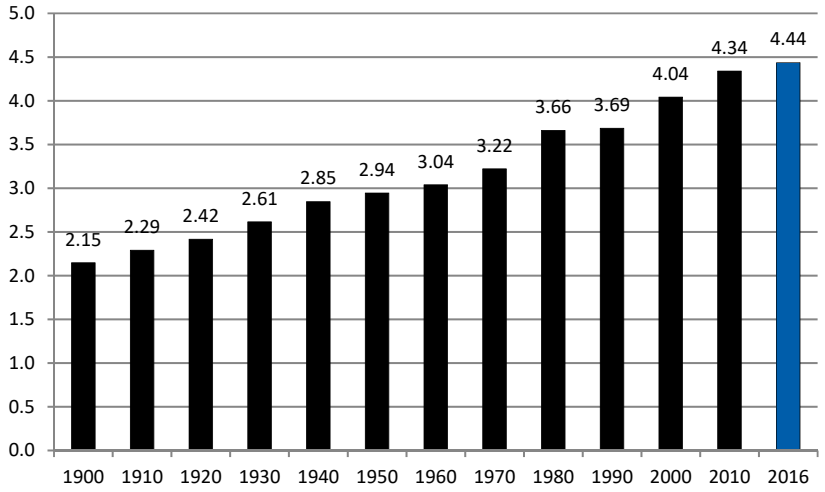
Immigrants strengthen our communities and bolster our economy.

producing counties of both Western and Eastern Kentucky. On the other hand, population growth in much of Northern and Central Kentucky has been strong. The fastest growing counties were Scott (24.1%), Warren (16.9%), Shelby (15.1%), Boone (14.4%), and Jessamine (13.7%). Immigration can help grow the state's population, but Kentucky's foreign-born population is relatively small (3.5%). By comparison, the competitor state and U.S. averages are 7.5 and 13.5 percent, respectively. Immigrants strengthen our communities and bolster our economy. University of Kentucky economist Dr. Jenny Minier notes that "more than 40% of Fortune 500 companies, including American icons like Apple, Budweiser, Google, and McDonald's, were founded by immigrants or the children of immigrants." Their economic contribution extends across the entire range of jobs in the labor force, from those who harvest agricultural products to those occupying Fortune 500 CEO suites. One telling statistic of their impact is this: the percentage of U.S. or native-born Kentuckians with a Bachelor's degree or higher is 23 percent, while the percentage of foreign-born Kentuckians with a Bachelor's or higher is 34 percent—one out of three compared to one out of four.

POPULATION TOTALS

Kentucky's population in the 2010 Census was 4,339,367, representing a 7.4 percent increase from the 2000 Census population of 4,041,769 and ranking it the 26th most populous state. As former state demographer Michael Price at the University of Louisville pointed out after the 2010 Census, while "the U.S. population grew at a faster pace (9.7 percent), the state population growth of nearly 300,000 persons is significant—the equivalent of adding a second Lexington." Kentucky's population was essentially flat from 1940 to 1970, growing by just over 13 percent while the U.S. population increased by over 55 percent. However, from 1970 to 2010, Kentucky's population increased by 35 percent, which is lower than the competitor states (41 percent) and the United States (52 percent), but represents a significant increase from the preceding decades. The most recent population estimate (2016) for Kentucky is 4,436,974.

Population Totals, Kentucky, 1900-2016
(millions)

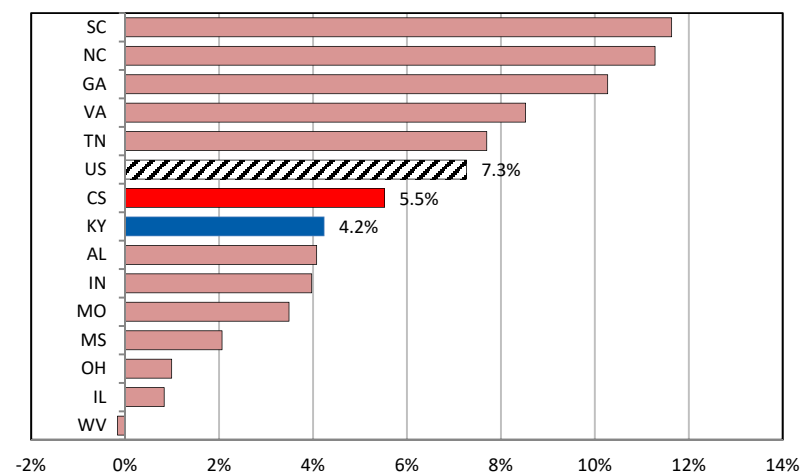


Source: U.S. Census Bureau

POPULATION CHANGE

A state's population growth rate is indicative of its economic energy. Here we present state growth rates between the peak of the last economic expansion, which was during the fourth quarter of 2007, and the "present" (2016). By 2016, the U.S. population was 7.3 percent higher than the peak of the last economic expansion (or in 2007). As evidenced in the chart below, Kentucky experienced slower population growth (4.2%) than the U.S. or the competitor state average (5.5%). Generally, there is a consistency between these population growth rates and total *private* employment growth during the same time period (see page 68). The populations of South Carolina, North Carolina, Georgia, Virginia, and Tennessee grew at a faster rate than the U.S.; Kentucky, however, grew less than two-thirds of the U.S. rate. At 17.5 percent, Utah has the highest growth rate during this period, and Michigan has the lowest (-0.7%); Kentucky has the 33rd highest growth rate among the states.

Percentage Change in Population 2007-2016, Kentucky, Competitor States, & the U.S.



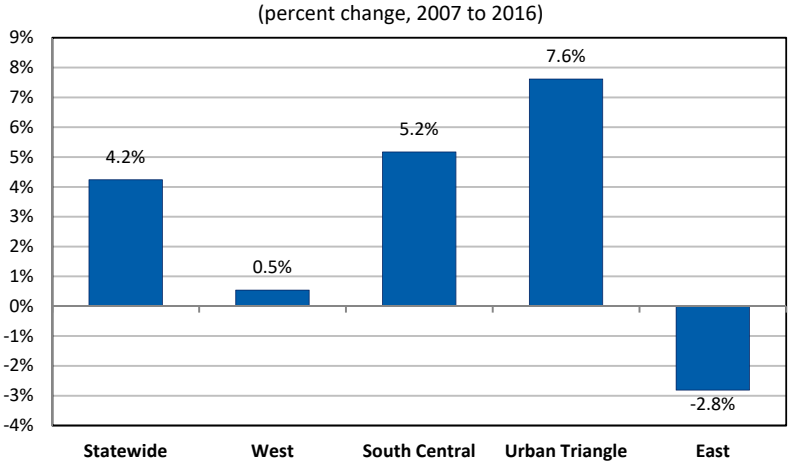
Source: U.S. Census Bureau

REGIONAL POPULATION CHANGES

Population growth rates within a state can serve as an indicator of economic trends. The population growth rate of Kentucky and its regions from the peak of the last economic expansion in 2007 to the present (2015) is shown below (a county-level map of these four regions is available in the glossary). Kentucky's Urban Triangle experienced a 7.6 percent increase; South Central Kentucky is not far behind at 5.2 percent. However, the population in Western Kentucky only grew less than 1 percent and in Eastern Kentucky it *declined* 2.8 percent. For comparison purposes, Kentucky's overall population increased 4.2 percent and the U.S. increased 7.3 percent over the same time period.

Population Change in Kentucky Regions,
Peak of the Last Economic Expansion to the Present

(percent change, 2007 to 2016)

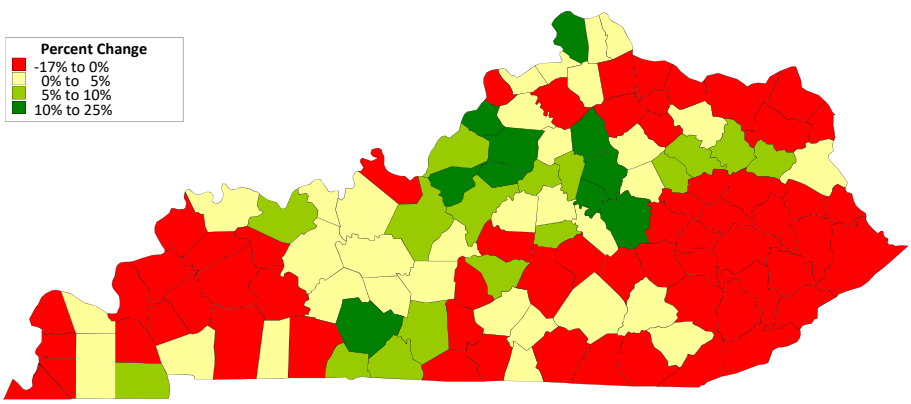


Source: Author's calculations using data from the U.S. Census Bureau. See glossary for map of Kentucky regions by county.

COUNTY POPULATION CHANGES

From the peak of the last economic expansion in 2007 to the present (2016), there have been some significant county-level population changes in Kentucky. As illustrated in the map below, the population in several counties was lower in 2016 compared to 2007. Overall, in fact, 61 counties, largely in Eastern Kentucky, but several in the western part of the state, lost population during this time period. The five largest declines were in Lee (-16.2%), Fulton (-9.9%), Harlan (-9.3%), Martin (-9.2%), and Leslie Counties (-9.0%); there were another 18 counties that experienced *declines* ranging from 4 to 8 percent, mainly in the traditional coal producing counties of both Western and Eastern Kentucky. On the other hand, population growth in much of Northern and Central Kentucky has been strong. The ten fastest growing counties all experienced double-digit increases, and include Scott (24.1%), Warren (16.9%), Shelby (15.1%), Boone (14.4%), Jessamine (13.7%), Oldham (13.1%), Fayette (12.4%), Spencer (11.8%), Madison (11.0%), and Bullitt Counties (10.6%). By comparison, Kentucky's population increased by 4.2 percent and the U.S. increased by 7.3 percent.

Kentucky County Population Change, 2007 to 2016

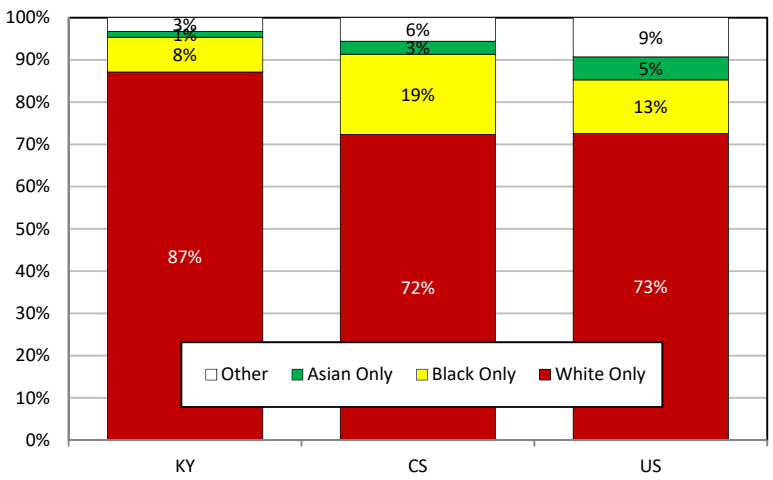


Source: U.S. Census Bureau

MINORITY POPULATION

In today's global economy, diversity is increasingly important and recognized as a community asset. In 2016, racial minorities comprised 27 to 28 percent of U.S. and competitor state populations, and only 13 percent of the Kentucky population. Kentucky's racial composition breaks down like this: white not Hispanic (87.1%), black (8.3%), Asian (1.4%), and other (3.2%). Kentucky's minority population is more concentrated in the state's metropolitan areas; in 2010, four of every five persons of color in Kentucky lived in metropolitan areas. While not depicted in the chart below, those who identify as Hispanic or Latino is significantly lower in Kentucky (3.4%) compared to the U.S. (17.8%) and competitor states (7.9%).

Population by Race, 2016,
Kentucky, Competitor States, and the U.S.
(percent of individuals)

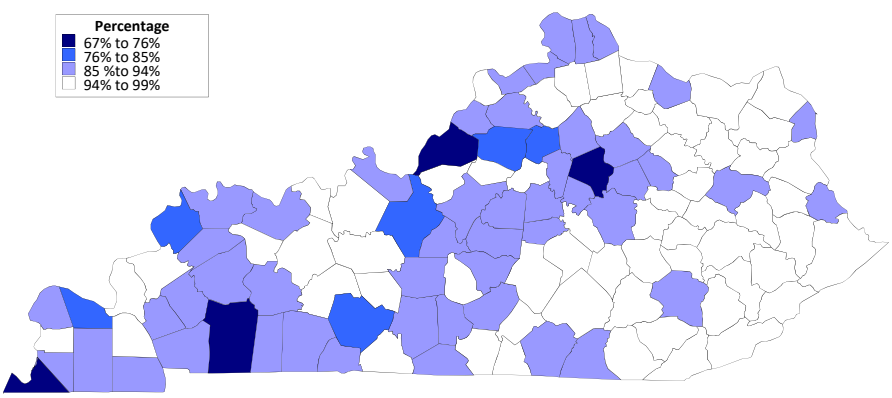


Source: American Community Survey, 2016 1-year estimate

WHITE, NON-HISPANIC POPULATION

An estimated 62 percent of the U.S. population and 85.4 percent of the Kentucky population is white (alone), non-Hispanic; the competitor state average is 68.3 percent. Using this as a measure of diversity, Christian County—where Ft. Campbell is located—is the state's most diverse county at 67 percent. Jefferson, Fulton, and Fayette Counties are second, third, and fourth at 69, 71, and 72 percent, respectively. The state's least diverse counties are clustered mainly in the east, with several counties at or above 95 percent comprised of white (alone), non-Hispanic. As we indicated on the previous page, diversity is increasingly viewed as a necessary community characteristic for creating a vibrant and robust local economy.

White Alone (non-Hispanic Population), 2012-2016
(percentage of total population)

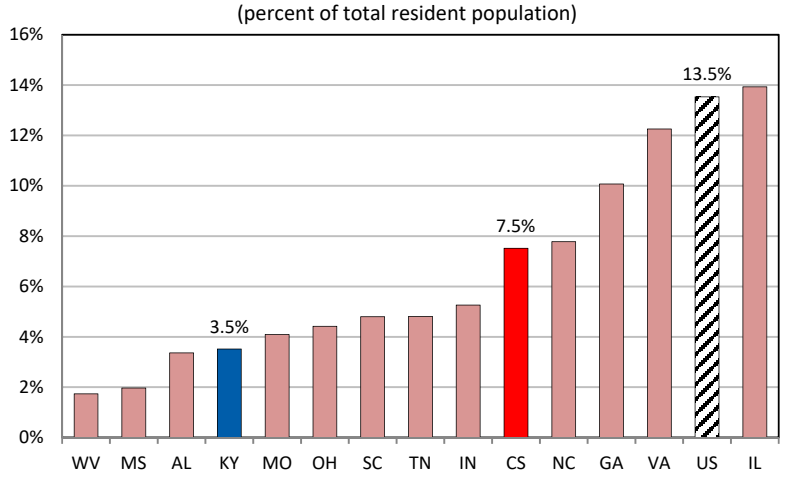


Source: U.S. Census Bureau, 2012-2016 5-Year American Community Survey

FOREIGN-BORN POPULATION

Immigrants strengthen our communities and bolster our economy. In a September 2017 paper, *Immigrants Benefit the Community and Economy*, authored by University of Kentucky economist Dr. Jenny Minier, she notes that "more than 40% of Fortune 500 companies, including American icons like Apple, Budweiser, Google, and McDonald's, were founded by immigrants or the children of immigrants." Moreover, Minier cites a recent study which finds that "over half of the 87 technology startups valued at over $1 billion were co-founded by immigrants, and on average, these companies had created 760 new jobs." The economic contribution of immigrants extends, of course, across the entire range of jobs in the labor force, from those who harvest agricultural products to those occupying Fortune 500 CEO suites. The percentage of foreign-born individuals in Kentucky is 3.5 percent, less than half of the competitor state average (7.5%) and a quarter of the U.S. average (13.5%).

Foreign-Born Population, 2016,
Kentucky, Competitor States and the U.S.
(percent of total resident population)

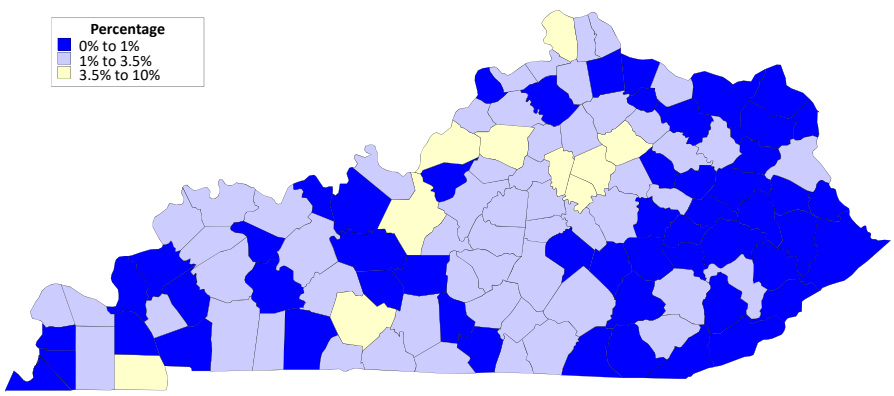


Source: American Community Survey, Table B05002 2016 1-Year Estimate
Note: "CS" is the weighted average of the competitor states.

FOREIGN-BORN POPULATION BY COUNTY

Kentucky's percentage of foreign-born population is relatively low, but it is approaching ten percent in a few areas, such as Fayette (8.9%) and Warren Counties (9.3%). As one can see on the map below, the Kentucky counties with the highest percentages of foreign-born individuals are disproportionately located in the urban triangle, the area of the state's economic engine. Nonetheless, even in counties with a small number of foreign-born individuals, these immigrants frequently play an outsized role in their local communities as business owners, entrepreneurs, and health care providers. Indeed, many are serving in medically underserved areas of rural Kentucky. One telling statistic, that is indicative of their impact, is this: the percentage of U.S. or native-born Kentuckians with a Bachelor's degree or higher is 23 percent, while the percentage of foreign-born Kentuckians with a Bachelor's or higher is 34 percent—one out of three.

Foreign-Born Population by Kentucky County, 2012-2016
(percentage of total county population)

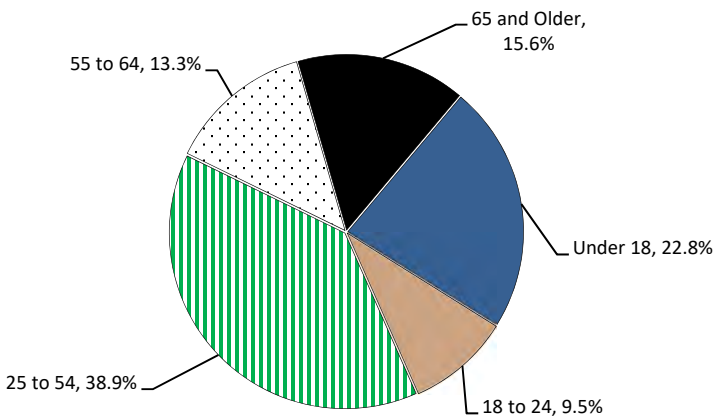


Source: U.S. Census Bureau, 2016 5-Year American Community Survey

Population by Age Group

Kentucky's population is aging, evidenced by the median age increasing from 35.9 years in 2000 to 38.1 in 2010—and on to 38.7 in 2016. The U.S. median age, by comparison, is slightly lower, evidenced by 37.2 in 2010 and 37.9 in 2016. The number of persons in Kentucky aged 65 and above increased by 112,500, or by 19.5 percent, from 2000 to 2016; by comparison, this age group increased by 22.3 percent in the U.S. and 20.9 percent in the competitor states. However, at 15.6 percent of Kentucky's total population, it represents about the same proportion as in the U.S. (15.2%) and competitor states (15.3%). The same is true for the other age groups—the distribution of age groups in Kentucky is more or less consistent with the U.S. and competitor state percentages. For example, the prime working age group, 25 to 54, comprises 38.9 percent of Kentucky's total population, compared to 39.6 percent in the U.S. and 39.3 percent in the competitor states.

Kentucky Population Distribution, by Age Group, 2016

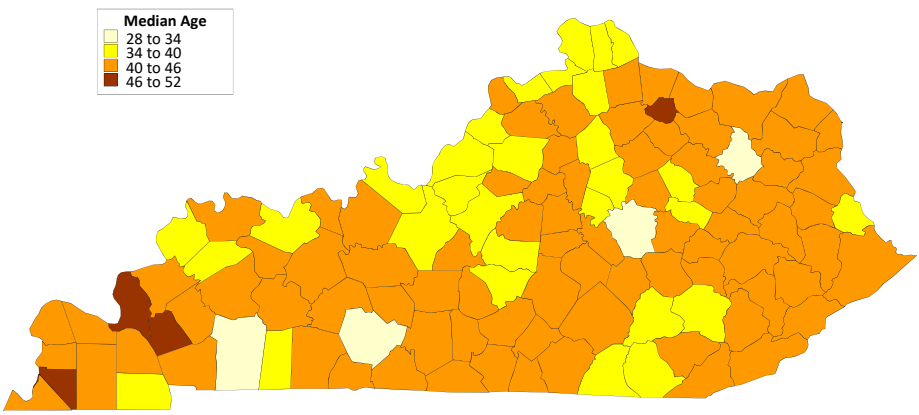


Source: U.S. Census Bureau

MEDIAN AGE

The county-level median age in Kentucky ranges from a low of 28.3 in Christian County to a high of 49 in Lyon County. The median is the middle point in a distribution; it is the point where half the population is above and half is below. The median ages for the U.S. and Kentucky are 37.7 and 38.6, respectively. In general, counties with military installations or college campuses will have lower median ages. In addition to Christian, five other counties have median ages below 36: Rowan, Warren, Calloway, Madison, and Fayette. On the other hand, in addition to Lyon County, three other counties have median ages 46 or older: Livingston, Robertson, and Hickman.

Median Age by County, 2012-2016

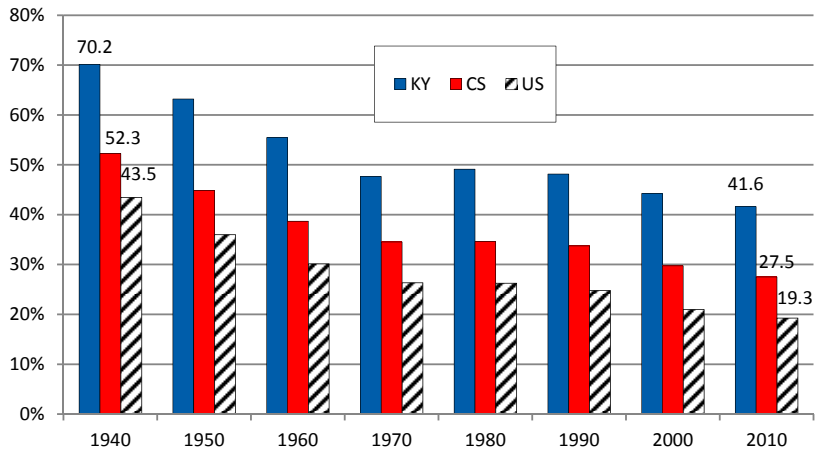


Source: U.S. Census Bureau, 2012-2016 5-Year American Community Survey

RURAL POPULATION

While Kentucky has become increasingly urban over the years, a significant portion of Kentucky's population live in rural areas—especially compared to its competitor states and the U.S. In the 2010 Census, nearly 42 percent of Kentucky's population resided in rural areas (the balance of 58 percent live in urban areas), compared to about 28 percent in the competitor states and around 19 percent in the U.S. Rural communities can have many unique and appealing assets that provide a foundation for economic development activities. For example, natural amenities such as mountains, lakes, streams, forests, and wildlife can be used to leverage economic development and attract individuals hoping to find more idyllic surroundings. At the same time, there are many development challenges associated with building diverse economies and providing an adequate infrastructure in rural areas.

Population Living in Rural Areas,
Kentucky, Competitor States, and the U.S.
(percent of individuals)



Source: U.S. Census Bureau


PUBLIC FINANCE

Public Finance

KENTUCKY'S OVERALL FISCAL CONDITION was ranked 47th by the Mercatus Center at George Mason University in its 2017 *Ranking the States by Fiscal Condition* report. Their evaluation, which is derived from FY 2015 state financial data, rests on 13 different financial indicators. Using these indicators, they create five dimensions of solvency to assess each state's short- and long-term fiscal prospects. Unfortunately, Kentucky performs below the U.S. average on each of the five dimensions: 37th on budget solvency, 44th on trust fund solvency, 41st on service-level solvency, 39th on cash solvency, and 46th on long-run solvency. To be certain, there are budgetary challenges on the horizon. Kentucky's public pension programs, for example, are in dire financial shape, evidenced by an estimated $32.8 billion unfunded liability. By multiple measures, Kentucky's public pension system ranks as one of the most financially troubled among the 50 states. Moreover, Kentucky has a substantial structural deficit. We estimate that tax revenue elasticity is about 0.88. This means that, on average, tax revenue increases at about 88 percent of the overall economic growth rate. Ideally, revenue elasticity would be 1.0, indicating that, on average, state revenue

A broader tax base would help ensure that revenue keeps pace with economic growth.

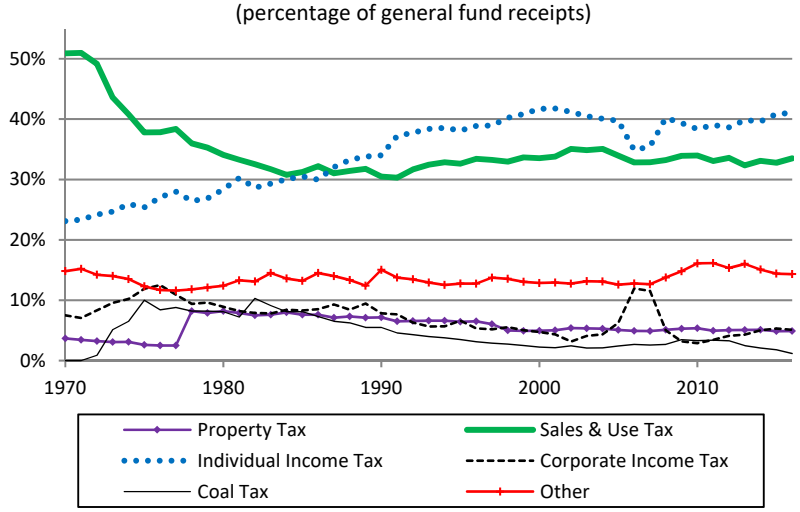
changes at the same rate as the state's economy. Since 2009, Kentucky's revenue growth has not kept pace with the economy. Revenue growth rates are affected by both changes in the revenue base and tax rates. Most states' revenue systems failed to keep pace with overall economic growth during the decade from 2000 to 2009 due to one or both factors. The Great Recession had a significant impact on both taxes and income during this period. Since the economic recovery began in 2009, the ratio of total tax compound annual growth rate and the personal income compound annual growth rate has increased to around 0.97 in the U.S. and among the competitor states, but it is lower in Kentucky (0.88). It is likely that the growing funding gap between the wealthiest and poorest school districts reflects the state's underlying budgetary problems. The Kentucky Center for Economic Policy, which highlights the "equity gap" in a December 2017 report, states that it is a "result of decreasing reliance on state funding for education and an increasing reliance on local school district resources." If the state's underlying financial weaknesses are not addressed, the state could find itself increasingly unable to fund other necessary government services.

General Fund Receipts by Source

Two sources of revenue—the individual income tax and the sales and use tax—account for 74.5 percent of Kentucky general fund revenue (FY2016). This figure illustrates how Kentucky's revenue system has fundamentally changed since 1970. Forty years ago the sales and use tax comprised 51 percent of Kentucky's general fund receipts, while income tax collections accounted for 23 percent. However, by the mid-1980s, the income tax accounted for more general fund revenue than the sales and use tax. The changing distribution of tax receipts reflects more basic changes in the economy—the gradual shift away from making products and toward providing services. Most states, including Kentucky, tend to apply a *broad-base* sales tax to goods but not services. Consequently, the state's tax base is gradually becoming narrower and losing elasticity—a measure of whether revenue is keeping pace with the economy.

Kentucky's General Fund Receipts by Major Sources, FY70 to FY16

(percentage of general fund receipts)



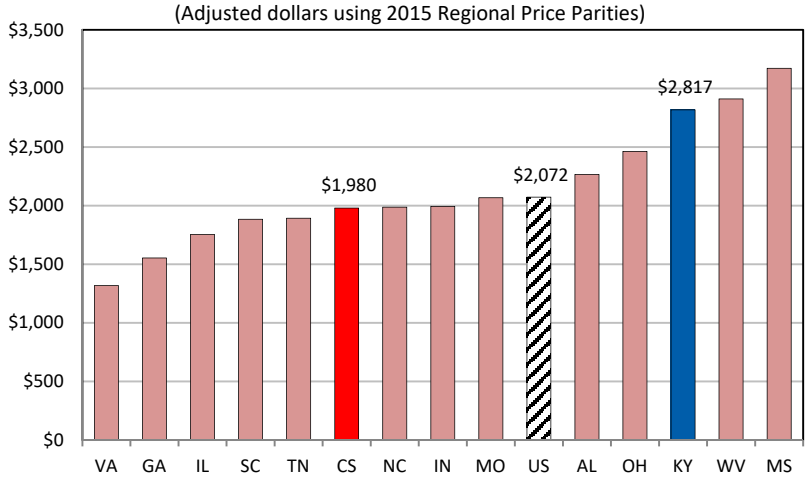
Source: Authors' calculations based on data from the Kentucky Finance and Administration Cabinet and the Kentucky Revenue Cabinet

REVENUE FROM FEDERAL TRANSFERS

Kentucky receives a significant amount of its total revenue from federal intergovernmental transfers. In 2015, this amounted to 27.5 percent of Kentucky's total revenue. The competitor state average was about 19.5 percent and the U.S. average was about 19.2 percent. These transfers are mainly for health care (Medicaid), education, transportation, and public safety. On per capita basis, Kentucky received about $2,817 in revenue from federal transfers, compared to $1,980 and $2,072 for the competitor states and U.S., respectively. Wyoming had the highest amount at $3,823 and Virginia the lowest at $1,318. These dollars have been adjusted to reflect state-level cost-of-living differences using regional price parity estimates from the U.S. Bureau of Economic Analysis.

State and Local Revenue From Federal Transfers, Per Capita, 2015, Kentucky, Competitor States, & the U.S.

(Adjusted dollars using 2015 Regional Price Parities)

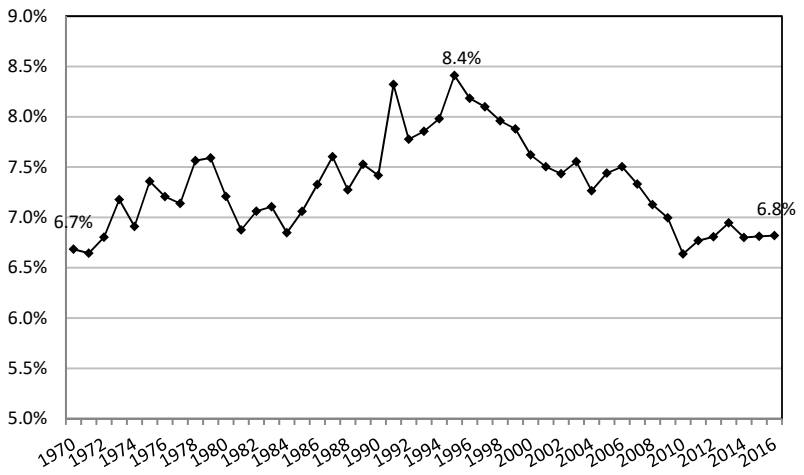


Source: U.S. Census Bureau, 2015 Annual Surveys of State and Local Government Finances

TAX COLLECTIONS AND PERSONAL INCOME

Kentucky's recurring budgetary problems are due, in part, to the long-term decline in revenue elasticity. There are several economic, demographic, and political factors contributing to the gradual reduction in elasticity. Regardless of how we assess the adequacy of the revenue structure, Kentucky's main revenue sources are growing slower than its economy. This point is illustrated by examining Kentucky's total tax collections as a percentage of personal income, which has declined steadily from its peak of 8.4 percent in 1995 to 6.8 percent in 2016. If these trends continue, we estimate that Kentucky tax revenue as a percentage of the economy could decline to around 6.6 percent by 2025—a similar level to 2010 during the Great Recession.

Kentucky Total State-Level Tax Collections as a Percentage of Total Personal Income, 1970-2016

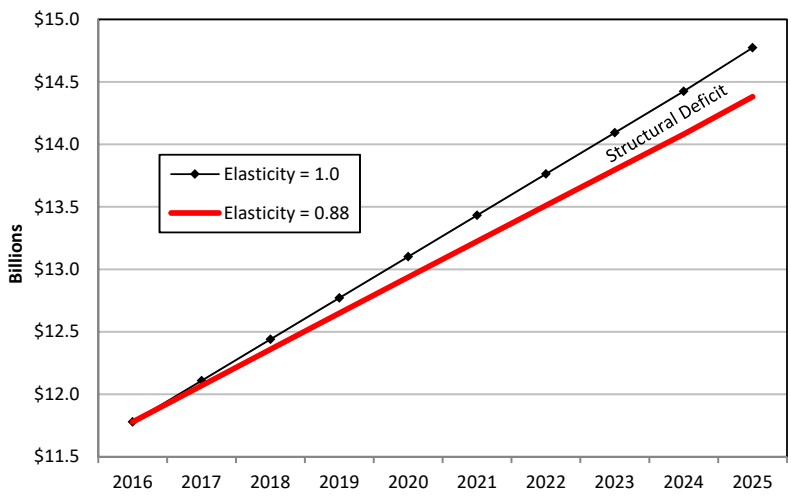


Source: Author's calculations based on data from the U.S. Department of Commerce, Bureau of Economic Analysis and U.S. Census Bureau, State Government Tax Collections, various years

STRUCTURAL DEFICIT

The work of the Governor's Blue Ribbon Commission on Tax Reform was conducted over five years ago, and we concluded then that the state had a substantial structural deficit. Our updated analysis, which is based on data from 2009 to 2016, suggests that Kentucky still has a significant structural deficit. We estimate that Kentucky's tax revenue elasticity is about 0.88. This means that, on average, tax revenue increases at about 88 percent of the overall economic growth rate. Ideally, revenue elasticity would be 1.0, indicating that, on average, state revenue changes at the same rate as the state's economy. Without fundamental tax reforms, Kentucky could face a $400 billion structural deficit by the 2024-2026 biennial state budget. Consequently, the state could find itself increasingly unable to fund necessary government services.

Simulated Kentucky Tax Revenue, 2016 to 2025

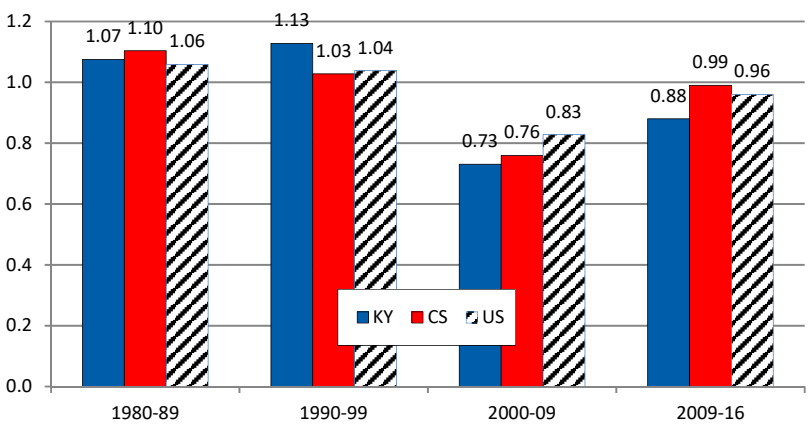


Source: Estimated by the author

GROWTH RATES, TAXES AND INCOME

Since 2009, Kentucky's revenue growth has not kept pace with the economy. Revenue growth rates are affected by both changes in the revenue base and tax rates. Most states' revenue systems failed to keep pace with overall economic growth during the decade from 2000 to 2009 due to one or both of these factors. The Great Recession had a significant impact on both taxes and income during this period. Using the ratio between the compound annual growth rates (CAGR) of revenue and personal income, we compare Kentucky to the competitor states and the U.S. during four time periods. We use 2009 as the end point in one period and the beginning of the next since it marks the end of the economic contraction and the beginning of the current expansion. A ratio of 1.0 indicates that the revenue is growing at the same rate as the economy—a desirable outcome. In Kentucky, as well as in many of the competitor states, the growth in total tax revenue slowed relative to the economy in the 2000s. As shown in the graph, the ratio between Kentucky's total tax CAGR and personal income CAGR declined to 0.73 with the competitor states declining to 0.76 and the U.S. to 0.83. Since the economic recovery began in 2009, the ratio has increased to around 0.96 to 0.98 in the U.S. and among the competitor states, but it is lower in Kentucky (0.88).

Ratio Between Compound Annual Growth Rates of Total Taxes and Personal Income, Various Periods, Kentucky, Competitor States, and the U.S.

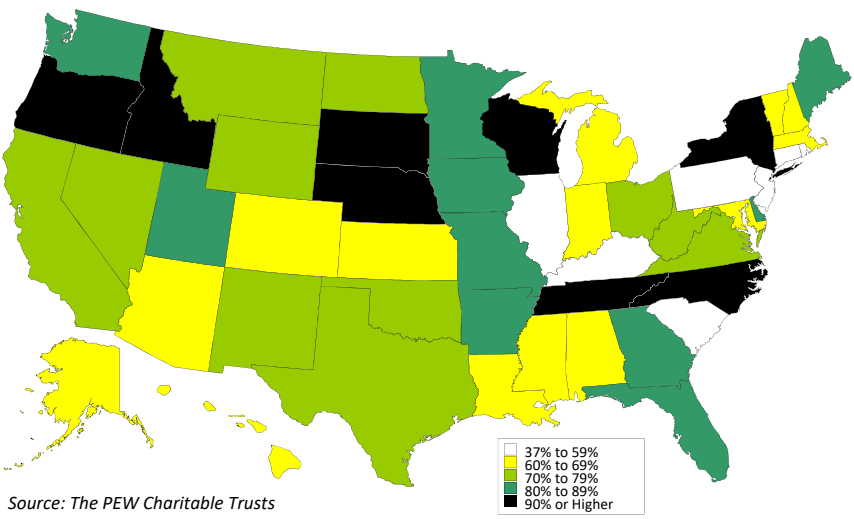


Source: U.S. Census Bureau, Bureau of Economic Analysis & State Government Tax Collections
Note: Total taxes are not adjusted for sales tax increases. Adjustments will produce slightly different results.

Public Pension Funding Gaps

Kentucky's public pension programs are in dire financial shape, evidenced by an estimated $32.8 billion unfunded liability (based on 2016 actuarial assumptions). By multiple measures, Kentucky's public pension system ranks as one of the most financially troubled among the 50 states. There are eight public pension programs: County Employees' Retirement System (Hazardous & Non-Hazardous); Kentucky Employees' Retirement System (Hazardous & Non-Hazardous); State Police Retirement System; Judicial Retirement Fund; Legislators' Retirement Fund; and the Teachers' Retirement System. In 2015, these pension funds were funded at approximately 38 percent of the level needed to be fully funded—one of the lowest funded ratios in the country. The map below, which is produced from 2015 data published in the PEW Charitable Trusts, *Measuring the Fiscal Health of State Pension Plans* (July 2017), shows Kentucky's position relative to other states. Unfortunately, since 2015 Kentucky's pension programs have lost additional financial ground and unfunded liabilities are continuing to grow. The state's ability to improve the finances supporting these public pension programs is tightly linked to the state's overall financial health, as discussed on the preceding pages.

Public Pension Funded Ratios, 2015

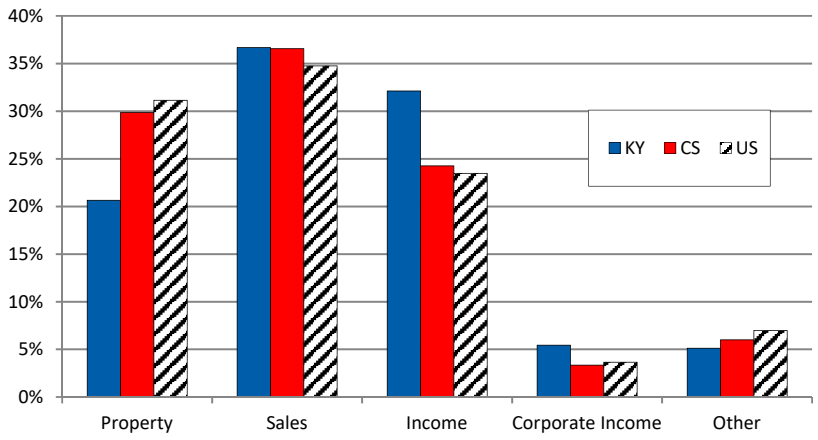


Source: The PEW Charitable Trusts

STATE AND LOCAL TAX REVENUE BY SOURCE

This figure shows the percentage of revenue collected by each reported tax source for Kentucky and a weighted-average of its competitor states and the U.S. Kentucky is significantly less reliant on property taxes than its competitors (and the U.S.), who raise a much larger share of local tax revenue from the property tax, and particularly those states to the north of Kentucky. Kentucky has no general sales tax option for any local governments, something a number of its competitor states (and 38 states in the U.S.) allow. Unlike many of its competitors, Kentucky allows local individual income (occupation license) taxation (only 13 states and DC permit local income taxation). Not surprisingly, then, Kentucky collects a smaller share of combined state and local tax revenues from sales taxation and more from income taxation.

State and Local Tax Revenue by Source, 2015
Kentucky, Competitor States, and the U.S.
(percent of total tax revenue)

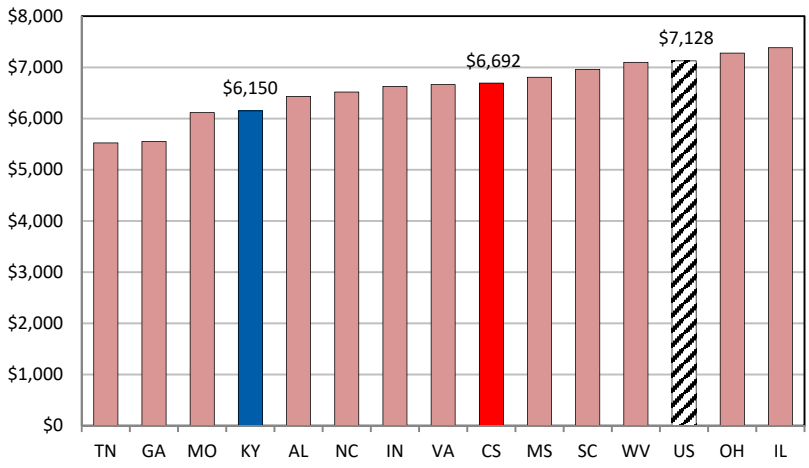


Source: U.S. Census Bureau, 2015 Annual Surveys of State and Local Government Finances

STATE AND LOCAL OWN SOURCE REVENUE

Since states differ in the relative distribution of tax burdens between state and local governments, any comparison of revenue burdens among states requires a consideration of combined state and local revenue burdens. Here we report state and local own revenue burdens for Kentucky and its competitor states in 2015. On a per capita basis, Kentucky's per capita own-source state and local revenue was $6,150 in 2015, lower than the competitor state average of $6,692 as well as the U.S. average of $7,128. North Dakota had the highest amount at $13,167 and Arizona the lowest at $5,064. These dollars have been adjusted to reflect state-level cost-of-living differences using regional price parity estimates from the U.S. Bureau of Economic Analysis.

State and Local Own Source Revenue, Per Capita, 2015, Kentucky, Competitor States, and the U.S.
(Adjusted dollars using 2015 Regional Price Parities)

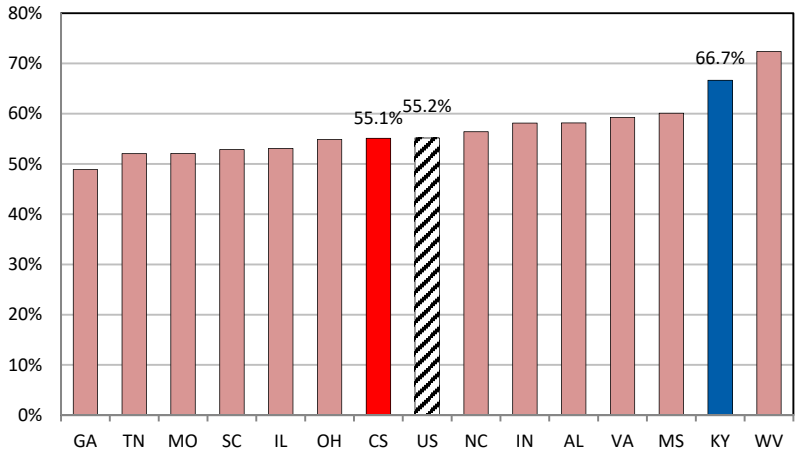


Source: U.S. Census Bureau, 2015 Annual Surveys of State and Local Government Finances

State Portion of Total Revenue

State government in Kentucky collects 66.7 percent of state and local own-source revenues (2017); only West Virginia, which collects 72.4 percent through the state, is more centralized (among the competitor states). All of the other competitor states collect 60 percent or less through state sources. Conversely, Georgia collects over 50 percent from local revenue sources. The competitor states and U.S. averages are both about 55 percent, indicating substantially less centralization at the state level compared to Kentucky. Nationally, Vermont is the most centralized at 80.9 percent, while New York is the lowest at 45.7 percent.

State Portion of Total Revenue, 2015,
Kentucky, Competitor States, and the U.S.
(percentage of state and local own source revenue)



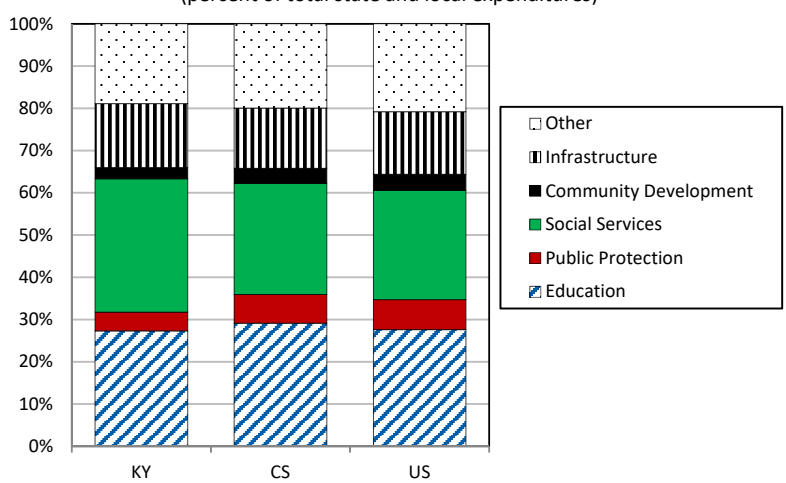
Source: U.S. Census Bureau, 2015 Annual Surveys of State and Local Government Finances

STATE AND LOCAL EXPENDITURES

Here we present data that illustrate Kentucky's state and local spending by selected functional categories: *Education,* which includes elementary and secondary education and higher education; *Public Protection*, which includes police, fire, and corrections; *Social Services*, which includes public welfare, public assistance, and Medicaid; *Community Development*, which includes libraries, natural resources, parks and recreation, and housing and community development; and *Infrastructure,* which includes highways, water, sewers, utilities, and solid waste. For Kentucky, the competitor states, and the U.S., these five categories account for around 80 percent of state and local government expenditures (2015). As a percentage of total state and local government expenditures, Kentucky spends about the same on education and infrastructure, more on social services, and less on public protection and community development compared to the U.S. average. The Other category includes government administration, interest paid on debt, and insurance. However, as the figures on the following pages show (pages 184-193), when comparing per capita expenditures, a slightly different picture emerges. On a per capita basis, Kentucky expenditures are generally lower than the U.S. for every category except social services, where they have been about the same, but exceeded the U.S. in 2015.

Distribution of Selected State and Local Expenditures, 2015, Kentucky, Competitor States, and the U.S.

(percent of total state and local expenditures)

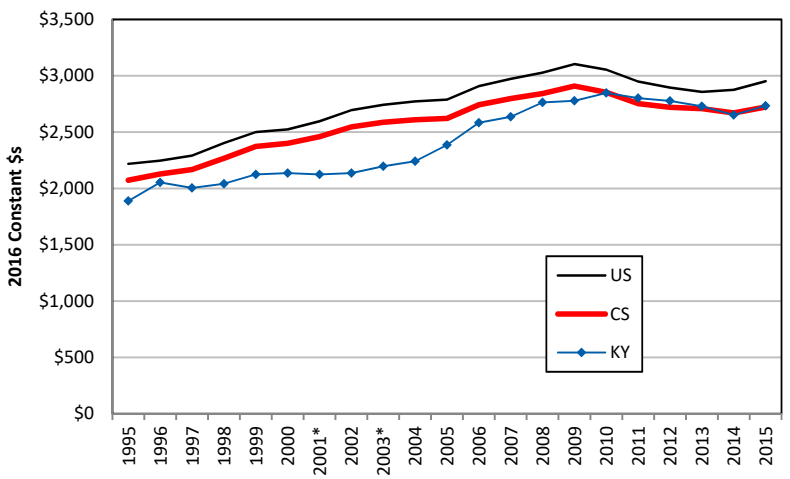


Source: U.S. Census Bureau, 2015 Annual Surveys of State and Local Government Finances

EDUCATION EXPENDITURES

Education expenditures include elementary and secondary education, higher education, and other education such as adult, technical, or vocational education equal to or less than two years of college. State and local expenditures for education steadily increased on a per capita basis (in constant 2016 dollars) from 1995 until 2009-2010. These expenditures have been trending downward to flat since 2010 for Kentucky, the competitor states, and the U.S. When viewed over the 21-year period from 1995 to 2015, Kentucky has a higher percentage increase (45%) than the competitor states (31%) or the U.S. overall (33%). Kentucky has expended more of its cumulative gross domestic product on education during this time period (5.9%) than either the competitor states (5.4%) or the U.S. (5.3%). These investments have enabled the state to improve its educational standing relative to the other states. Research shows that investments in human capital—education—are vital for a state's economic success. A highly educated population can create new enterprises with innovative and entrepreneurial activities, and a skilled labor force can attract new plants and factories. The "availability of skilled labor" ranks as the most important factor for respondents to the most recent *Annual Survey of Corporate Executive and Consultants on Site Selection*, with 93 percent ranking it as either "important" or "very important.

State and Local Education Expenditures, Per Capita, 1995-2015, Kentucky, Competitor States, and the U.S.



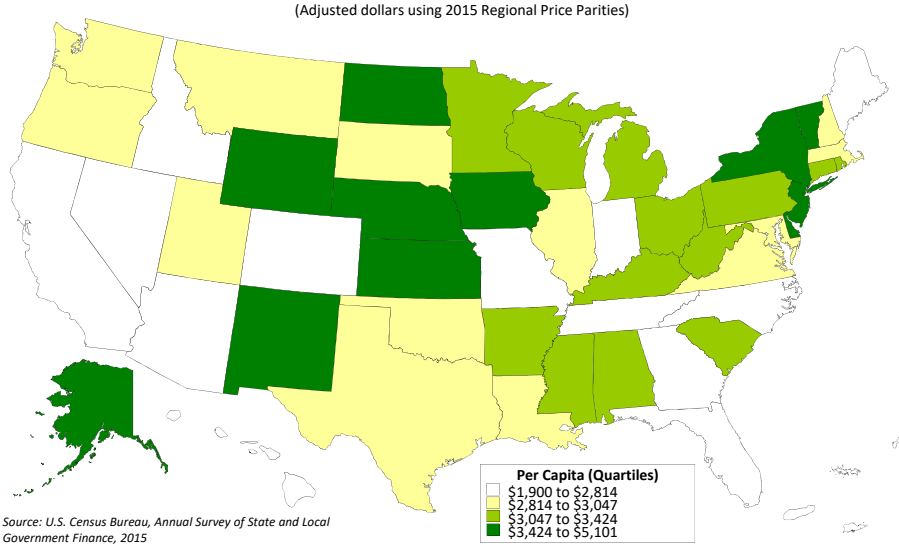
Source: U.S. Census Bureau, Annual Survey of State and Local Government Finance
Note: KY and CS data for 2001 and 2003 are interpolated.

EDUCATION EXPENDITURES IN THE U.S.

One way to reasonably assess a state's position relative to other states is by ranking the states and placing them into four more or less equal groups, or quartiles. Kentucky's per capita state and local expenditures for education in 2015 are in the third quartile of states. Wyoming is the highest at $5,100 and Hawaii is the lowest at $1,901. Kentucky's per capita spending is $3,047. These dollars have been adjusted to reflect state-level cost-of-living differences using regional price parity estimates from the U.S. Bureau of Economic Analysis.

Education Expenditures, 2015

(Adjusted dollars using 2015 Regional Price Parities)

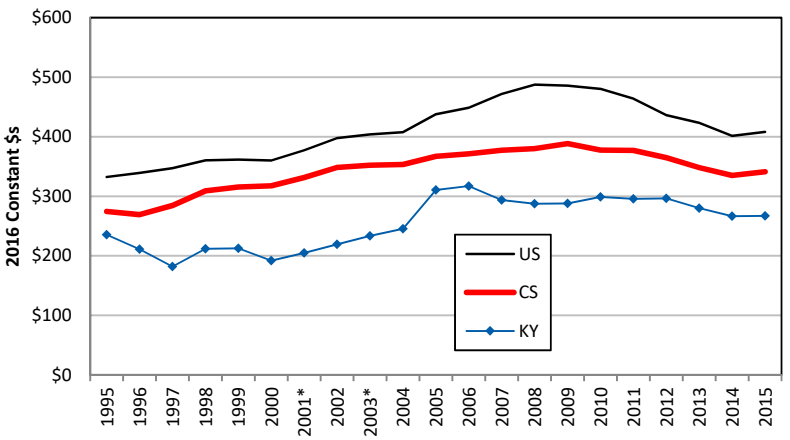


Source: U.S. Census Bureau, Annual Survey of State and Local Government Finance, 2015

COMMUNITY DEVELOPMENT EXPENDITURES

We combine four broad areas—libraries, natural resources, parks & recreation, and housing & community development—into a single category called community development. State and local expenditures for community development in Kentucky steadily increased on a per capita basis (in constant 2016 dollars) from 1995 until 2005-06, but have been flat or declining slightly for the last ten years. When viewed over the 21-year period from 1995 to 2015, Kentucky has a lower percentage increase (13%) than the competitor states (24%) or the U.S. overall (23%). Kentucky has expended less of its cumulative gross domestic product on community development during this time period (0.63%) than either the competitor states (0.72%) or the U.S. (0.80%). Quality of life factors, which can include social amenities like libraries, parks, and natural open spaces, ranks as the third most important factor for respondents to the most recent *Annual Survey of Corporate Executive and Consultants on Site Selection*, evidenced by 87.6 percent ranking it as either "important" or "very important." Availability of skilled labor and highway accessibility ranked first and second, respectively.

State and Local Community Development Expenditures, Per Capita, 1995-2015, Kentucky, Competitor States, and the U.S.



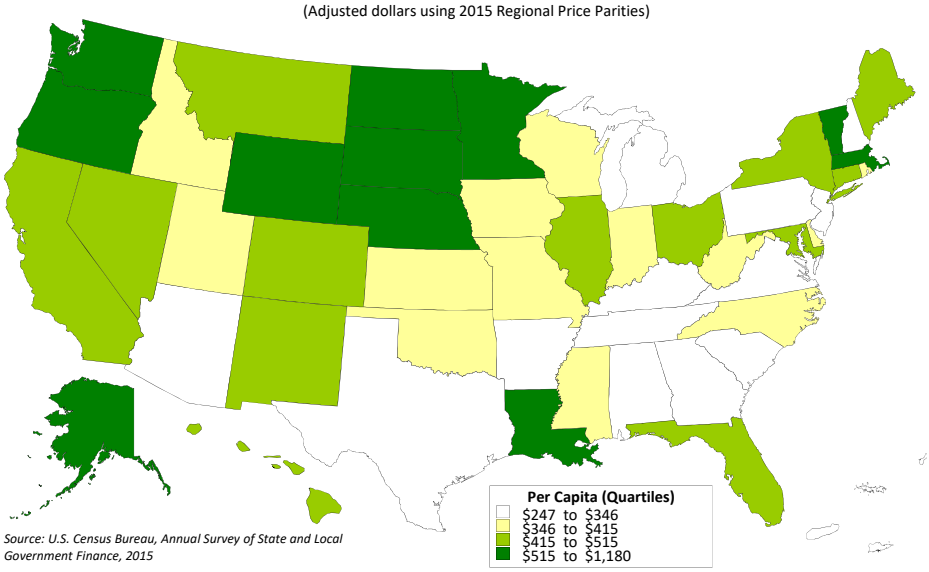
Source: U.S. Census Bureau, Annual Survey of State and Local Government Finance
Note: KY and CS data for 2001 and 2003 are interpolated.

Community Development Expenditures in the U.S.

Here we place the states into four approximately equal groups called quartiles. With per capita spending of $298, Kentucky's state and local expenditures for community development in 2015 are in the bottom quartile. Alaska is the highest at $1,179 and Texas is the lowest at $247. These dollars have been adjusted to reflect state-level cost-of-living differences using regional price parity estimates from the U.S. Bureau of Economic Analysis.

Community Development Expenditures, 2015

(Adjusted dollars using 2015 Regional Price Parities)

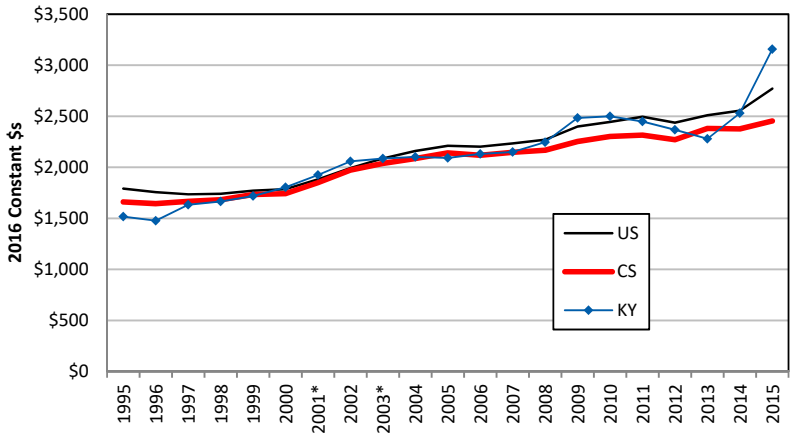


Source: U.S. Census Bureau, Annual Survey of State and Local Government Finance, 2015

SOCIAL SERVICES EXPENDITURES

We combine five categories—public welfare, hospitals, health, social insurance, and veteran's services—into a single category called social services; this covers expenditures associated with three Federal programs—Supplemental Security Income (SSI), Temporary Assistance for Needy Families (TANF), and Medicaid. State and local expenditures for social services increased steadily on a per capita basis (in constant 2016 dollars) from 1995 to 2015 in Kentucky, among the competitor states, and in the U.S. overall. When viewed over this 21-year period, Kentucky has a higher percentage increase (108%) than the competitor states (48%) or the U.S. (55%). Also, Kentucky expended more of its cumulative gross domestic product on social services during this time period (5.2%) than either the competitor states (4.4%) or the U.S. (4.2%).

State and Local Social Services Expenditures, Per Capita, 1995-2015, Kentucky, Competitor States, and the U.S.



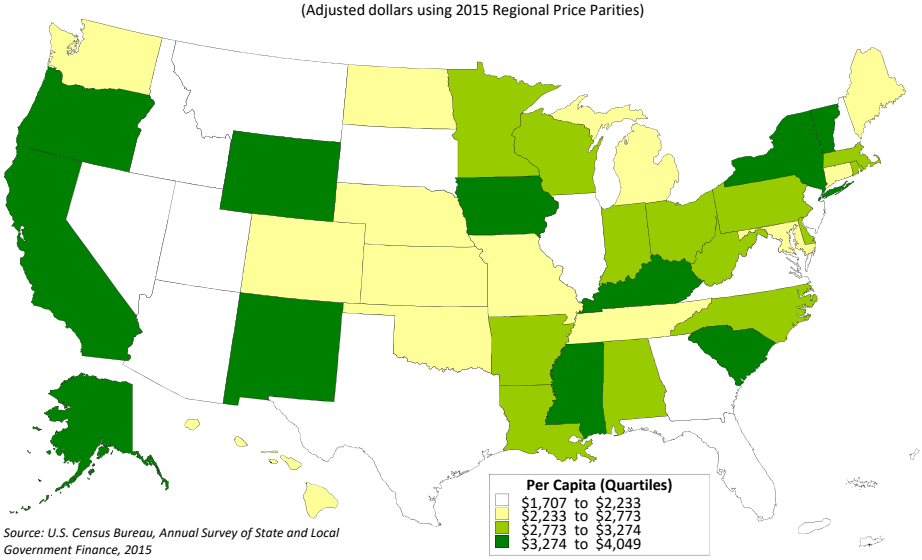
Source: U.S. Census Bureau, Annual Survey of State and Local Government Finance
Note: KY and CS data for 2001 and 2003 are interpolated.

Social Services Expenditures in the U.S.

Here we place the states into four approximately equal groups called quartiles. With per capita spending of $3,519, Kentucky's state and local expenditures for social services in 2015 are in the fourth quartile. Wyoming is the highest at $4,048 and New Hampshire is the lowest at $1,707. These dollars have been adjusted to reflect state-level cost-of-living differences using regional price parity estimates from the U.S. Bureau of Economic Analysis.

Social Services Expenditures, 2015

(Adjusted dollars using 2015 Regional Price Parities)

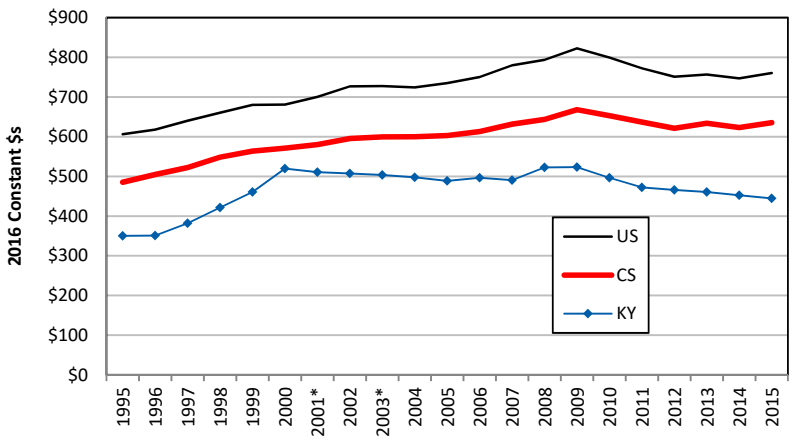


Source: U.S. Census Bureau, Annual Survey of State and Local Government Finance, 2015

PUBLIC PROTECTION EXPENDITURES

We combine four categories—police protection, fire protection, corrections (e.g., prisons and jails), and protective inspection (e.g., building & construction inspections and licensing)—into a single category called public protection. State and local expenditures for public protection increased moderately on a per capita basis (in constant 2016 dollars) from 1995 to 2015 in Kentucky, among the competitor states, and in the U.S. overall. When viewed over this 21-year period, Kentucky (27%) and the competitor states (31%) have increased at a slightly higher rate than the U.S. overall (25%). Also, Kentucky expended about the same percentage of its cumulative gross domestic product on public protection during this time period (1.1%) as the competitor states (1.3%) and the U.S. (1.4%).

State and Local Public Protection Expenditures, Per Capita, 1995-2015, Kentucky, Competitor States, and the U.S.



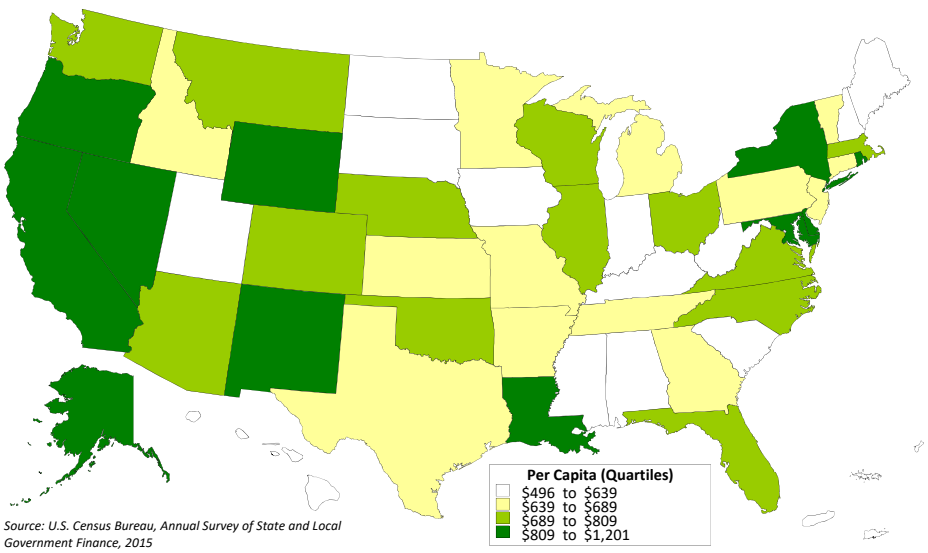
Source: U.S. Census Bureau, Annual Survey of State and Local Government Finance
Note: KY and CS data for 2001 and 2003 are interpolated.

Public Protection Expenditures in the U.S.

Here we place the states into four approximately equal groups called quartiles. With per capita spending of $496, Kentucky's state and local expenditures for public protection in 2015 are in the bottom quartile. In fact, Kentucky has the lowest value of any state. Alaska is the highest at $1,200. These dollars have been adjusted to reflect state-level cost-of-living differences using regional price parity estimates from the U.S. Bureau of Economic Analysis.

Public Protection Expenditures, 2015

(Adjusted dollars using 2015 Regional Price Parities)

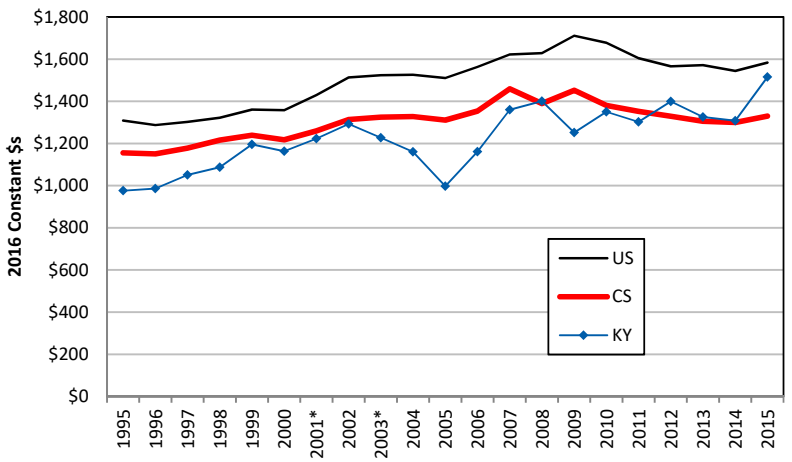


Source: U.S. Census Bureau, Annual Survey of State and Local Government Finance, 2015

INFRASTRUCTURE EXPENDITURES

We combine several expenditure categories into a single catchall to estimate infrastructure expenditures; this includes highways, air transportation, sea & inland ports, parking facilities, sewerage, solid waste management, and utilities like water supply, electric power, gas supply & transit. State and local expenditures for infrastructure have steadily increased on a per capita basis (in constant 2016 dollars). When viewed over the 21-year period from 1995 to 2015, Kentucky has a higher percentage increase (55%) than the competitor states (15%) or the U.S. (21%). Kentucky has expended slightly more of its cumulative gross domestic product on infrastructure (3.0%) than the competitor states (2.7%) or the U.S. (2.9%). Numerous infrastructure factors are ranked high in the most recent *Annual Survey of Corporate Executive and Consultants on Site Selection*, led by "highway accessibility," which listed as the most important site selection factor with 94.4 percent indicating it is either "important" or "very important."

State and Local Infrastructure Expenditures, Per Capita, 1995-2015, Kentucky, Competitor States, and the U.S.



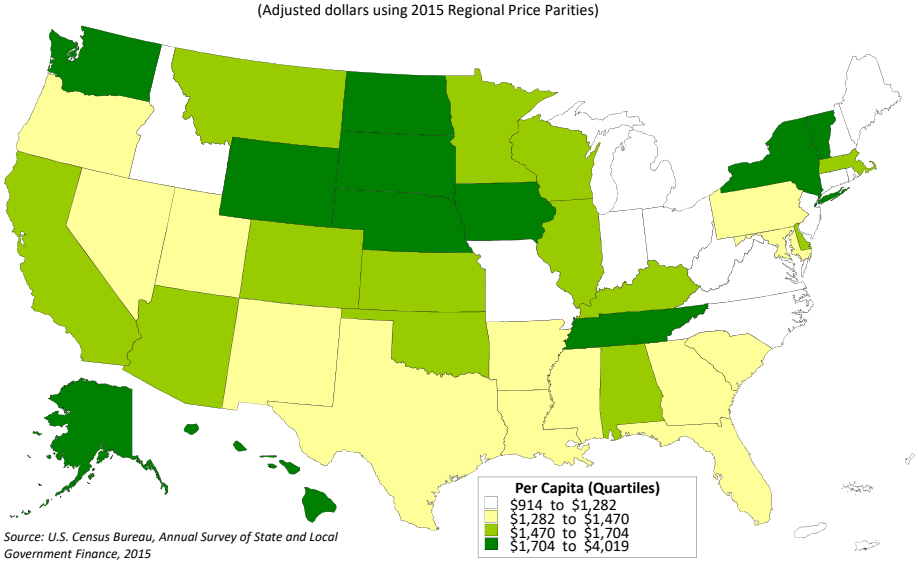
Source: U.S. Census Bureau, Annual Survey of State and Local Government Finance
Note: KY and CS data for 2001 and 2003 are interpolated.

Infrastructure Expenditures in the U.S.

Here we place the states into four approximately equal groups called quartiles. With per capita spending of $1,689, Kentucky's state and local expenditures for infrastructure in 2015 are in the third quartile. Alaska is the highest at $4,018 and New Hampshire is the lowest at $914. These dollars have been adjusted to reflect state-level cost-of-living differences using regional price parity estimates from the U.S. Bureau of Economic Analysis.

Infrastructure Expenditures, 2015

(Adjusted dollars using 2015 Regional Price Parities)

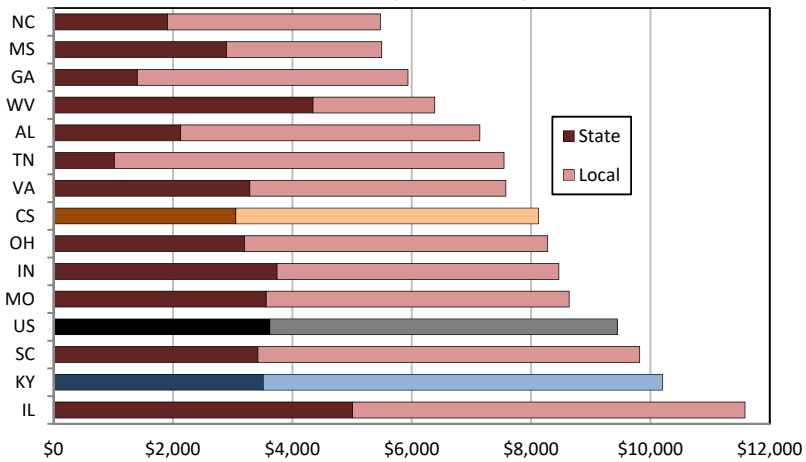


Source: U.S. Census Bureau, Annual Survey of State and Local Government Finance, 2015

DEBT

State and local government debt is defined as "all interest-bearing short-term credit obligations and all long-term obligations incurred in the name of the government and all its dependent agencies, whether used for public or private purposes." Governments issue bonds and incur debt for big-ticket items like roads or large construction projects. Nationally, state and local governments had almost $3 trillion in outstanding debt in 2015, with 61.6 percent at the local government level and 38.4 percent at the state government level. The figure shows combined state and local debt per capita, with Kentucky second among the competitor states at $10,200, 34 percent of which is held by state government. The U.S. per capita debt for state and local governments is $9,444. These dollars have been adjusted to reflect state-level cost-of-living differences using regional price parity estimates from the U.S. Bureau of Economic Analysis.

Debt Outstanding, Per Capita, 2015
Kentucky, Competitor States, and the U.S.
(state and local debt, by total, RPP adjusted $s)



Source: U.S. Census Bureau, 2015 Annual Surveys of State and Local Government Finances

Notes & Sources

Advanced Placement Exam Mastery—College Board, *AP Report to the Nation*, <apreport.collegeboard.org/> and *AP Cohort Data: Graduating Class of 2016*.

Agriculture and GDP—U.S. Department of Commerce, Bureau of Economic Analysis, Gross domestic product (GDP) by state (millions of current dollars).

Air Quality (part 1)—Kentucky Energy and Environment Cabinet, Department for Environmental Protection, Division for Air Quality, *Fiscal Year 2017 Annual Report* <air.ky.gov/>. The data on air quality trends were obtained via email from the Shauna Switzer, Division for Air Quality on November 21, 2017. Notes about specific pollutants: O_3—Based upon annual statewide averages of all fourth highest daily maximum 8-hour concentrations [29 sites used for 2016 average (ppm)]; NO_2—Based upon annual statewide averages of all 98th percentile daily concentrations 1-hour averages [7 sites used for 2016 average (ppm)]; and SO_2—Based upon annual statewide averages of all 99th percentile daily maximum 1-hour concentrations [12 sites used for 2016 average (ppm)].

Air Quality (part 2)—See the endnote above for detailed information on the source. Notes about specific pollutants: CO—Based upon annual statewide averages of all second highest daily maximum 1-hour concentrations [3 sites used for 2016 average (ppm)]; $PM_{2.5}$—Based upon annual statewide averages of all 98th percentile 24-hour concentrations [19 sites used for 2016 average (µ/m3)]; and PM_{10}—Based upon annual statewide averages of all maximum 24-hour concentrations [8 sites used for 2016 average (µ/m3)].

Associate's Degrees—Estimated by the author using American Community Survey, 2016 1-Year Estimate, Public Use Microdata Sample (PUMS) data.

Banking Status—FDIC *National Survey of Unbanked and Underbanked Households, 2015*.

Bridges & Problem Bridges by County—U.S. Department of Transportation, Federal Highway Administration, Office of Bridges and Structures. The way bridges are classified has changed. Per an email from Samantha Lubkin, with the FHWA Office of Bridges and Structures, on November 6, 2017: Functionally obsolete is a legacy classification that was used to implement the Highway Bridge Program, which was discontinued with the enactment of MAP-21. As a result, fiscal year 2015 was the last year outstanding Highway Bridge Program funds could be obligated on eligible projects, including ones with bridges that were once classified as functionally obsolete. Therefore, FHWA is no longer tracking this measure, and will not be publishing it on our website for the 2016 data forward. Our focus has shifted to a performance-based program as established in MAP-21 and continued in the Fast Act. As such, we encourage the use of the Good-Fair-Poor bridge condition measures outlined in the Pavement and Bridge Condition Performance Measures final rule, published in January of 2017: <www.fhwa.dot.gov/tpm/rule.cfm>. A summary of bridge conditions for the last 5 years can be found here: <www.fhwa.dot.gov/bridge/nbi/condition.cfm>. The bridge data for counties is available here: <www.

fhwa.dot.gov/bridge/nbi/no10/county16a.cfm#ky>.

Business Bankruptcies—The Administrative Office of the U.S. Courts <www.uscourts.gov/Statistics/BankruptcyStatistics/quarterly-filings-3-month-chapter-district.aspx>. The establishment data from the County Business Patterns.

Charitable Contributions—Internal Revenue Service, Statistics of Income <www.irs.gov/uac/SOI-Tax-Stats---Historic-Table-2>.

Child Poverty—U.S. Census Bureau, Poverty Status in the past 12 months, 2016 American Community Survey 1-Year Estimates <www.census.gov/acs/www/>.

Children in Single-Parent Families—U.S. Census, American Community Survey, 1-Year estimate, 2016, Table C23008. The citation referenced in the text is Raj Chetty, Nathaniel Hendren, Patrick Kline, and Emmanuel Saez, "Where is the Land of Opportunity? The Geography of Intergenerational Mobility in the United States," *The Quarterly Journal of Economics*, Vol. 129, Issue 4, November 2014, pp. 1553-1623.

Chronic Disease by County (Number & Percent)—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, 2012-2016. To estimate county-level percentages and numbers we use a special grouping of counties developed by the University of Kentucky Markey Cancer Control Program and College of Public Health under the direction of the Kentucky Department for Public Health. The text references this peer-reviewed research: Asay GRB, Roy K, Lang JE, Payne RL, Howard DH. Absenteeism and Employer Costs Associated With Chronic Diseases and Health Risk Factors in the US Workforce. Prev Chronic Dis 2016;13:150503. DOI: http://dx.doi.org/10.5888/pcd13.150503.

Chronic Disease Risk by Age Group—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, 2016.

Coal Production—Kentucky Energy and Environment Cabinet, Kentucky Quarterly Coal Reports <energy.ky.gov/Pages/CoalFacts.aspx>.

Coincident Index—State Coincident Indexes was obtained from the Federal Reserve Bank of Philadelphia <www.philadelphiafed.org/research-and-data/regional-economy/indexes/coincident>.

College Attainment by County—U.S. Department of Commerce, American Community Survey, 2012-2016, 5-year estimates <www.census.gov/acs/www/>.

College Attainment—Estimated by the author using American Community Survey, 2016 1-Year Estimate, Public Use Microdata Sample (PUMS) data.

College Readiness—*The Condition of College & Career Readiness*, 2017, various state reports, ACT, Inc. The Competitor States values reflect a weighted average of the 12 states.

Community Development Expenditures (in the U.S.)—U.S. Census Bureau, 2015 Annual Surveys of State and Local Government Finances <www.census.gov/govs/estimate/>. We use the following Census Bureau Item Codes to create this category: E52, F52, G52, E55, F55, G55, E56, F56, G56, E59, F59, G59, E61, F61, G61, E50, F50, and G50.

Commuting—U.S. Census, American Community Survey, 5-Year Estimate, 2012-2016, Table DP03-Selected Economic Statistics.

County Population Changes—Census data obtained from the U.S. Census Bureau.

County-Level Innovation Index—Innovations in America's Regions, a project funded in part by the U.S. Commerce Department's Economic Development Administration. Work was conducted by the Purdue Center for Regional Development, the Indiana Business Research Center at Indiana University's Kelley School of Business, and other research partners. Data are available online at <www.statsamerica.org/innovation/index.html>.

Crime Rate—Federal Bureau of Investigation, *Crime in the United States 2016*, Table 4, Crime in the United States, by Region, and Table 5, Crime in the United States by State <www.fbi.gov/>.

Criminal Offense Rate by County—*Crime in Kentucky, 2016*, Kentucky State Police, available at <www.kentuckystatepolice.org/data.htm>.

Current Smokers—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, 2011-2016.

Dams—National Inventory of Dams <http://nid.usace.army.mil/>, data is current as of October 2016. The data on the classification of dams into quality categories, such as poor or unsatisfactory, come from the Association of State Dam Officials <http://damsafety.org/> via email, received in April, 2017.

Debt—U.S. Census Bureau, 2015 Annual Surveys of State and Local Government Finances <www.census.gov/govs/estimate>.

Developed Land—U.S. Department of Agriculture, Natural Resources Conservation Service, National Resources Inventory <https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/nra/nri/>.

Disability Income (DI)—U.S. Social Security Administration, Office of Retirement and Disability Policy, Office of Research, Evaluation, and Statistics, *Annual Statistical Report on the Social Security Disability Insurance Program, 2016* <www.socialsecurity.gov>.

Disability—U.S. Department of Commerce, American Community Survey, 2016, 1-year estimates <www.census.gov/acs/www/>.

Disconnected Young Adults—Percentages are estimated from 2016 1-year PUMS data. In addition to the age variable (AGEP), there are three variables used to create this recoded variable: ESR—Employment Status Recode (where ESR=3 or 6); SCHL—Educational Attainment (where SCHL<=19); and SCH—School Enrollment (where SCH=1).

Drug Overdose Death Rate—Author's analysis of data from the Centers for Disease Control and Prevention (CDC), National Center for Health Statistics, Multiple Cause of Death 1999-2015 on CDC WONDER Online Database.

Education Expenditures (in the U.S.)—U.S. Census Bureau, 2015 Annual Surveys of State and Local Government Finances <www.census.gov/govs/estimate/>. We use the following Census Bureau Item Codes to create this category: E12, F12, G12, E16, E18, F16, F18, G16, G18, E21, F21, G21, and J19.

Education Index—Refer to Michael T. Childress, "Kentucky's Educational Performance & Points of Leverage," CBER Issue Brief, December 2015 <cber.uky.edu/>.

Educational Achievement Gap—National Center for Education Statistics, NAEP Data Explorer <nces.ed.gov/nationsreportcard/naepdata/dataset.aspx>.

Educational Spending ROI—See Educational Index above.

Elder Poverty—U.S. Census Bureau, Poverty Status in the past 12 months, 2016 American Community Survey 1-Year Estimates <www.census.gov/acs/www/>. The Employee Benefit Research Institute *2017 Retirement Confidence Survey* results are available at <www.ebri.org/surveys/rcs/>.

Employment by Education—Refer to Christopher R. Bollinger, "Want a Job? Get a College Degree," CBER Issue Brief, October 2015 <cber.uky.edu/>.

Employment by Foreign Companies—Foreign Direct Investment in the U.S., Majority-Owned Bank and Nonbank U.S. Affiliates, Employment. Bureau of Economic Analysis, Regional Economic Accounts & International Data.

Employment by Sector—U.S. Department of Labor, Bureau of Labor Statistics <www.bls.gov/sae/>.

Employment Growth by Kentucky Region—U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages <http://www.bls.gov/cew/data.htm>.

Employment Growth by State—U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages <http://www.bls.gov/cew/data.htm>.

Employment-Population Ratio—Estimated by the author using U.S. Census Current Population Survey (CPS) data from Sarah Flood, Miriam King, Steven Ruggles, and J. Robert Warren. Integrated Public Use Microdata Series, Current Population Survey: Version 4.0 [Basic Monthly dataset]. Minneapolis, MN: University of Minnesota, 2015. http://doi.org/10.18128/D030.V4.0.

Energy Consumption by End-Use Sector—U.S. Energy Information Administration, State Energy Data System, Table C1: Energy Consumption Overview: Estimates by Energy Source and End-Use Sector, 2015 <www.eia.gov>.

Energy Consumption by Source—U.S. Energy Information Administration, *State Energy Data 2015: Consumption*, and *Kentucky State Energy Profile and Energy Estimates* <www.eia.gov>.

Energy Consumption per GDP—U.S. Energy Information Administration and U.S. Department of Commerce, Bureau of Economic Analysis.

Energy Efficiency—U.S. Energy Information Administration.

Entrepreneurial Breadth—Kauffman Index of Growth Entrepreneurship. Data downloaded from <www.kauffman.org/kauffman-index/about/about>.

Entrepreneurial Depth—U.S. Department of Commerce, Bureau of Economic Analysis, SA4 Personal Income and Employment by Major Component and SA30 Economic Profile.

Exports—U.S. Department of Commerce, International Trade Administration, <tse.export.gov/TSE/TSEhome.aspx>.

Family Income by Education—Refer to Christopher R. Bollinger, "Education Pays

Everywhere!," CBER Issue Brief, October 2015 <cber.uky.edu/>.

Farm Commodities—United States Department of Agriculture, Economic Research Service, U.S. and State Farm Income and Wealth Statistics <www.ers.usda.gov/data-products/farm-income-and-wealth-statistics.aspx>.

Farm Employment—U.S. Department of Commerce, Bureau of Economic Analysis, SA25N Total full-time and part-time employment by NAICS industry.

Farms—These data come from various sources, including the Kentucky Department of Agriculture's annual report, *Kentucky Agricultural Statistics* and the United States Department of Agriculture, *Farms and Land in Farms*, various years.

Favors for Neighbors—Estimated from U.S. Census, November 2013, Current Population Survey microdata, Civic Engagement Supplement.

Food Insecurity—Author's analysis of data from Sarah Flood, Miriam King, Steven Ruggles, and J. Robert Warren. Integrated Public Use Microdata Series, Current Population Survey: Version 4.0 [Food Security CPS Supplement data]. Minneapolis, MN: University of Minnesota, 2015.

Food Stamp Participation—U.S. Department of Agriculture, Food and Nutrition Service and University of Kentucky Center for Poverty Research. 2016. "UKCPR National Welfare Data, 1980-2015." Gatton College of Business and Economics, University of Kentucky, Lexington, KY. http://www.ukcpr.org/data (accessed November 2017).

Foreclosures—Mortgage Bankers Association, National Delinquency Survey.

Foreign-Born Population (by County)—U.S. Census Bureau, ACS 2016 1- and 5-Year Estimates, Table B05002.

Free or Reduced-Price Lunch Eligibility—U.S. Department of Education, ED Data Express, Common Core of Data (CCD), "Public Elementary/Secondary School Universe Survey," 2015–16.

General Fund Receipts by Source—Kentucky Finance and Administration Cabinet and the Kentucky Revenue Cabinet, Annual Reports, various years.

Gini Index (by State and County)—U.S. Census Bureau, American Community Survey, various years.

Growth Rates, Taxes and Income—U.S. Census Bureau, Bureau of Economic Analysis & State Government Tax Collections.

Health by Education—Refer to Christopher R. Bollinger, "Education for Your Health!," CBER Issue Brief, October 2015 <cber.uky.edu/>.

Health Insurance Coverage: Children—U.S. Census Bureau, Health Insurance Historical Tables, H1B Series, HIB-5. Health Insurance Coverage Status and Type of Coverage by State—Children Under 18: 1999 to 2012 <www.census.gov/hhes/www/hlthins/data/historical/files/hihistt5B.xls> and American Community Survey (various years, 1-Year estimates).

Health Insurance Coverage: Everyone—U.S. Census Bureau, Health Insurance Historical Tables, H1B Series, HIB-4. Health Insurance Coverage Status and Type of Coverage by State--All Persons: 1999 to 2012 <www.census.gov/hhes/www/hlthins/data/historical/

files/hihistt4B.xls> and American Community Survey (various years, 1-Year Estimates).

Health Security and Preparedness—2017 release of the National Health Security Preparedness Index <www.nhspi.org>.

High School Attainment—Estimated by the author using American Community Survey, 2016 1-Year Estimate, Public Use Microdata Sample (PUMS) data.

High School Graduation Rate—U.S. Department of Education, EDFacts/Consolidated State Performance Report, 2015-16: < www2.ed.gov/admins/lead/account/consolidated/index.html>.

High-Speed Internet (by County)—The reported data in the Infrastructure chapter are from two different Federal Communications Commission (FCC) reports, 2016 Measuring Broadband America Fixed Broadband Report <https://www.fcc.gov/reports-research/reports/measuring-broadband-america/measuring-fixed-broadband-report-2016> and the 2016 Broadband Progress Report <https://www.fcc.gov/reports-research/reports/broadband-progress-reports/2016-broadband-progress-report>. We obtained the data found in the Innovation chapter from the American Community Survey, 2016 1-Year estimate, Table GCT2801.

High-Technology Establishments—Using the National Science Foundation and Milken Institute designations of 4-digit NAICS codes and County Business Patterns data on number of establishments, we calculation the percentage that are considered high-tech establishments. Here are the 50 NAICS codes used: 1131, 1132, 2111, 2211, 3241, 3251, 3252, 3253, 3254, 3255, 3259, 3332, 3333, 3336, 3339, 3341, 3342, 3343, 3344, 3345, 3346, 3353, 3364, 3369, 4234, 4861, 4862, 4869, 5112, 5161, 5171, 5172, 5173, 5174, 5179, 5181, 5182, 5211, 5232, 5413, 5415, 5416, 5417, 5511, 5612, 8112, 3391, 5121, 5191, 6215.

Hourly Wages—These data are part of the CPS Outgoing Rotation Group. For this analysis, the data were downloaded from the Center for Economic and Policy Research (CEPR) web site at <ceprdata.org>. We use the variable "wage3" for this analysis.

Household Income Growth—Author's analysis of IPUMS-CPS data, courtesy of Miriam King, Steven Ruggles, J. Trent Alexander, Sarah Flood, Katie Genadek, Matthew B. Schroeder, Brandon Trampe, and Rebecca Vick. Integrated Public Use Microdata Series, Current Population Survey: Version 3.0. [Machine-readable database]. Minneapolis: University of Minnesota, 2010.

Household Income Ratio—See Household Income Growth above for data source information.

Household Income—See Household Income Growth above for data source information. Household income includes income of the householder and all other people 15 years and older in the household, whether or not they are related to the householder. The median is the point that divides the household income distribution into halves, one half with income above the median and the other with income below the median. The median is based on the income distribution of all households, including those with no income. The distributional data is a one-year (2016) estimate from the American Community Survey.

Housing Starts—U.S. Census Bureau.

Income Sources by Location—U.S. Department of Commerce, Bureau of Economic Analysis, and the 2013 Urban-Rural Continuum Code, available at <www.ers.usda.gov/data-products/rural-urban-continuum-codes.aspx#.UqR_ZeLs2HY>.

Industrial Electricity Costs—U.S. Energy Information Administration <www.eia.gov/beta/state/data.cfm?sid=KY#Prices>.

Industrial Research & Development—National Science Foundation, Business and Industrial R&D, various years <www.nsf.gov/statistics/industry/>.

Infrastructure Expenditures (in the U.S.)—U.S. Census Bureau, 2015 Annual Surveys of State and Local Government Finances <www.census.gov/govs/estimate/>. We use the following Census Bureau Item Codes to create this category: E44, F44, G44, E45, F45, G45, E94, F94, G94, I94, E01, F01, G01, E87, F87, G87, E91, F91, G91, I91, E80, F80, G80, E60, F60, G60, E92, F92, G92, I92, E93, F93, G93, I93, E81, F81, and G81.

Infrastructure Expenditures (in the U.S.)—U.S. Census Bureau, 2014 Annual Surveys of State and Local Government Finances <www.census.gov/govs/estimate/>.

Job Growth—U.S. Department of Labor, Bureau of Labor Statistics, Current Employment Statistics, total private, all employees, not seasonally adjusted <www.bls.gov/>.

Kentucky Coal Distribution—*Annual Coal Distribution Report 2016*, U.S. Energy Information Administration, <www.eia.gov/coal/distribution/annual/archive.cfm>.

Labor Force Participation (by County)—American Community Survey, U.S. Census Bureau, 2016 1-year estimate. The county-level data are from the ACS 5-Year estimate, Table S2301.

Land Use—U.S. Department of Agriculture, National Resource Inventory.

Lead & Copper Rule—United States, Environmental Protection Agency, Safe Drinking Water Information System data, various years. These estimates are generated by the author using a method employed by the Natural Resources Defense Council and described in a May 2017 report, *Threats on Tap: Widespread Violations Highlight Need for Investment in Water Infrastructure and Protections* <https://www.nrdc.org/resources/threats-tap-widespread-violations-water-infrastructure>.

Lead Risk—The methodology used in producing the county-level lead exposure risk levels is based on data from the 2014 American Community Survey 5-Year estimates. Specifically, we used census tract-level housing age and poverty data; each of these is responsible for a different component of lead exposure risk. This data enumerates the number of households in each stratum of building age and poverty level, so to yield county-level data, we simply summed along the first five digits of GeoID2: the county portion of the unique census tract identifier. Proceeding, we used coefficients produced by a team at the Washington State Department of Health and Vox media to produce two regressions: 1) lead exposure risk due to housing; and, 2) lead exposure risk due to poverty. Then each of those were normalized and these z-scores were summed, with 58% weight on housing risk and 42% on poverty. Finally, this "raw score" was sorted into deciles, yielding the lead exposure risk estimates. More information is available at <www.vox.com/a/lead-exposure-risk-map>.

Local Food Suppliers—U.S. Department of Agriculture, *2012 Census of Agriculture* (Table 43: Selected Practices). Personnel with the Kentucky Department of Agriculture provided data on CSA and farmers' markets that is discussed in the narrative.

Median Age—U.S. Census Bureau, ACS 1-Year estimate.

Medicaid Beneficiaries—Kaiser Family Foundation, <www.statehealthfacts.org> and Centers for Medicare & Medicaid Services, State/County Penetration File, (various years).

Mining and Coal—These data are from the Bureau of Economic Analysis and the Energy Information Administration, Annual Coal Report, various years.

Minority Population—U.S. Census Bureau, ACS 1-Year estimate, Table B02001.

Motor Gasoline Expenditures—U.S. Energy Information Administration, State Energy Data System.

Narrow Roads—Federal Highway Administration, Highway Statistics 2015, Table HM-53 <www.fhwa.dot.gov/policyinformation/statistics.cfm>.

Natural Gas Supplanting Coal—U.S. Energy Information Administration, Electricity Net Generation Total (All Sectors).

Neighborhood Quality—2016 National Survey of Children's Health <childhealthdata.org>.

Net Earnings per Capita (by County)—U.S. Department of Commerce, Bureau of Economic Analysis.

Net Earnings—U.S. Department of Commerce, Bureau of Economic Analysis.

Nonemployer Establishments—U.S. Census Bureau, Nonemployer Statistics <www.census.gov/econ/nonemployer/historical.htm>.

Nonprofits—Internal Revenue Service, Exempt Organizations Business Master File (2017, August).

Number At Risk for Risk Behaviors—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, 2016.

Opioid Prescription Rate—Alan B. Krueger, "Where have all the workers gone? An inquiry into the decline of the U.S. labor force participation rate," Brookings, Sept. 2017 <www.brookings.edu/bpea-articles/where-have-all-the-workers-gone-an-inquiry-into-the-decline-of-the-u-s-labor-force-participation-rate/>.

Oral Health—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, 2016 <www.cdc.gov/brfss/technical_infodata/index.htm>.

Organic Farming—USDA *Certified Organic Survey, 2016*, <www.nass.usda.gov/Surveys/Guide_to_NASS_Surveys/Organic_Production/index.php>, and *Land in Farms, 2016 Summary*.

Patents (by County)—U.S. Patent and Trademark Office, Utility Patents <www.uspto.gov/web/offices/ac/ido/oeip/taf/cst_utlh.htm>. Population data are from the U.S. Census

Bureau <www.census.gov>. The competitor states is a weighted average of AL, GA, IL, IN, MS, MO, NC, OH, SC, TN, VA, and WV.

Per Capita Personal Income—U.S. Department of Commerce, Bureau of Economic Analysis, SA1-3 Personal income summary.

Performance on Standardized Tests—U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), various assessments, <nces.ed.gov/nationsreportcard/naepdata/>.

Personal Bankruptcies—The Administrative Office of the U.S. Courts <www.uscourts.gov/Statistics/BankruptcyStatistics/quarterly-filings-3-month-chapter-district.aspx>. The population data are from the U.S. Census.

Population by Age Group—U.S. Census, American Community Survey, 2016 1-Year Estimates.

Population Change—U.S. Census Bureau, Decennial Census, 2000 and the American Community Survey 2016 1-year estimate.

Population Totals—U.S. Census Bureau, Urban and Rural Population: 1900 to 1990 <www.census.gov/population/www/censusdata/files/urpop0090.txt>. The 2000 and 2010 population totals were obtained from the Census totals available at <www.census.gov>. The competitor state average of 41 percent increase is a weighted average of the 12 competitor states.

Poverty Rate by County—U.S. Census Bureau, Small Area Income and Poverty Estimates, <www.census.gov/did/www/saipe/>.

Poverty Rate—Estimated by the author using the CPS-IPUMS constructed variable OFFPOV (Official Poverty Status, person-level variable). Courtesy of Miriam King, Steven Ruggles, J. Trent Alexander, Sarah Flood, Katie Genadek, Matthew B. Schroeder, Brandon Trampe, and Rebecca Vick. Integrated Public Use Microdata Series, Current Population Survey: Version 3.0. [Machine-readable database]. Minneapolis, MN: Minnesota Population Center [producer and distributor], 2010.

Premature Death—Robert Wood Johnson Foundation and the University of Wisconsin Population Health Institute, *County Health Rankings 2017*, <www.countyhealthrankings.org>.

Public Assistance by Education—U.S. Census Bureau, Public Use Microdata Sample (PUMS), ACS 2016.

Public Participation in the Arts—Authors' analysis of data from Sarah Flood, Miriam King, Steven Ruggles, and J. Robert Warren. Integrated Public Use Microdata Series, Current Population Survey: Version 5.0 [CPS Public Art Supplement]. Minneapolis, MN: University of Minnesota, 2017.

Public Pension Funding Gaps—The PEW Charitable Trusts, Public Sector Retirement Systems <www.pewtrusts.org/en/projects/public-sector-retirement-systems>.

Public Pre-K Enrollment—*The State of Preschool 2016: State Preschool Yearbook*, The National Institute for Early Education Research, estimates derived from Table 4 <nieer.

org/yearbook>.

Public Protection Expenditures (in the U.S.)—U.S. Census Bureau, 2015 Annual Surveys of State and Local Government Finances <www.census.gov/govs/estimate/>. We use the following Census Bureau Item Codes to create this category: E04, F04, G04, E05, F05, G05, E62, F62, G62, E24, F24, G24, E66, F66, and G66.

Quarterly Percentage Change in Real GDP, U.S.—U.S. Department of Commerce, Bureau of Economic Analysis, National Income and Product Account Tables, Section 1 <www.bea.gov/national/nipaweb/DownSS2.asp>.

Recycling—Kentucky Energy and Environment Cabinet, Division of Waste Management, *Annual Report—Fiscal Year 2017* <waste.ky.gov>.

Regional Employment Shift—Data used in the shift-share analysis are from the Bureau of Labor Statistics (BLS), Current Employment Statistics (CES), all employees, not seasonally adjusted, for national estimates <http://www.bls.gov/ces/>, and BLS, State and Metro Area Employment (SAE), all employees, not seasonally adjusted, for the state estimates, <http://www.bls.gov/sae/>.

Regional Population Change—U.S. Census Bureau.

Renewable Energy Production—U.S. Energy Information Administration, State Energy Data Production, State Energy Data System (SEDS), 1960-2015 estimates <www.eia.gov/state/seds/>.

Residential Electricity Costs—U.S. Energy Information Administration, *Electricity* <www.eia.gov/electricity/sales_revenue_price/xls/table5_a.xls>.

Revenue from Federal Transfers—U.S. Census Bureau, 2015 Annual Surveys of State and Local Government Finances <www.census.gov/govs/estimate/>. These per capita estimates have been adjusted to reflect cost-of-living differences across the states using the 2014 regional price parity estimates from the Bureau of Economic Analysis.

Risk Behaviors and Chronic Disease—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, 2016.

Road Condition—Federal Highway Administration, Highway Statistics 2015, Table HM-64 <www.fhwa.dot.gov/policyinformation/statistics.cfm>.

Rural Population—U.S. Census Bureau, Urban and Rural Population: 1900 to 1990 <www.census.gov/population/www/censusdata/files/urpop0090.txt>. The 2000 and 2010 population totals were obtained from the Census totals available at <factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml>. The competitor state average is a weighted average of the 12 competitor states.

SBIR/STTR Awards by County—Small Business Innovation Research, Small Business Technology Transfer <www.sbir.gov/past-awards>.

Science & Technology Index—Milken Institute, *2016 State Technology and Science Index* <www.milkeninstitute.org>.

Science and Engineering Graduates—Calculated from the Integrated Postsecondary Education Data System (IPEDS) using 2013 STEM-designed CIP codes. Note that the STEM

degrees are normalized using the number of individuals in the population 20 to 24 years old, but this does not mean that all of these degrees were conferred upon individuals in this age range.

Selected Educational Indicators—Refer to Michael T. Childress, "Kentucky's Educational Performance & Points of Leverage," CBER Issue Brief, December 2015 <cber.uky.edu/>.

Selected Obstacles to Education— Refer to Michael T. Childress, "Kentucky's Educational Performance & Points of Leverage," CBER Issue Brief, December 2015 <cber.uky.edu/>.

Small Business Innovation Research—Small Business Innovation Research, Small Business Technology Transfer <www.sbir.gov/past-awards>.

Social Capital Index—Using principal component analysis, we generate county-level scores based on associational density data from 2013 County Business Patterns (NAICS 713910, 713940, 713950, 713990, 813110, 813410, 813910, 813920, 813930, and 813940), voter turnout for the 2014 general election data from the Kentucky State Board of Elections, the county-level response rate to the 2010 U.S. decennial census (U.S. Census Bureau), and the number of tax-exempt non-profit organizations (Business Master File, March 2016) from the National Center for Charitable Statistics. We follow a method outlined in A. Rupasingha et al., "The production of social capital in US counties," *The Journal of Socio-Economics* 35 (2006) 83-101. Also see A. Rupasingha et al., "Social Capital and Economic Growth: A County-Level Analysis," *Journal of Agricultural and Applied Economics*, 33 (2000) 565-572.

Social Determinants of Health—We use 24 variables organized around five broad thematic areas used in the U.S. Department for Health and Human Services, Healthy People 2020 framework: HEALTH (using data from County Health Rankings and the Area Resource File, we use the Population to Dentists ratio, Population to Mental Health Providers ratio, Population to Primary Care Physicians ratio, other Primary Care Providers ratio, and percentage of the population with health insurance); EDUCATION (high school graduation is obtained from the adjusted cohort graduation rate data and, where necessary, weighted estimates are produced at the county-level where there are multiple high schools in a county, successful transition to adulthood using higher education, work, and military, language and literacy data from EXPLORE benchmark, and early childhood education and development data on kindergarten readiness); ECONOMIC STABILITY (poverty rate from the U.S. Census ACS, unemployment rate from BLS, food insecurity from County Health Rankings, housing stability using foreclosure data from HUD, and Gini Index values from the Census ACS); SOCIAL (associational density data from 2013 County Business Patterns (NAICS 713910, 713940, 713950, 713990, 813110, 813410, 813910, 813920, 813930, and 813940), voter turnout for the 2014 general election data from the Kentucky State Board of Elections, the county-level response rate to the 2010 U.S. decennial census (U.S. Census Bureau), and the number of tax-exempt non-profit organizations (Business Master File, March 2016) from the National Center for Charitable Statistics.); NEIGHBORHOOD & BUILT ENVIRONMENT (ESHE Index on the availability of health food, severe housing problems using data from County Health Rankings, specified

as the number of households experiencing overcrowding, high housing costs, or lack of kitchen or plumbing facilities. These data come from the Census Bureau and HUD's Comprehensive Housing Affordability Strategy, crime rate data from the Kentucky State Police, a lead risk index generated from housing age and poverty, air pollution data from EPA, and water quality data from County Health Rankings which uses EPA data on health-based violations). We perform a principal component analysis on each of the five thematic areas and average the results at the county-level to generate a county score. All data are transformed and ordered so that a high positive number is considered "good" for health outcomes.

Social Services Expenditures (in the U.S.)—U.S. Census Bureau, 2015 Annual Surveys of State and Local Government Finances <www.census.gov/govs/estimate/>. We use the following Census Bureau Item Codes to create this category: J67, J68, E74, E75, E77, F77, G77, E79, F79, G79, E73, E67, E36, F36, G36, E32, F32, G32, E22, F22, G22, E85, F85, G85, and J85.

Solid Waste (Disposal)—Kentucky Energy and Environment Cabinet, Division of Waste Management, *Annual Report—Fiscal Year 2017* <waste.ky.gov>.

Sources of Personal Income—U.S. Department of Commerce, Bureau of Economic Analysis, SA04 State income and employment summary.

State and Local Expenditures—U.S. Census Bureau, 2015 Annual Surveys of State and Local Government Finances <www.census.gov/govs/estimate/>.

State and Local Own Source Revenue—U.S. Census Bureau, 2015 Annual Surveys of State and Local Government Finances <www.census.gov/govs/estimate/>. More information about the BEA Regional Price Parities is available at <www.bea.gov/regional/pdf/RPP2015.pdf>.

State and Local Tax Revenue by Source—U.S. Census Bureau, 2015 Annual Surveys of State and Local Government Finances <www.census.gov/govs/estimate/>.

State Portion of Total Revenue—U.S. Census Bureau, 2015 Annual Surveys of State and Local Government Finances <www.census.gov/govs/estimate/>.

Structural Deficit—Update of William Hoyt, William Fox, Michael Childress, and James Saunoris, *Final Report to the Governor's Blue Ribbon Commission on Tax Reform*, September 2012, University of Kentucky, Center for Business and Economic Research <cber.uky.edu>.

Supplemental Security Income (SSI)—Social Security Administration and University of Kentucky Center for Poverty Research. 2016. "UKCPR National Welfare Data, 1980-2015." Gatton College of Business and Economics, University of Kentucky, Lexington, KY. http://www.ukcpr.org/data (accessed November 2017).

Tax Collections and Personal Income—U.S. Department of Commerce, Bureau of Economic Analysis, and U.S. Census Bureau, State Government Tax Collections, various years <www.census.gov/govs/statetax/>.

Technology Use by Education—Estimated using Current Population Survey Computer and Internet Use Supplement, July 2015. This is a measure of Internet use from any

location and is constructed using these variables, where PEINHOME=1 OR PEINWORK=1 OR PEINSCHL=1 OR PEINCAFE=1 OR PEINTRAV=1 OR PEINLICO=1 OR PEINELHO=1 OR PEINOTHR=1. More information available at the U.S. Department of Commerce, NTIA, Digital Nation Data Explorer <www.ntia.doc.gov/other-publication/2016/digital-nation-data-explorer>.

Temporary Assistance for Needy Families—The Administration for Children and Families, U.S. Department of Health and Family Services and University of Kentucky Center for Poverty Research. 2016. "UKCPR National Welfare Data, 1980-2015." Gatton College of Business and Economics, University of Kentucky, Lexington, KY. http://www.ukcpr.org/data (accessed November 2017).

Total Research & Development—National Science Foundation/National Center for Science and Engineering Statistics. National Patterns of R&D Resources, various years <www.nsf.gov/statistics/natlpatterns/>.

Toxic Releases—U.S. Environmental Protection Agency, Toxics Release Inventory, TRI Explorer <iaspub.epa.gov/triexplorer/tri_release.chemical>. These data are TRI On-site and Off-site Reported Disposed of or Otherwise Released (in pounds), for All industries, for All chemicals, 2016.

Transfer Payments by County—Bureau of Economic Analysis.

Transition from Goods to Services: Employment—U.S. Department of Labor, Bureau of Labor Statistics <data.bls.gov>. The denominator is seasonally adjusted total nonfarm employment (SMS21000000000000001). The three numerators are private-sector service providing (SMS21000000800000001), goods producing (SMS21000000600000001), and government employment (SMS21000009000000001)—all seasonally adjusted.

Transition from Goods to Services: GDP—U.S. Department of Commerce, Bureau of Economic Analysis <www.bea.gov/itable/>. Using the NAICS and SIC classifications, we categorize these industries as "goods producing": agriculture, forestry, fishing, and hunting; mining; construction; and manufacturing. The rest of the industries are considered "service providing." Government includes federal, state and local.

Trust—Estimated from U.S. Census, November 2013, Current Population Survey microdata, Civic Engagement Supplement.

Value-Added Food Production—U.S. Census Bureau, Annual Survey of Manufactures, various years.

Venture Capital—PricewaterhouseCoopers, National Venture Capital Association, Money Tree Report, historical trend data, <www.pwcmoneytree.com/MTPublic/ns/nav.jsp?page=historical>.

Volunteer Hours—These data are from the 2015 Current Population Survey (CPS) September Volunteer Supplement results, based on adults aged 15 and older.

Volunteer Rate by Education—These data are from the 2015 Current Population Survey (CPS) September Volunteer Supplement results, based on adults aged 25 and older.

Volunteer Rate—These data are from the 2015 Current Population Survey (CPS) September Volunteer Supplement results, based on adults aged 15 and older. Volunteers

are considered individuals who performed unpaid volunteer activities through or for an organization at any point during the 12-month period, from September 1 of the prior year through the survey week in September of the survey year.

Wage & Salary Growth by Kentucky Region—U.S. Department of Labor, Bureau of Labor Statistics, Quarterly Census of Employment and Wages, private, all industries, all establishment sizes, <www.bls.gov/cew/>.

Wage & Salary Growth by State—U.S. Department of Labor, Bureau of Labor Statistics, Quarterly Census of Employment and Wages, private, all industries, all establishment sizes, <www.bls.gov/cew/>.

Wage & Salary Ratio—Bureau of Economic Analysis, CA30, Economic Profile, and the 2013 Urban-Rural Continuum Code, available at <www.ers.usda.gov/data-products/rural-urban-continuum-codes.aspx#.UqR_ZeLs2HY>.

Wages and Education—CPS Outgoing Rotation Group. For this analysis, the data were downloaded from the Center for Economic and Policy Research (CEPR) web site at <ceprdata.org>. We use the variable "wage3" for this analysis.

Water Quality—United States, Environmental Protection Agency, Safe Drinking Water Information System data, various years. These estimates are generated by the author using a method employed by the Natural Resources Defense Council and described in a May 2017 report, *Threats on Tap: Widespread Violations Highlight Need for Investment in Water Infrastructure and Protections* <https://www.nrdc.org/resources/threats-tap-widespread-violations-water-infrastructure>.

White, Non-Hispanic Population—U.S. Census Bureau.

Women, Infants, and Children (WIC)—U.S. Department of Agriculture, Food and Nutrition Service, and University of Kentucky Center for Poverty Research. 2016. "UKCPR National Welfare Data, 1980-2015." Gatton College of Business and Economics, University of Kentucky, Lexington, KY. http://www.ukcpr.org/data (accessed November 2017).

Youth Alcohol and Drug Abuse—Centers for Disease Control and Prevention, *Youth Risk Behavior Surveillance System (YRBSS)*, <www.cdc.gov/healthyyouth/yrbs/index.htm>.

Youth Health-Related Behaviors—Centers for Disease Control and Prevention, *Youth Risk Behavior Surveillance System (YRBSS)*, <www.cdc.gov/healthyyouth/yrbs/index.htm>. See Rasberry CN, Tiu GF, Kann L, et al. Health-Related Behaviors and Academic Achievement Among High School Students — United States, 2015. *MMWR Morb Mortal Wkly Rep* 2017;66:921–927. DOI: http://dx.doi.org/10.15585/mmwr.mm6635a1.

Youth Obesity—Centers for Disease Control and Prevention, *Youth Risk Behavior Surveillance System (YRBSS)*, various years <www.cdc.gov/healthyyouth/data/yrbs/data.htm>.

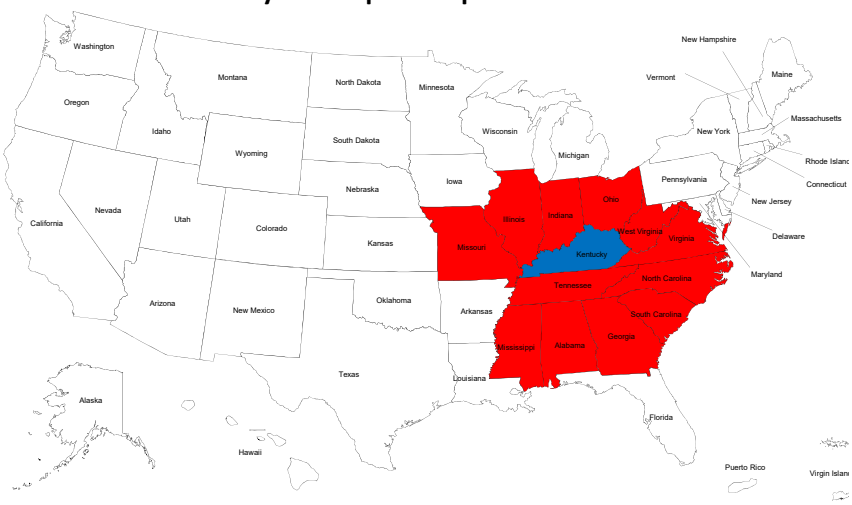
Glossary

Bankruptcy—A legal proceeding involving a person or business that is unable to repay outstanding debts.

Commodity—A product, either raw or manufactured, that can be purchased or traded.

Competitor States—States that are similar to Kentucky in terms of economic and demographic characteristics which are viewed as the main competitors to Kentucky for industrial development. There are twelve states: Alabama, Georgia, Illinois, Indiana, Mississippi, Missouri, North Carolina, Ohio, South Carolina, Tennessee, Virginia, West Virginia.

Kentucky's Principal Competitor States



Compound Annual Growth Rate (CAGR)—The rate of increase in the value of a quantity that is compounded over several years.

Constant dollars—Nominal or current dollar amounts that are adjusted to remove the effect of inflation.

Consumer Price Index (CPI)—The U.S. Department of Labor, Bureau of Labor Statistics, defines the CPI as a "measure of the average change over time in the prices paid by urban consumers for a market basket of consumer goods and services."

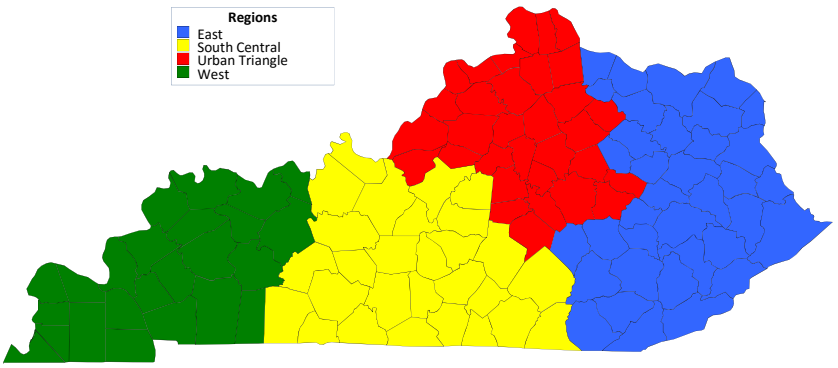
Current dollars—Also called nominal dollars, these dollar amounts are not adjusted to remove the effect of inflation and represent the current value of the dollar during a given year.

Dividends—The portion of the profits generated by a corporation that is dispersed to its shareholders.

Eastern Kentucky—Counties in Kentucky located in the eastern most Area Development Districts (ADDs), including Bath, Bell, Boyd, Bracken, Breathitt, Carter, Clay, Elliott, Fleming,

Floyd, Greenup, Harlan, Jackson, Johnson, Knott, Knox, Laurel, Lawrence, Lee, Leslie, Letcher, Lewis, Magoffin, Martin, Mason, Menifee, Montgomery, Morgan, Owsley, Perry, Pike, Robertson, Rockcastle, Rowan, Whitley, and Wolfe Counties.

Kentucky Regions



Export—Goods and/or services generated in one country and sold in another.

Functionally Obsolete (FO) (Bridges) —"A bridge is considered 'functionally obsolete' when it does not meet current design standards (for criteria such as lane width), either because the volume of traffic carried by the bridge exceeds the level anticipated when the bridge was constructed and/or the relevant design standards have been revised." See "2010 Status of the Nation's Highways, Bridges, and Transit: Conditions and Performance."

Gini (coefficient) Index—A measure of income dispersion, ranging from zero, which indicates perfect equality, to one, which indicates absolute inequality. A higher number indicates more concentration of income in fewer hands, with a value of one indicating that one person holds all the income.

Globalization—An adjective describing the interdependent relationship between national economies that has both positive and negative impacts on international markets.

Great Recession—The period of decline in annual real world gross domestic product per capita experienced in the U.S. from December of 2007 until June of 2009, leading to a decrease international trade, a notable rise in unemployment, and deflated commodity prices.

Gross Domestic Product (GDP)—The total value of a country's goods and services. This includes private consumption, investment, government spending, and exports (subtracting imports from this value).

Inflation—The phenomenon where the price of goods and services increases, while the value of the currency used to purchase those items remains stagnant; getting less

"bang for your buck."

Interest—The rate lenders charge borrowers to compensate for risk attributed to making funds available to borrowers, also known as the cost of borrowing

Mean (*syn* **Average)**—The sum of all values divided by the total number of values.

Median—The most central number in a data set; the number separating the upper half of the sample/population from the lower half.

Middle-class—The Census Bureau has no official definition of middle-class. See U.S. Census Bureau; "Middle Class in America," (2010) U.S. Department of Commerce, Economics and Statistics Administration. However, there are many definitions of "middle class" and opinions on what should be included when categorizing households (e.g., income, net worth, government transfers, etc.).

Nominal dollars—An unadjusted dollar value that reflects the historical value; it has not been adjusted to remove the effect of inflation.

Outsourcing—Transferring business activities outside of a firm in order to reduce costs.

Patent—A property right granted by the government of the United States of America to an inventor "to exclude others from making, using, offering for sale, or selling the invention throughout the United States or importing the invention into the United States" for a limited time in exchange for public disclosure of the invention when the patent is granted.

Per Capita—An adjustment made to reflect the size of the population. For example, per capita income represents the level of income for every child, woman, and man in the base population.

Personal Income—Income received by persons from all sources. It includes income received from participation in production as well as from government and business transfer payments. It is the sum of compensation of employees (received), supplements to wages and salaries, proprietors' income with inventory valuation adjustment (IVA) and capital consumption adjustment (CCAdj), rental income of persons with CCAdj, personal income receipts on assets, and personal current transfer receipts, less contributions for government social insurance.

Poverty Rate—The percentage of people (or families) living below the poverty line ($12,228 for individuals; $24,563 for a family of four, 2016 thresholds).

Poverty—The Census Bureau uses a set of money income thresholds that vary by family size and composition to determine who is in poverty. If a family's total income is less than the family's threshold, then that family and every individual in it is considered in poverty. The official poverty thresholds do not vary geographically, but they are updated for inflation using Consumer Price Index (CPI-U). The official poverty definition uses money income before taxes and does not include capital gains or noncash benefits (such as public housing, Medicaid, and food stamps)..

Property Crimes—In the FBI's Uniform Crime Reporting (UCR) Program, property crime includes the offenses of burglary, larceny-theft, motor vehicle theft, and arson. The object of the theft-type offenses is the taking of money or property, but there is no

force or threat of force against the victims.

Real dollars—Analogous to constant dollars, it reflects the nominal dollar that has been adjusted to remove, for example, the effect of inflation over a period of time.

Real Growth—Represents growth in real or constant dollars.

Recession—In general usage, the word recession connotes a marked slippage in economic activity. The National Bureau of Economic Research (NBER) is charged with officially marking the beginning and ending of a recession. The NBER recession is a monthly concept that takes account of a number of monthly indicators—such as employment, personal income, and industrial production—as well as quarterly GDP growth.

Return on Investment (ROI)—ROI measures the amount the return on an investment relative to the cost of the investment.

Rural—The 2013 Rural-Urban Continuum Codes form a classification scheme that distinguishes metropolitan counties by the population size of their metro area, and nonmetropolitan counties by degree of urbanization and adjacency to a metro area. The official Office of Management and Budget (OMB) metro and nonmetro categories have been subdivided into three metro and six nonmetro categories. Each county in the U.S. is assigned one of the 9 codes.

Social Capital—The networks of relationships among people who live and work in a particular society, enabling that society to function effectively.

South Central Kentucky—Counties in Kentucky located in the Area Development Districts (ADDs) to the south of the Bluegrass District (greater Fayette County), including Adair, Allen, Barren, Breckinridge, Butler, Casey, Clinton, Cumberland, Edmonson, Grayson, Green, Hardin, Hart, Larue, Logan, Marion, McCreary, Meade, Metcalfe, Monroe, Nelson, Pulaski, Russell, Simpson, Taylor, Warren, Washington, and Wayne Counties.

Structurally Deficient (SD) (Bridges)—A bridge that is characterized by deteriorated conditions of significant bridge elements and potentially reduced load-carrying capacity. See "2010 Status of the Nation's Highways, Bridges, and Transit: Conditions and Performance."

Urban (*syn* **Metropolitan)**—The 2013 Rural-Urban Continuum Codes form a classification scheme that distinguishes metropolitan counties by the population size of their metro area, and nonmetropolitan counties by degree of urbanization and adjacency to a metro area. The official Office of Management and Budget (OMB) metro and nonmetro categories have been subdivided into three metro and six nonmetro categories. Each county in the U.S. is assigned one of the 9 codes.

Urban Triangle—Counties in Kentucky located in the Area Development Districts (ADDs) encompassing Louisville, Lexington, and the Cincinnati area of Northern Kentucky, including Anderson, Boone, Bourbon, Boyle, Bullitt, Campbell, Carroll, Clark, Estill, Fayette, Franklin, Gallatin, Garrard, Grant, Harrison, Henry, Jefferson, Jessamine, Kenton, Lincoln, Madison, Mercer, Nicholas, Oldham, Owen, Pendleton, Powell, Scott, Shelby, Spencer, Trimble, and Woodford Counties.

Value Added—The gross output of an industry or a sector less its intermediate inputs;

the contribution of an industry or sector to gross domestic product (GDP). Value added by industry can also be measured as the sum of compensation of employees, taxes on production and imports less subsidies, and gross operating surplus.

Venture Capital Investments—Capital invested in a project in which there is a substantial element of risk, typically a new or expanding business.

Violent Crimes—In the FBI's Uniform Crime Reporting (UCR) Program, violent crime is composed of four offenses: murder and nonnegligent manslaughter, rape, robbery, and aggravated assault. Violent crimes are defined in the UCR Program as those offenses which involve force or threat of force.

Western Kentucky—Counties in Kentucky located in the western most Area Development Districts (ADDs), including Ballard, Caldwell, Calloway, Carlisle, Christian, Crittenden, Daviess, Fulton, Graves, Hancock, Henderson, Hickman, Hopkins, Livingston, Lyon, Marshall, McCracken, McLean, Muhlenberg, Ohio, Todd, Trigg, Union, and Webster Counties.

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