2012

Kentucky Annual Economic Report 2012

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

Christopher R. Bollinger
University of Kentucky, chris.bollinger@uky.edu

Glenn C. Blomquist
University of Kentucky, GCBLOM@UKY.EDU

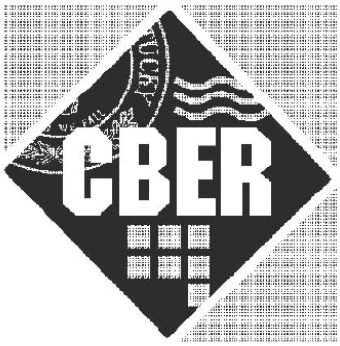
Merl Hackbart
University of Kentucky, m.hackbart@uky.edu

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

KENTUCKY

Annual Economic Report

2012



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

UK UNIVERSITY OF KENTUCKY

GATTON COLLEGE OF BUSINESS AND ECONOMICS

Kentucky Annual Economic Report

2012

Center for Business and Economic Research

Department of Economics

Gatton College of Business and Economics

University of Kentucky

Dr. Kenneth R. Troske & Dr. Christopher R. Bollinger, *Co-Directors*
Center for Business and Economic Research
Dr. Glenn C. Blomquist, *Interim Chair*
Department of Economics
Dr. Merl Hackbart, *Interim Dean*
Gatton College of Business and Economics

Michael T. Childress, *Managing Editor*

Center for Business and Economic Research

CBER Staff

Co-Directors: Dr. Kenneth R. Troske
Dr. Christopher R. Bollinger
Associate Director: Dr. Christopher Jepsen
Economic Analyst: Anna L. Stewart
Policy Analyst: Michael T. Childress

Research Assistants:
Derrick Jenniges
Rachel Keller
James Saunoris

Administrative Staff Associate:
Jeannie Graves

Department of Economics University of Kentucky

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

CBER's research includes a variety of interests. Recent projects have been conducted on manpower, labor, and human resources; transportation economics; health economics; regulatory reform; public finance; and economic growth and development.

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

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

Past issues of the *Kentucky Annual Economic Report* are available online at http://cber.uky.edu

From the Co-Directors . . .

The Center for Business and Economic Research has a statutory obligation to examine various aspects of the Kentucky economy and prepare an annual economic report. This report is one of the important ways that the Center fulfills its mandated mission as specified in the Kentucky Revised Statutes (KRS 164.738). These articles cover a variety of issues that range from an economic forecast for Kentucky in 2012 to a detailed examination of demographic trends in our state to an examination of how to develop the intellectual capital within our universities into commercial enterprises. And while each of these articles is grounded in the "here and now," a common theme tying these articles together is their forward-looking perspectives.

In the first article, Dr. Chris Jepsen, the CBER Associate Director, and Dr. Ken Troske document recent trends in the U.S. and Kentucky economies and provide a forecast for 2012. They pay particular attention to two areas of the economy where growth has been particularly slow after the recession, employment and housing. Noting the slow growth of the U.S. and Kentucky economies after the latest recession, they expect the national, state, and local economies to experience slow growth in 2012, and they do not expect the U.S. economy to return to the growth rates of the mid-1990s until 2014 or 2015.

Then, using various economic, social, and health variables, Michael Childress and Matthew Howell present the State of the State Index—a single number that summarizes Kentucky's overall status relative to other states over a twenty year period. Based on data from 1990 to 2009, the State of the State Index includes factors ranging from per capita income to the poverty rate. The index shows that Kentucky made minor progress between 1990 and 2009.

Demographic trends, of course, play a significant role in Kentucky's economy, as the University of Louisville's Michael Price points out in his chapter. He notes that over the last decade Kentucky demonstrated two very unequal patterns of population growth. In much of Eastern and Western Kentucky, population growth was slow or negative. Conversely, the metro areas of Northern and Central Kentucky grew faster than the U.S. as a whole. Clearly, these demographic patterns will have important implications for Kentucky's future economic development.

Another developing trend that could affect Kentucky are the new or pending environmental regulations that are expected to have significant effects on the cost of electric power generation, and therefore on the price of electricity. John Garen, Chris Jepsen, and James Saunoris, colleagues in the economics department, estimate the likely effects of increased electricity prices on Gross State Product (GSP) and on employment. Their estimates and simulations indicate that price increases in electricity could have sizable negative effects on Kentucky's GSP and employment growth.

Another traditional mainstay of Kentucky's economy is the transportation sector. Sean Slone, with the Council on State Governments, points out that Kentucky's infrastructure needs exceed the ability to fund them. He discusses some of these funding issues and how public-private partnerships are being used in neighboring states to fund infrastructure projects.

Economists Chris Jepsen, Frank Scott, and Jesse Zenthoefer examine the economic consequences of the current access rate system for intrastate long-distance calls. They note that many telephone companies charge much higher access rates for intrastate calls than for interstate calls, which results in an economic inefficiency.

Writing about how to leverage additional economic opportunities from research universities, H. Dan O'Hair, Dean of the University of Kentucky College of Communications and Information Studies, analyzes responses to a Request for Information issued by the White House Office of Science and Technology Policy in 2009 asking for input into the issues of university commercialization, innovation, and entrepreneurship. He offers five recommendations that seek to invigorate the innovation and entrepreneurship processes at universities.

Noting that Kentucky employers are acutely affected by ill health as Kentucky leads the nation in chronic disease prevalence, Jennifer E. Swanberg, Jess Miller Clouser, and Lee Ann Walton, with the University of Kentucky Institute for Workplace Innovation (iwin), discuss the findings from their recent study on the best strategies for integrating health promotion programs and initiatives.

Similarly, Jennifer Dupuis, program manager for health literacy and leadership research in the College of Communications and Information Studies, H. Dan O'Hair, and Michael Childress discuss the economic costs of poor health literacy and summarizes the major points from a series of ten colloquia which were designed to elicit insights about unique programs and activities to improve health literacy.

Collectively these articles paint a picture of continuity and change for Kentucky's economy, its communities, and its citizens. Ideas, innovation, and intellectual capital form the foundation of the knowledge economy, but Kentucky, like many states, is still centered on making and growing things, extracting and transporting raw materials, and moving people and products to markets and workplaces. For Kentucky to achieve broad prosperity and improve its per capita income, we will surely need to continue along the path of seeking educational excellence as well as economic innovation.

We have worked on a number of important projects at the Center this year, and we anticipate completing several other projects addressing some of Kentucky's pressing public policy issues.

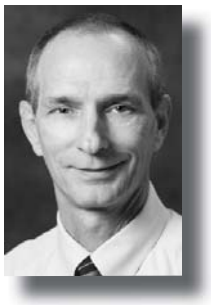
Dr. Kenneth R. Troske & Dr. Christopher R. Bollinger
Co-Directors
Center for Business and Economic Research
Gatton College of Business and Economics
University of Kentucky

Authors

Michael T. Childress works in the University of Kentucky, College of Communications and Information Studies and the Center for Business and Economic Research, Gatton College of Business and Economics. From 1993 to 2010 he served as the executive director of the Kentucky Long-Term Policy Research Center, a state government agency created by the Kentucky General Assembly in 1992 to bring a future-oriented perspective to decision making in the Commonwealth. The work of the Center included research, policy analysis, communications with all branches of government, and public outreach. In this capacity he directed the Center's numerous research activities. From 1988 to 1993, he was an analyst at the RAND Corporation in Santa Monica, California. Mr. Childress received his B.A. from the University of Kentucky with honors and as a member of Phi Beta Kappa in 1984, and an M.A. from the University of California, Los Angeles, in 1986—both in political science.

Jess Miller Clouser serves as Project Coordinator for the Institute for Workplace Innovation, where she has worked for four years. She works closely with the research arm of iwin by conducting literature reviews, writing copy for reports, and managing research projects. She served as the Project Manager for the Latino Farmworker Health Project and currently manages the Latino Horse Worker Health Project, a 5-year, million-dollar research project. She also maintains the website and supports other iwin functions as needed. Jess graduated with honors from the University of Kentucky with a BA in English and Spanish and a minor in Anthropology. She was a Gaines Fellow, a Singletary Scholar and worked as the Assistant Coordinator for the Residencelife Recycling Program. Jess has volunteered and worked for several community organizations, at UK's Summer Environmental Writing Program, and at her family's small downtown diner.

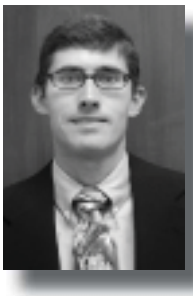
Jennifer Dupuis is Project Manager for Health Literacy and Leadership Research in the College of Communications and Information Studies at the University of Kentucky. She earned her B.A. in English and Spanish at Albion College (Michigan) in 1996, and her Masters in Library Science at University of Kentucky in 2011. Her current work focuses on the application of health literacy and communications concepts in the education of healthcare professionals. Ms. Dupuis serves as Co-Chair of the Research Committee and member of the Steering Committee for Health Literacy Kentucky, a non-profit organization dedicated to improving the health literacy of Kentuckians.



John Garen is a Gatton Endowed Professor of Economics in the Gatton College of Business and Economics at the University of Kentucky, where he has been a member of the faculty since 1985. Dr. Garen received his Ph.D. from Ohio State University in 1982 and has served as a Visiting Professor at the University of Chicago, a Visiting Scholar at the Mercatus Center and at National Sun Yat-Sen University, and is an Adjunct Scholar for the Bluegrass Institute for Public Policy Solutions. From 2005-2009 he served as Department Chair and during 2004-2005 he was Co-Director of the Gatton College's Center for Business and Economic Research. Dr. Garen has conducted research on a wide variety economics issues, leading to over thirty publications in many of the foremost academic journals as well as numerous reports and manuscripts. Growing out of this experience has been a steady flow of opinion columns, media work, and presentations to the public on the economy and economic issues, and on the importance of economics to good public policy.

Matthew L. Howell is a Ph.D. candidate in the Martin School of Public Policy and Administration at the University of Kentucky, where he has worked and studied since 2006. He will receive his Ph.D. on May 6, 2012. His primary teaching and research interests are state and local government, public policy and administration, quantitative methods, and the interaction of policy making with local governments. Prior to earning his Ph.D., Matthew earned his B.A. from Missouri State University (2006) and M.P.P. from the University of Kentucky (2011).

Authors



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

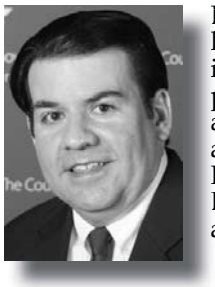
H. Dan O'Hair is Dean of the College of Communications and Information Studies and Professor of Communication at The University of Kentucky. He received his Ph.D. in 1982 from The University of Oklahoma in communication. In 2006, he served as the President of the National Communication Association, the world's largest and oldest professional association devoted to the study of communication. He has published over ninety research articles and scholarly chapters in risk and health communication, public relations, business communication, media management, and psychology journals and volumes, and has authored and edited fifteen books in the areas of communication, risk management, health, and terrorism. He has directed over twenty doctoral dissertations and served on over ninety doctoral and masters committees. He has been the principal investigator or Co-PI for several grants from business, non-profit, and government institutions totaling more than $10 million. Dr. O'Hair has served on the editorial boards of twenty-seven research journals and is a past editor of the Journal of Applied Communication Research, published by the National Communication Association. Articles published in JACR have been referenced or reviewed by such publications as the Wall Street Journal and the Harvard Communication Letter. He has served as an education and training consultant to dozens of private, non-profit and government organizations.

Michael Price has been a demographer at the University of Louisville's Urban Studies Institute for over 25 years and recently served as the interim Director of the Kentucky State Data Center. During his tenure at the Institute, Price has run an applied demographic research program which produces Kentucky's official population forecasts and represents Kentucky in the Census Bureau program to produce state and local population estimates. The guiding principle to Price's work is to produce data and analysis that contribute to practical solutions to difficult problems. He has been an author or contributor to hundreds of research reports, a public speaker on demographic data and trends, and a charter data partner to the Kentucky Kids Count project and the Greater Louisville Project. Price obtained a Bachelor of Arts (1973) and Masters of Arts (1977) in Sociology from the University of Louisville and pursued doctoral studies as a Research Assistant at Michigan State University.

James Saunoris is currently a Ph.D. candidate at the University of Kentucky. He received his B.S. and M.S. from Illinois State University in Normal, Illinois and a M.S. from the University of Kentucky. He works as a research assistant at the Center for Business and Economic Research. His primary research interests are in the areas of public finance and open-economy macro/monetary economics. His research has been published/forthcoming in economic journals such as Journal of Policy Modeling, Journal of Regional Analysis & Policy and Journal of Economic Studies.

Frank Scott is Gatton Professor of Economics at the University of Kentucky. He graduated from the College of William and Mary in 1973, majoring in economics. He received the Ph.D. in economics from the University of Virginia in 1979. His teaching interests include microeconomic theory, industrial organization, managerial economics, and law and economics. His research interests include industrial organization, regulation of business, public policy, and applied microeconomics in general. He has published in a variety of academic journals on topics such as franchising, antitrust, tax policy and labor compensation, utility regulation and ratemaking, the economics of lotteries, and the economics of professional sports industries. He has served as a consultant to several state and federal government agencies and as a consultant and expert witness for numerous private-sector businesses and the federal government.

Authors



Sean Slone is the Senior Transportation Policy Analyst at The Council of State Governments (CSG) in Lexington. He oversees CSG's Transportation Policy Task Force, which is made up of state legislators, state department of transportation officials and private sector transportation industry associates from around the country. He writes frequently on transportation policy for CSG publications such as Capitol Ideas and Capitol Research. His work has also appeared in The Lane Report. Before joining the CSG staff in 2006, Sean spent 10 years as a producer for C-SPAN in Washington, D.C. and five years as a producer/reporter for Kentucky Educational Television, where he covered the Kentucky General Assembly. A Lexington native, Sean has a Bachelor's in Television Production from Emerson College and a Master's in Journalism from Northwestern University's Medill School of Journalism.

Jennifer E. Swanberg, Ph.D., is the executive director and founder of the Institute for Workplace Innovation (iwin) at the University of Kentucky, an associate professor in the UK College of Social Work with joint appointments in the Colleges of Business and Economics, Medicine and Public Health. She is a faculty affiliate with the UK Center on Poverty Research and the Center for the Advancement of Women's Health, a Research Fellow of the Boston College Work & Family Roundtable, and a member of the Employee Policy Research Network. Dr. Swanberg is an interdisciplinary social scientist with broad research interests in understanding how the social contexts of work contribute to health among individuals; how social policies affect individuals' quality of life; and how information on these issues can be used to improve organizational practice, policy, and business outcomes as well as social policies and individual outcomes. Her research focuses primarily on the organization of work, low-wage jobs, and antecedents of work-family conflict among underrepresented working populations.

Kenneth R. Troske is the Interim Senior Associate Dean in the Gatton College of Business, Director of the Center for Business and Economic Research, and William B. Sturgill Professor of Economics at the University of Kentucky as well as a Research Fellow with the Institute for the Study of Labor (IZA) in Bonn, Germany. Dr. Troske served as a member of the Congressional Oversight Panel whose task was to assess the existing condition of America's financial markets and the regulatory system as well as to closely monitor the actions of the Treasury Department and financial institutions to determine if their actions are in the best interest of the American economy. He is also a member of the Federal Reserve Bank of Cleveland Lexington Business Advisory Council. He received his Ph.D. in economics in 1992 from the University of Chicago and his undergraduate degree in economics from the University of Washington in 1984. His primary research areas are labor and human resource economics. Dr. Troske has authored a number of widely-known papers utilizing employer-employee matched data on topics such as education, productivity, technology, and discrimination. His most recent work has focused on evaluating various aspects of the Workforce Development System in the U.S., the role of human capital in promoting the economic growth of a region and the impact of tax incentives on the creation of jobs in a region. His papers have appeared in many leading journals in economics including the Quarterly Journal of Economics, Journal of Labor Economics, Journal of Human Resources, Review of Economics and Statistics, and the American Economic Review.

Lee Ann Walton is the Employer Engagement Manager for the Institute of Workplace Innovation, where she has worked for the past three years. She works to engage employers across the state in adopting innovative workplace practices that benefit employers and employees. Lee Ann has over 15 years of experience in complex marketing strategy and project management and has worked in a wide array of industries, making her a self-proclaimed Generalist. She graduated from the University of Kentucky with a Bachelor of Business Administration in Marketing and a Master's of Science in Hospitality and Dietetics where her Master's thesis focused on exploring how Kentucky wineries network and if this had a relation to their growth and profitability.

Jesse Zenthoefer is currently an Operations Analyst at Consumer Programs Incorporated. He received his BS in Economics from the University of Central Missouri in Warrensburg, MO and his MS in Economics from the University of Kentucky. He formerly worked as a research assistant at the Center for Business and Economic Research.

Table of Contents

The U.S. and Kentucky Economies in 2011: Is this the "New Normal"?

Christopher Jepsen & Kenneth R. Troske

In this article, we document recent trends in the U.S. and Kentucky economies and provide a forecast for the following year. We pay particular attention to two areas of the economy where growth has been particularly slow after the recession, employment and housing. The slow growth of the U.S. and Kentucky economies after the latest recession, at least compared to growth rates after previous recessions, is typical for a recession accompanied by a financial crisis. For 2012, we expect the national, state, and local economies to experience slow growth, and we do not expect the U.S. economy to return to the growth rates of the mid-1990s until 2014 or 2015.

Recently there has been much written about the slow pace of economic growth and persistently high rates of unemployment. Many commentators have pointed out that after a major recession the economy typically experiences a fairly high rate of economic growth, around 4-5 percent per year, and a rapidly falling unemployment rate. In contrast, since the end of the most recent recession, the U.S. economy has experienced much lower rates of GDP growth—in the range of 1.5-2.5 percent per year—and persistently high rates of unemployment—hovering around 9 percent. This has led many to conclude that the economy has changed and what we are experiencing is the "new normal."

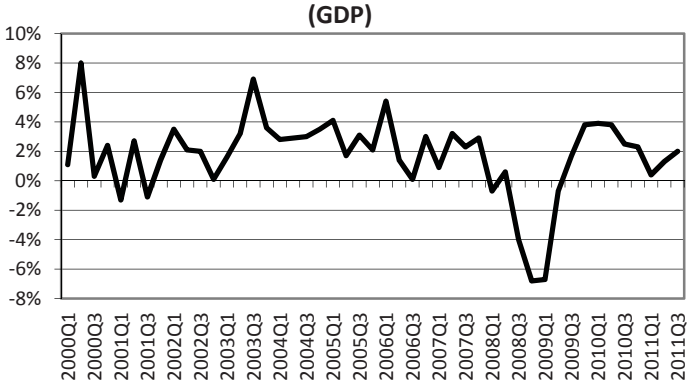
Of course, the recent recession was not a typical recession. Instead it was a recession that was accompanied by a significant financial crisis that likely increased the severity of the recession. As is well documented in the book *This Time is Different*, by economists Carmen Reinhart and Ken Rogoff, recoveries from recessions accompanied by financial crises tend to be slow and fitful with a number of years of below-average growth and persistently high unemployment. This is because financial crises lead households, businesses, and financial institutions to adopt a much more conservative outlook while working to repair the financial damage they experienced, which results in lower rates of borrowing and more caution before undertaking significant investments in both capital and labor. In other words, the current recovery is ***typical*** for a recession produced by a financial crisis. And while this may be cold comfort to people who are struggling to find a job or who have simply given up and stopped looking, it does make it clear that there is no "new normal." The economy is functioning exactly as expected given its recent past. This also means that, going forward, we should expect several more years of moderate growth and unemployment rates well above the pre-recession rates. However, as Reinhart and Rogoff make clear, we should remain confident that the economy will return to normal with robust growth and low unemployment.

What about the Kentucky and Central Kentucky economies? Shouldn't we be better off since people here did not engage in many of the financial shenanigans that people in other parts of the country perpetrated. There was no housing bubble in Kentucky. We did not see an explosion of sub-prime mortgages. Local banks did not invest in Collateralized Debt Obligations (CDOs). So why are we suffering? First, it is important to recognize that we have fared much better than many other regions. The recession has had a smaller impact on the Kentucky economy than it has in places such as Las Vegas, Phoenix or Miami. And, as we will see below, there is substantial evidence that Kentucky is recovering from the recession at a faster rate than other parts of the country. It also is important to recognize, however, that in Kentucky we are largely dependent on the manufacturing sector. We make

goods that people in other parts of the country and the world buy. So the slow growth of the U.S. economy and the economies in Western Europe (a significant trading partner for Kentucky firms) limits the growth of the Kentucky economy and will continue to do so for the next several years.

In the rest of this article we will review the performance of the economy over the last several years, focusing on the Kentucky economy and the economic growth of Central Kentucky. As part of this review we will pay particular attention to employment. Our goal is to provide readers with a realistic sense of when we can expect things to return to normal.

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



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

Gross Domestic Product

Beginning in the third quarter of 2008, the economy contracted for four straight quarters (Figure 1). The economy also contracted in the first quarter of 2008. Between 2007 and 2009, the economy shrunk by an amount that matches the recessions of the mid-1970s and the early 1980s. Starting with the third quarter of 2009, the economy has grown for nine consecutive quarters. The growth was nearly zero in the first quarter of 2011 as the economy struggled to find its way after the stimulus funding ended. The current debt crisis in Europe and mounting U.S. debt create concern about future growth of the economy.

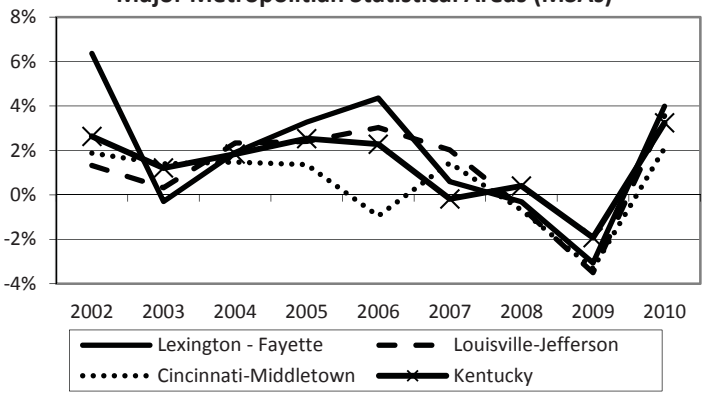
Figure 2 looks at annual GDP growth for Kentucky and its three major metropolitan statistical areas (MSA). Kentucky and its metropolitan areas grew at a much slower pace than the national economy during the last boom, and Kentucky did not contract as much as the U.S. in the recent recession. Although the recession impacted growth in all three metropolitan areas, there are some important differences. Given the large number of manufacturing firms in the Louisville area, it is not surprising that the recession had the largest impact in Louisville. The Cincinnati/Northern Kentucky area has had the lowest growth of the three areas for nearly the entire period. Although Lexington was also hurt by the recession, it had the highest growth for much of the decade, including a 4 percent growth rate in 2010.

When thinking about returning to normal, it is important to recognize that as of the third quarter of 2011 the real value of GDP for the U.S. exceeded the pre-recession peak value of GDP. This is also true for the Kentucky economy as well as for the Lexington MSA, while as of 2010 the value of output in the Louisville MSA remained just slightly below the pre-recession level (and will likely exceed this level when the 2011 data become available). So based solely on the amount of output produced, these economies appear to have returned to their pre-recession levels.

Unemployment

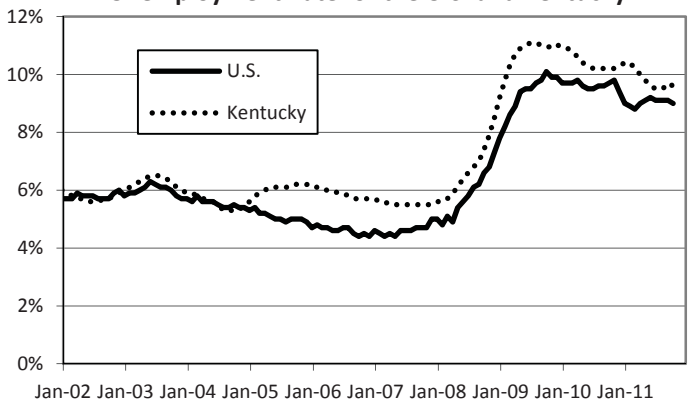
The fact that unemployment has been much slower to recover from the recession compared to GDP has been well documented. A central concern of the 2012 elections is the high unemployment

FIGURE 2
Percentage Change in GDP in Kentucky and Its Major Metropolitian Statistical Areas (MSAs)



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

FIGURE 3
Unemployment Rate for the U.S. and Kentucky

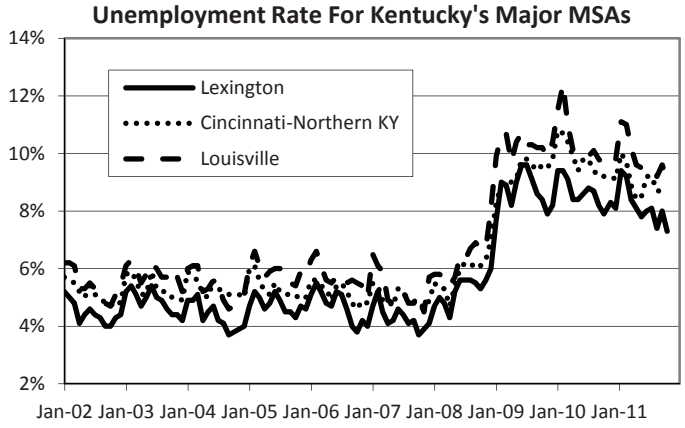


Source: U.S. Department of Labor, Bureau of Labor Statistics

rate. The unemployment rate in Kentucky has been higher than the U.S. rate since 2004 (Figure 3). In early 2011, the U.S. unemployment rate finally dropped below 9 percent for the first time since April 2009. In Kentucky, unemployment peaked at 11.1 percent in the summer of 2009 before dropping below 10 percent in May 2011. The preliminary U.S. unemployment rate for November 2011 is 8.6 percent, still well above the unemployment rate of 5 percent at the beginning of 2008. For Kentucky, the preliminary unemployment rate for October is 9.6 percent, also well above the early 2008 level of approximately 5.5 percent.

Figure 4 shows the unemployment rates for Kentucky's metropolitan areas. These rates, which have not been seasonally adjusted (unlike the national and state rates), show a similar pattern to the national and state rates. Louisville has had the highest unemployment rates throughout the period, while Lexington has had the lowest rates.

FIGURE 4
Unemployment Rate For Kentucky's Major MSAs



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

One particularly troubling aspect of the current recovery is the fact that many individuals are unemployed for long durations. In 2007, prior to the recession, the median unemployment duration was approximately 8.5 weeks, both nationally and in Kentucky.[1] Nationally, the median duration of unemployment rose to 15.7 weeks in 2009 and 21.5 weeks in 2010. The median duration was slightly lower in Kentucky: 13.9 weeks in 2009 and 17.1 weeks in 2010.

Employment

Because the unemployment rate is the number of employed individuals divided by the number of individuals in the labor market, changes in the unemployment rate are driven by both numbers, not just by employment. In fact, some of the recent improvements in the unemployment rate are due in no small part to the fact that many people have stopped looking for work and are no longer considered part of the labor force. Therefore, it is important to look at changes in employment, in addition to changes in the unemployment rate, to get a clear picture of the health of the labor market.

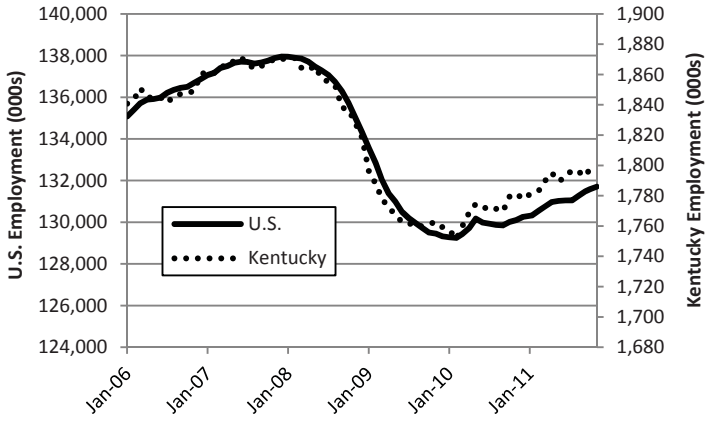
Figure 5 shows trends in employment for the U.S. and Kentucky. This figure clearly shows that despite the recent growth in employment, employment in both the nation and in Kentucky remains well below pre-recession levels. For the U.S., employment remains approximately six percent below the peak, which represents just over six million jobs. For Kentucky, employment remains approximately four percent below peak, which represents about 73,000 jobs.

The employment patterns in Kentucky's three major MSAs – Cincinnati/Northern Kentucky, Louisville, and Kentucky – are quite similar to what is seen at the state and national levels. For all three major MSAs, employment peaked around the middle of 2007 and, despite recent growth, remains well below peak. The Cincinnati MSA has fared the worst of the three metro areas, experiencing a five percent drop in employment, which translates into a loss of 53,000 jobs. Both Louisville and Lexington lost around four percent of employment which represents 19,000 jobs in Louisville and 9,000 jobs in Lexington.

Comparing the trends in employment with the trends in GDP discussed above reveals one of the more significant changes that have occurred during the recession—the large increase in labor productivity. Between 2007 and 2011 overall labor productivity in the U.S. has risen by approximately six percent, compared to an increase for Kentucky as a whole and in Kentucky's major MSAs of approximately four percent. This growth in productivity means that businesses are now able to produce the same amount of output with much less labor, so businesses are under less pressure to hire workers in order to meet the growing demand for their products or services. This productivity increase also puts pressure on workers looking for employment to increase their skills so that they are able to compete in the more productive workplace.

So when do we expect employment to return to normal, or at least return to pre-recession levels? Assuming that employment continues to grow at the rate we have seen for the past year, it will be five years before the U.S. returns to pre-recession levels of employment. If we see a doubling of the rate of employment growth, which would be a growth rate that is closer to the historic average, then employment in the U.S. would return to pre-recession levels in slightly less than three years. For Kentucky, again assuming growth continues at the level we have seen in the past year, we will return to pre-recession levels of employment in just over three years, while the return to normal should take just over two years for the Cincinnati MSA and a little less than two years for the Lexington and Louisville MSAs. Of course, simply returning to pre-recession levels of employment ignores the increase in population that has occurred over the last several years. Taking population growth into account adds between six months to a year, depending on the region, before we see employment levels that are comparable to levels we saw prior to the start of the recession. Simply put, without a significant increase in the growth of employment, we are still several years away from a return to normal in the labor market.

FIGURE 5
U.S. and Kentucky Employment



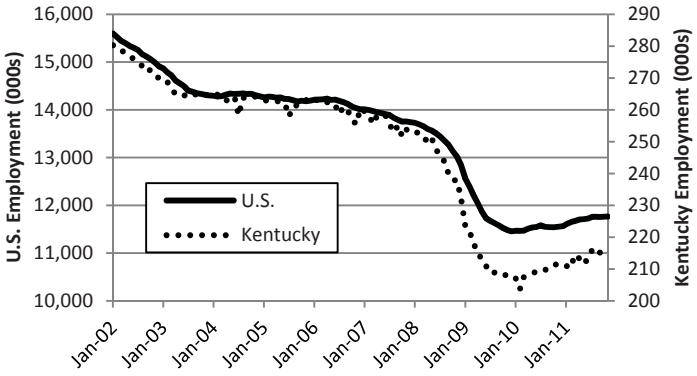
Source: U.S. Department of Labor, Bureau of Labor Statistics

Manufacturing Sector

The manufacturing sector has traditionally employed a large percentage of workers, particularly in Kentucky. As shown in Figure 6, manufacturing employment fell from January of 2002 to January of 2010, and the reduction in employment was particularly large starting in the middle of 2008. In 2011 manufacturing employment has risen slightly, although it is nowhere close to its pre-recession levels. In Kentucky manufacturing employment has fallen by 35,000 jobs since January of 2008, which represents a 14 percent decline in manufacturing employment in the state.

The dramatic fall in manufacturing employment also has occurred in all three metropolitan areas in the state. Louisville has experienced by far the largest decline in employment, although employment has increased considerably since early

FIGURE 6
Manufacturing Employment in the U.S. and Kentucky



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

2010. Lexington's manufacturing employment has remained relatively constant throughout 2010 and 2011, whereas manufacturing employment in Cincinnati/Northern Kentucky has been growing since late 2009.

The impact of the current recession has already had a profound, and likely permanent, impact on Kentucky's economy. The recessions this century have led to a decline in the manufacturing sector's share of employment from 14 percent in 2000 to 9 percent in 2010. In contrast, the share of the state's employment in health and education has risen from 10 percent in 2000 to 12 percent in 2010 and has surpassed manufacturing in employment share. The professional and financial sector has also seen a growth in its share of employment and appears likely to pass manufacturing in the next few years. As the focus of Kentucky's economy continues its long-run shift away from traditional industries such as manufacturing, agriculture, and mining, the state's future economic growth will be driven by the health and education and professional and financial sectors. It is important that policymakers in the state recognize this on-going shift and change their focus away from the declining sectors towards the sectors holding the greatest potential for future growth.

Housing Market

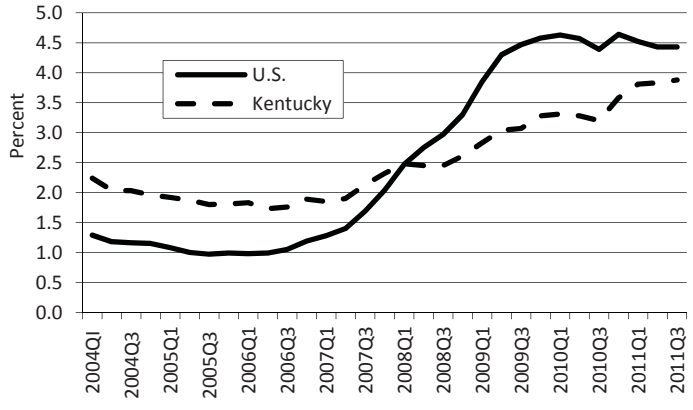
The most recent recession was triggered in part because problems in the housing market spread to the financial sector. Because the recession started with problems in the housing market, a full recovery of the economy will be difficult without a recovery in the housing market. Consequently, this section focuses on recent developments in the housing sector.

As has been extensively discussed in a variety of places, both the federal government and the private sector undertook extensive efforts to increase the number of people who owned a home using methods such as keeping mortgage rates artificially low or by creating new financing options that allowed people to purchase homes with very small, or nonexistent, down payments. Although these efforts succeeded in pushing the homeownership rates up to 69 percent nationally and 75 percent in Kentucky— the highest rates in history—it is now clear that many of these new homeowners could not afford their homes. As of the third quarter of 2011, the homeownership rate is 66 percent nationally and 69 percent in Kentucky.

One result of this unprecedented and unsustainable increase in homeownership has been a dramatic increase in foreclosures. Figure 7 shows that between the first quarter of 2006 and the first quarter of 2010, the percentage of mortgages in foreclosure nationally has increased from one percent to over 4.5 percent. Although foreclosure rates have stabilized in 2010 and 2011, they are still well above four percent.

The figure shows that the foreclosure rate in Kentucky has also increased dramatically relative to pre-recession levels, although the state's rate is now below the national rate. Before the recession, Kentucky had higher foreclosure rates than the nation until 2008. In the third quarter of 2011 (the most recent data), the rate in Kentucky is 3.9 percent compared to the national rate of 4.4 percent, a difference of 12 percent (or 0.5 percentage points). This lower foreclosure rate for Kentucky illustrates that housing problems are less severe in Kentucky compared to many parts of the country.

FIGURE 7
Foreclosures as a Percentage of All Mortgages



Source: Mortgage Bankers Association

The rising foreclosure rates and earlier efforts to increase homeownership rates have led to an increase in the supply of housing in the country. Because this increase in the supply of houses has not been met by an increase in demand for houses, we have seen a significant fall in housing prices in recent periods. Figure 8 plots the Federal Housing Finance Agency's housing price index for the U.S. and Kentucky. As this figure shows, housing prices in the country

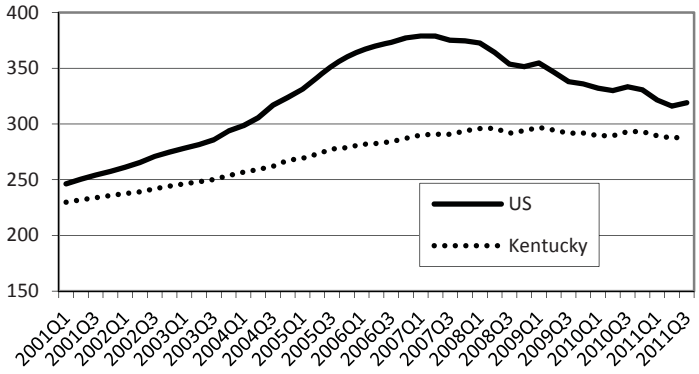
have been falling since second quarter 2007. Overall, housing prices in the country have fallen approximately 16 percent since their peak. After falling in the first two quarters of 2011, U.S. housing prices rose slightly during the third quarter. Because housing prices also rose in the third quarter of 2010 before dropping for the next three quarters, it seems unlikely that housing prices have bottomed out.

In contrast, Kentucky housing prices have remained fairly steady over this period, although they are down slightly in 2011 compared to previous years. Figure 9, which plots the housing price index for Lexington, Louisville, and Cincinnati/ Northern Kentucky, shows that housing prices have declined slightly in early 2011 in both the Lexington and Louisville markets. In contrast, the Cincinnati/Northern Kentucky market has seen a fairly steady fall in housing prices since 2008. Like the national market, the local markets should be closely watched to see if recent price increases will continue.

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

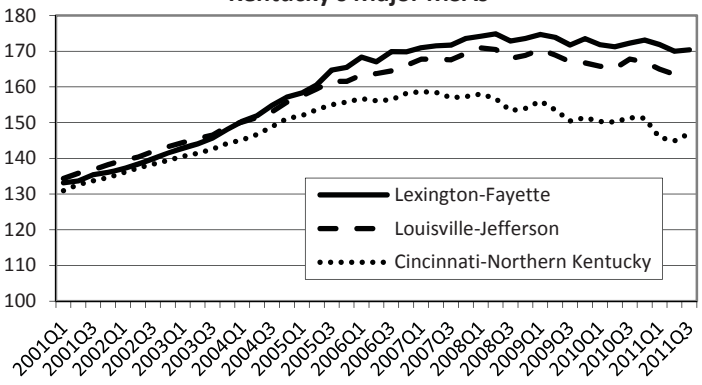
Unfortunately, recent events appear likely to only prolong the problems in the housing market. To begin with, mortgage lenders and servicers have been struggling under the crush of the rise in foreclosures and have been sloppy in processing paper work. They may have even committed fraud in their efforts to quickly foreclose on borrowers who are delinquent. Fixing these problems is likely to take time. The general consensus is that the federal government's 2010 home buyer tax credit only served to speed up some decisions to buy a house without having any impact on the overall demand for homes. Finally, the federal government's attempts to modify mortgages through their Making Home Affordable program will only be available to a small number of borrowers and for those that will be helped, the help will only be temporary. Eventually, these homeowners will be back in the same situation they currently find themselves in—living in a house they cannot afford with a mortgage that exceeds the value of their house. In the end the housing market will need to fix itself, through individuals moving into more economically-appropriate housing

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



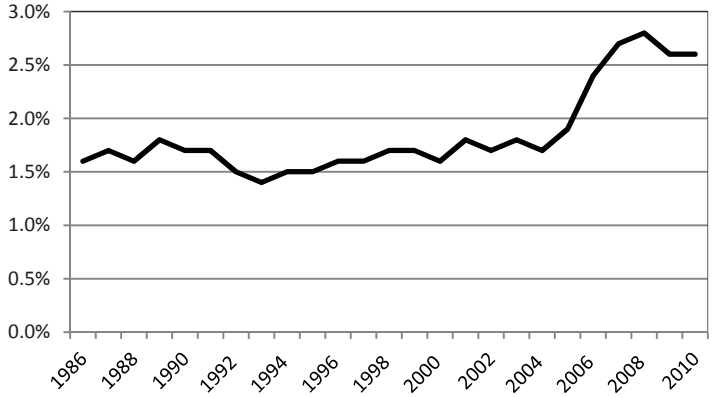
Source: Federal Housing Finance Agency

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



Source: Federal Housing Finance Agency

FIGURE 10
Homeownership Vacancy Rate for the U.S.



Source: U.S. Census Bureau

situations and through an increase in the number of people demanding a home. Until these scenarios occur the housing market will continue to limit the growth of the economy.

Outlook for 2012

In Table 1 we present our forecast for the coming year. In the first column we present our forecast from last year. The second column contains the most recent data showing the actual performance of the economy in 2011. Comparing columns 1 and 2 shows how accurate we were last year. Finally, column 3 shows our predictions for 2012.

As the numbers in this table indicate, we expect the U.S. economy to continue its slow but steady growth for 2012, with an overall growth rate around 2.5 percent. We do not expect the economy to slip into a new recession. Since a growth rate of 2.5 percent is below what is necessary to significantly reduce unemployment, we expect the unemployment rate to remain relatively high at 8 percent. We do expect an increase in employment growth in the coming year, and we believe the level of employment will remain below the level seen prior to the start of the recession. We expect that inflation will remain under control in the coming year.

We believe that the Kentucky economy will continue to outpace the U.S. economy in the coming year, averaging 3.0 percent growth, and we expect to see a fairly significant drop in unemployment in the state, down to 8.5 percent. These expectations are predicated on our belief that we will see reasonable growth in overall employment, with growth in the manufacturing sector leading the way. We also believe that Central Kentucky will continue to experience somewhat faster growth and lower unemployment than the rest of the state.

In summary, we believe that our recovery from the recent recession and financial crisis remain typical, with growth in the range of 2.5-3.0 percent per year and fairly high rates of unemployment. However, we see no reason to expect that low growth and high unemployment will persist. We believe by 2014 or 2015 the U.S. economy will return to rates of growth and unemployment that we saw in the mid-1990s. We remain confident that the economy will continue to improve and will eventually return to the "old normal."

[1]All unemployment duration data are from the U.S. Department of Labor, Bureau of Labor Statistics.

TABLE 1
Forecast for 2012

	2011 Forecast	2011 Actual or Best Available	2012 Forecast
Real GDP Growth--U.S.	2.7%	1.2%	2.5%
Unemployment Rate--U.S.	9.4%	9.0%	8.0%
Inflation--U.S.	1.5%	1.4%	1.5%
Employment Growth--U.S.	1.0%	1.2%	2.0%
Growth in Manf. Employment--U.S.	2.0%	1.7%	2.0%
Real GDP Growth--Kentucky	2.8%	---	3.0%
Unemployment Rate--Kentucky	9.5%	9.9%	8.5%
Employment Growth--Kentucky	1.5%	1.1%	2.5%
Growth in Manf. Employment--Kentucky	3.5%	2.8%	3.0%

The State of the State Index:

Kentucky Makes Minor Progress

Michael T. Childress & Matthew L. Howell

Here we present an approach that combines 45 different factors into a single quality-of-life index. The State of the State Index is a single number that summarizes Kentucky's overall status relative to other states over a twenty-year period. Based on data from 1990 to 2009, the State of the State Index includes factors ranging from teen pregnancy, poverty, and voter participation rates to toxic releases to air, water, and land. Together, they form an empirically-based index that offers a perspective on how Kentucky – or any other state – is faring relative to other states and its own past. The Index shows that Kentucky made minor progress between 1990 and 2009, demonstrated by the state's national and peer-state rankings improving a few places during this period.

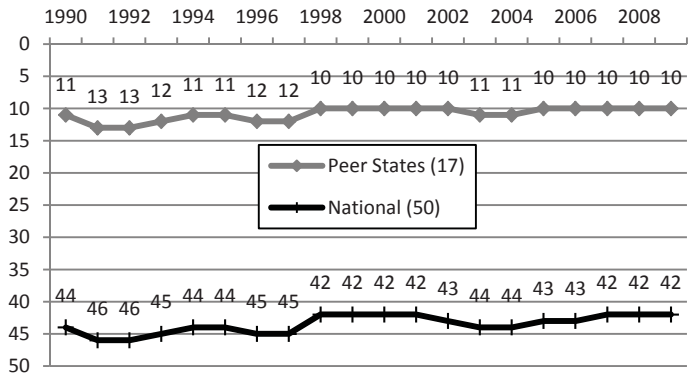
The quality of life or overall standard of living in a state is important to policymakers, economic development professionals, and, of course, the citizens who live there. What then, can one say about the quality of life in Kentucky? *Kentake* (or *Kentahteh*), as it was once called by Native Americans, is rich in natural amenities, such as forests, mountains, and lakes; and there is an extensive body of literature examining the relationship between amenities, quality of life, and economic growth.[1] Ours is a state with a relatively low crime rate, a high home ownership rate, and high levels of civic pride.[2] On the other hand, our health status is poor, per capita income has languished at around 80 percent of the U.S. average for the last 40 years, and our college attainment rate ranks near the bottom at 45th.

States, of course, are ranked in numerous ways according to various demographic, economic, education, environmental, and social characteristics. Such comparisons enable us to track progress over time and determine where we stand relative to other states. These rankings can provide a context that identifies strengths or deficiencies—either in comparison to other states or relative to a state's past. Knowing how a state is performing at a broad level can suggest areas needing additional research or analysis, as well as indicating to policymakers where to strategically direct attention and resources.

Here we present an approach that combines 45 different factors into a single quality-of-life index. The State of the State Index is a single number that summarizes Kentucky's overall status relative to other states over a twenty-year period. Based on data from 1990 to 2009, the State of the State Index includes factors ranging from teen pregnancy, poverty, and voter participation rates to toxic releases to air, water, and land. Together, they form an empirically-based index that offers a perspective on how Kentucky—or any other state—is faring relative to other states and its own past.

The Index shows that Kentucky made slight progress between 1990 and 2009, demonstrated by the state's national and peer-state[3] rankings improving a few places during this period.

FIGURE 1
State of the State Index, Kentucky's National and Peer-State Rankings, 1990 to 2009



Kentucky's average ranking improved slightly to about 42nd (42.4) over the last five years of the index compared to 45th during the first five years of the index. Likewise, Kentucky's ranking among the seventeen peer states improved from 12th during the early 1990s to 10th for the last part of the 2000s. In the sections that follow, we describe how the index was created, which indicators are used, and how Kentucky's rank has changed.

How the Index was Created

The State of the State Index combines 45 variables, generally covering 1990 to 2009,[4] and it includes measures of health status, community

TABLE 1
The 45 Long-Term Quality-of-Life Indicators Used in the State-of-the-State Index

Name	Description	Source
Health		
1. Health Insurance	percent of all people covered by private or government health insurance	US Census Bureau
2. Smoking	percent of the population aged 18 and older who smoke	Centers for Disease Control and Prevention (CDC), Behavioral Risk Factor Surveillance System (BRFSS)
3. Obesity	percent of people 18 and older with a body mass index of 30 or more	CDC BRFSS
4. Oral Health	percent of adults at risk for tooth extraction	CDC BRFSS
5. Disability	percent of adults who are limited in any activities because of physical, mental, or emotional problems	CDC BRFSS
6. Health Status	percent of adults who report good or better health	CDC BRFSS
Community		
7. Crime Rate	number of serious crimes reported to law enforcement per 100,000 persons	Federal Bureau of Investigation, Uniform Crime Reports
8. Disabled Employment	percent of non-institutionalized disabled individuals who are employeed	Cornell University StatsRRTC using CPS data, ACS
9. Homeownership	percent of the total number of occupied households that are owner-occupied	US Census Bureau
10. Charitable Contributions	average annual contributions deductions per total number of tax returns filed	Internal Revenue Service
11. Teen Births	number of births to girls aged 15 to 17 years old per 1,000 girls age 15 to 17 years old	CDC National Health Statistics
12. Women in State Legislature	percent of total state legislature offices held by women	Center for American Women and Politics, Rutgers University
13. Traffic Fatalities	fatal accident rate (per 100 million vehicle miles traveled)	Reason Foundation, Federal Highway Administration (FHWA)
Economy		
14. Traffic Congestion	percent of urban interstate congested	Reason, FHWA
15. Per Capita Income	per capita personal income	U.S. Bureau of Economic Analysis (BEA)
16. Entrepreneurial Depth	the ratio of self-employed income to the number of self-employed workers	BEA
17. State Gross Product	per capita gross state product	BEA
18. Patents	average annual number of U.S. patents issued 1 million population	U.S. Patent and Trademark Office
19. Entrepreneurial Activity	percent of the adult population creating a new business each month	Kauffman Foundation, CPS
20. Poverty	percent of people living below the federal poverty level	US Census Bureau
21. Home Computer Access	percent of people with access to a computer in their home	US Census Bureau
22. Internet Access	percent of people with access to the Internet anywhere	US Census Bureau
23. Home Broadband	percent of households with access to broadband in their home	US Census Bureau
24. Household Income	median income of households (three-year moving averages)	US Census Bureau
25. Employment-Population Ratio	the proportion of the civilian noninstitutional population that is employed	Bureau of Labor Statistics (BLS)
Environment		
26. Air Quality	total pounds of toxic air emissions per capita	Toxic Release Inventory (TRI)
27. Water Quality	total pounds of toxic surface water discharges per capita	TRI
28. Land Pollution	total pounds of toxic releases to land per capita	TRI
29. Clean Water	percent of people served by community water systems with no health-based violations	Environmental Protection Agency
30. Renewable Energy	total renewable energy consumed, per capita, Btu (millions)	Energy Information Administration
Education		
31. High School Attainment	percentage of people 25 to 64 years old with at least a high school diploma	Current Population Survey (CPS)
32. Two-Year Degree Attainment	percentage of people 25 to 64 years old with at least a two-year degree	CPS
33. College Attainment	percentage of people 25 to 64 years old with at least a four-year degree	CPS
34. ACT Average Composite Score	ACT average composite scores	ACT Inc.
35. Dropout Rate	Event Dropout rates for public school students in grades 9 through 12	National Center for Education Statistics. Common Core of Data (CCD)
36. 8th Grade Math	percentage of 8th graders who have scored at or above the proficient level on the 8th Grade National Assessment of Educational Progress (NAEP) Math Exam	National Center for Education Statistics (NCES), NAEP
37. 8th Grade Reading	percentage of 8th graders who have scored at or above the proficient level on the 8th Grade NAEP Reading Exam	NCES, NAEP
38. 8th Grade Science	percentage of 8th graders who have scored at or above the proficient level on the 8th Grade NAEP Science Exam	NCES, NAEP
39. 4th Grade Math	percentage of 4th graders who have scored at or above the proficient level on the 4th Grade NAEP Math Exam	NCES, NAEP
40. 4th Grade Reading	percentage of 4th graders who have scored at or above the proficient level on the 4th Grade NAEP Reading Exam	NCES, NAEP
41. 4th Grade Science	percentage of 4th graders who have scored at or above the proficient level on the 4th Grade NAEP Science Exam	NCES, NAEP
42. AP Exam Mastery	percent of graduating class earning a 3 or higher on at least one AP Exam during high school	College Board
Government		
43. State and Local Government Efficiency	number of state residents served per 100 state and local government employees, excluding education employees	U.S. Census Bureau
44. Voting Participation	percent of the *eligible* voting-age population that voted in the most recent presidential election	U.S. Election Assistance Commission
45. Government Cooperation	total intergovernmental expenditure divided by total governments	U.S. Census Bureau

safety, economic vigor, educational achievement, environmental quality, and government efficiency (see Table 1). Initially developed in 1994 by the Kentucky Long-Term Policy Research Center, a state government agency, after reviewing strategic visioning efforts in other states and engaging the public in 15 public forums across Kentucky, many of the variables reflect the fundamental values of citizens and their expressed hopes for the future. An initial list of variables was developed from this input and analysis, and then reviewed by elected officials, academicians, public policy experts, and the public. The list of variables has been amended several times since 1994 to reflect the input of legislators, executive branch personnel, public policy experts, and citizens.

Using summary statistics about each indicator, we calculate a number ranging from 0 to 1 that expresses how each state's measure compares to other states. The higher the score, the better a state ranks among the states. The final index score is the average of all available indicator scores for a year. The indicators were standardized by converting them to Z-scores, which allows one to compare and combine them using a common yardstick. The equations are arranged so that a "good" outcome results in a positive Z-score. Then, to generate more intuitive scores, we derive a probability value using a cumulative standard normal distribution. Conceptually, the result represents the percentile ranking of the Z-scores and indicates the extent to which the state performed well or poorly relative

TABLE 2
Variable Availability by Year

	INDICATOR	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Health	1. Health Insurance																				
	2. Smoking																				
	3. Obesity																				
	4. Oral Health	X	X	X	X	X	X	X	X	X	1999			2002		2004		2006		2008	
	5. Disability	X	X	X	X	X	X	X	X	X	X	X	2001		2003		2005				
	6. Health Status	X	X	X																	
Community	7. Crime Rate																				
	8. Disabled Employment																				
	9. Homeownership																				
	10. Charitable Contributions																				
	11. Teen Births																				
	12. Women in State Leg.																				
	13. Traffic Fatalities																				
Economy	14. Traffic Congestion																				
	15. Per Capita Income																				
	16. Entrepreneurial Depth																				
	17. State Gross Product																				
	18. Patents																				
	19. Entrepreneurial Activity	X	X	X	X	X	X														
	20. Poverty																				
	21. Home Computer Access															X	X	X	X	X	X
	22. Internet Access	1989			1993					1998			2001			2003			2007		
	23. Home Broadband	X	X	X	X	X	X	X	X	X	X					2003			2007		
	24. Household Income																				
	25. Emp.-Population Ratio																				
Environment	26. Air Quality																				
	27. Water Quality																				
	28. Land Pollution																				
	29. Clean Water																				
	30. Renewable Energy																			2008	
Education	31. High School Attainment																				
	32. 2-Year Degree Attain.																				
	33. College Attainment																				
	34. ACT Score																				
	35. Dropout	X	X	X	X	X	X	X	X												
	36. 8th Grade Math	1990			1992			1996				2000			2003		2005		2007		
	37. 8th Grade Reading	X	X	X	X	X	X	X	X	1998					2003		2005		2007		
	38. 8th Grade Science	X	X	X	X	X	X	1996				2000					2005				
	39. 4th Grade Math	X	X	1992				1996				2000			2003		2005		2007		
	40. 4th Grade Reading	X	X	1992		1994				1998					2003		2005		2007		
	41. 4th Grade Science	X	X	X	X	X	X	X	X	X	X	2000					2005				
	42. AP Exam Mastery	X	X	X	X	X	X	X	X	X	X										
Govt	43. Govt Efficiency	1990																			
	44. Voting Participation	1988			1992			1996				2000				2004				2008	
	45. Govt Cooperation																				

Note: An "X" in a cell indicates the variable is not available for that year.

to the other states. For example, using per capita income, the first step in this method is to calculate the mean and standard deviation across all the states for a particular year. In 2009, Kentucky's per capita income was $32,258. The mean and standard deviation across all 50 states for that year were $38,728 and $5,517, respectively. The Z-score was calculated as (($32,258-$38,728)/$5,517) =-1.17. The probability value for this Z-score value is 0.121 and is analogous to being at the 12th percentile.

This procedure is done for all 45 variables, which are then aggregated into one of six broad categories: health, community, economy, environment, education, and government. The final State of the State Index score is the average of the six categories. Consequently, each *category* receives equal weight, not each *variable*, when the final index score is calculated. However, as we explain below, we are developing a software version of the index that will allow the user to decide how to weight categories and variables.

Limitations

Although the index provides a good indication of Kentucky's ranking over time, there are at least five limitations to this approach. First, some of the data are not collected annually, might not be available for all states in a given year, or might not be available for the entire twenty year period. Broadband, for example, did not exist in 1990; it is included in the index beginning in 2000. When data are available periodically, we either use the average of adjoining years as an estimate or, if that is not available, we use the national average. If data are not available for Kentucky, then the indicator is simply dropped and not used for that year—we do not use the national average as a proxy for Kentucky. And when data are collected periodically, we use the most recent year as a proxy. For example, as shown in Table 2, the oral health data are not available from the Centers for Disease Control (CDC) until 1999. Consequently, we use the 1999 data as a proxy until new data are available for 2002. Second, there are, undoubtedly, fundamentally important indicators not included in the index, such as those that measure educational achievement gaps or somewhat intangible factors, like the value of a state's natural amenities. Third, there are many factors that define a state's quality of life that do not easily lend themselves to quantification, inherently biasing the index toward those that can be quantified. Four, we give equal weight to each of the six categories of variables, but, arguably, some indicators, variables, or even whole categories are probably more important than others. However, due to its somewhat subjective nature, any weighting scheme would have its own limitations. Five, although rankings are ideal for determining the relative positions of states, they reveal nothing about the distance between states; these rankings do not reflect or impute statistical significance. Knowing that New Mexico is 41st, Kentucky is 42nd, and Oklahoma is 43rd does not reveal how near or far Kentucky is from New Mexico or Oklahoma, or whether it is a statistically significant difference. Given these limitations, the rankings should be viewed as suggestive of how a state is doing over time and relative to other states and therefore used as a tool for additional inquiry and deeper analysis.

Strengths

The results of the State of the State Index are consistent with other studies, and our approach offers more flexibility for exploring alternative scenarios. We are developing a Microsoft Excel based version with an intuitive user interface that will allow one to analyze the performance of any state (not just Kentucky), select variables to include, and determine weights for the categories or variables.[5]

We have been able to validate our approach by comparing the State of the State Index rankings with other reports and studies that rank states using various factors and methods. For example, using a similar method and 23 variables on health behaviors and outcomes, educational attainment, and community attributes like the crime rate, the United Health Foundation's *America's Health Rankings* places Kentucky 43rd in overall health.[6] By comparison, we use 6 health related variables to create a health subindex and rank Kentucky 48th; the two rankings are highly correlated (Pearson's r = 0.92).

We rank Kentucky 44th in the community subindex, which is more or less consistent with other measures of community strength and social capital. The Corporation for National & Community Service, for instance, notes that Kentucky ranks 40th in volunteer rates, 48th in volunteer hours per resident, and 40th in volunteer retention rates.[7]

We rank Kentucky 48th on the economy subindex, which is similar to the 47th ranking it received on the Milken Institute's *2010 State Technology and Science Index: Enduring Lessons for the Intangible Economy*. In this case the two rankings are correlated at 0.62.

Our environmental ranking of 39th is generally consistent with two other state-level environmental rankings for Kentucky. Forbes ranked Kentucky 45th in its 2007 list of *America's Greenest States*,[8] and 24/7 Wall St., LLC, a Delaware corporation that delivers financial news and opinion content to various Web sites, ranked Kentucky 40th using 49 metrics from multiple sources in its *2010 Environmental State of the Union*.[9]

Our education rank for Kentucky in 2009 is 33rd, which is similar to the Morgan Quitno Press *2006-2007 Smartest State* ranking of 31st.[10] The Morgan Quitno Press ranking uses 21 indicators of educational achievement, attainment, and spending.

Finally, our government ranking of Kentucky is 29th, placing it in the middle of the states. Likewise, a 2008 *Governing Magazine* assessment of each state's quality of management and performance earned Kentucky a B-, which also places it in the middle of the states.

In short, the State of the State Index generates results that are consistent with a broad range of other studies using diverse methods and approaches. Yet, while these studies typically focus on only one broad theme, like health or the economy, the State of the State Index integrates six broad categories into a single index.

Perhaps the greatest strength of the State of the State Index is its flexibility. For example, one can apply weights to the six broad categories—such as low, normal, or high—reflecting various levels of importance; with six categories that can take on three different values, there are 729 possible combinations (3^6). Using this approach one can construct alternative scenarios to gauge the importance and effect of various categories. For example, depending on one's value system or interpretation of the development literature, one might want to gauge the effect of assigning "high" importance to economy and education, "normal" importance to health and environment, and "low" importance to community and government. By making these particular changes, Kentucky's average national rank improves 3 places from the early 1990s to the late 2000s (46.4 to 43.4), and its peer-state rank also improves 3 places (13.4 to 10.4); these results are slightly better than the baseline scenario where all six categories are weighted equally.[11]

One can also assign different weights to variables as well as the categories, exclude specific variables, and focus on specific years instead of averaging across multiple years. Using the twelve variables in the education category, we show that Kentucky's education rank improved from 48th in 1990 to 33rd in 2009; comparing the *average* of the early 1990s (1990 to 1994) to the average of the late 2000s (2005-2009), it improved from 45.2 to 35.4. We can exclude various factors to gauge the impact on the state's educational rank. For illustrative purposes, we created 5 alternative scenarios by excluding four variables in different combinations—the ACT score, the dropout rate, 4th grade reading proficiency, 8th grade reading proficiency, and all four variables together. Kentucky's education rank increases substantially in each scenario, as shown in Table 3, but by different amounts. Kentucky's improvement ranked among the top ten in each of the scenarios, demonstrating how a sensitivity analysis can be used to gauge the importance and robustness of specific variables.

TABLE 3
Sensitivity Analysis of Excluding Selected Variables on Kentucky's Educational Rank

	1990	2009	Rank Change
Baseline	48	33	+15
exclude ACT	49	30	+19
exclude Dropout Rate	48	35	+13
exclude 4th Grade Reading Proficiency	48	34	+14
exclude 8th Grade Reading Proficiency	48	33	+15
exclude all four	49	37	+12
	Early 1990s ('90-'94 AVG.)	**Late 2000s ('05-'09 AVG.)**	**Rank Change**
Baseline	45.2	35.4	+9.8
exclude ACT	45.4	34.0	+11.4
exclude Dropout Rate	45.2	37.0	+8.2
exclude 4th Grade Reading Proficiency	45.4	36.4	+9.0
exclude 8th Grade Reading Proficiency	45.2	36.0	+9.2
exclude all four	45.6	38.4	+7.2

Conclusion

Kentucky made progress in education, but either stayed the same or lost ground in the other five broad categories, both at the national and regional levels. Kentucky's ranks at the national and regional levels for 1990 and 2009 are shown in Table 4. The Index shows that, overall, Kentucky

TABLE 4
Kentucky's National Ranks by Indicator and Category, 1990 and 2009

	National Index (50 States)			Peer State Index (17 States)		
	1990	2009	'90-'09 Change	1990	2009	'90-'09 Change
Health	**39**	**48**	**-9**	**9**	**16**	**-7**
1. Health Insurance	26	35	-9	6	10	-4
2. Smoking	48	49	-1	16	16	0
3. Obesity	36	47	-11	8	14	-6
4. Oral Health[i]	46	42	+4	13	11	+2
5. Disability[ii]	49	48	+1	16	16	0
6. Health Status[iii]	48	49	-1	15	16	-1
Community	**39**	**44**	**-5**	**9**	**11**	**-2**
7. Crime Rate	4	15	-11	2	2	0
8. Disabled Employment	39	49	-10	8	16	-8
9. Homeownership	31	19	+12	13	9	+4
10. Charitable Contributions	32	36	-4	13	14	-1
11. Teen Births	36	37	-1	8	9	-1
12. Women in State Legislature	47	45	+2	14	14	0
13. Traffic Fatalities	39	44	-5	10	12	-2
Economy	**46**	**48**	**-2**	**13**	**15**	**-2**
14. Traffic Congestion	17	43	-26	6	15	-9
15. Per Capita Income	44	46	-2	13	15	-2
16. Entrepreneurial Depth	25	40	-15	8	13	-5
17. State Gross Product	41	44	-3	13	12	+1
18. Patents	42	41	+1	14	12	+2
19. Entrepreneurial Activity[iv]	23	39	-16	5	13	-8
20. Poverty	44	44	0	12	14	-2
21. Home Computer Access[v]	45	38	+7	12	9	+3
22. Internet Access	46	44	+2	13	12	+1
23. Home Broadband[vi]	11	45	-34	1	12	-11
24. Household Income	44	46	-2	11	13	-2
25. Employment-Population Ratio	46	45	+1	13	12	+1
Environment	**46**	**39**	**+7**	**15**	**10**	**+5**
26. Air Quality	37	44	-7	8	11	-3
27. Water Quality	31	36	-5	8	8	0
28. Land Pollution	15	34	-19	1	8	-7
29. Clean Water	46	29	+17	16	10	+6
30. Renewable Energy	30	34	-4	11	11	0
Education	**48**	**33**	**+15**	**15**	**8**	**+7**
31. High School Attainment	46	42	+4	13	13	0
32. Two-Year Degree Attainment	45	44	+1	12	12	0
33. College Attainment	46	45	+1	13	13	0
34. ACT Average Composite Score	43	49	-6	11	16	-5
35. Dropout Rate[vii]	22	13	+9	5	4	+1
36. 8th Grade Math	44	38	+6	12	10	+2
37. 8th Grade Reading[vii]	16	21	-5	2	3	-1
38. 8th Grade Science[viii]	36	23	+13	8	5	+3
39. 4th Grade Math[ix]	42	35	+7	11	8	+3
40. 4th Grade Reading[ix]	40	11	+29	11	2	+9
41. 4th Grade Science[vi]	18	5	+13	7	2	+5
42. AP Exam Mastery[vi]	38	30	+8	11	10	+1
Government	**31**	**29**	**+2**	**9**	**9**	**0**
43. State and Local Govt Efficiency	6	8	-2	3	2	+1
44. Voting Participation	34	41	-7	8	14	-6
45. Government Cooperation	31	29	+2	13	12	+1

Note: The indicator ranks are based on the index scores for each indicator used to calculate the final index score. An increase in rank, such as from 10th to 1st, signifies a positive increase in performance for that indicator. The 49th place ranking in smoking rate for Kentucky signifies that it has one of the highest adult smoking rates in the country, not the lowest. The index adjusts for the inverted nature of the original value so that it may be compared to and combined with the other indicators in a meaningful way.
[i]Data available from 1999-2009, [ii]2001-2009, [iii]1993-2009, [iv]1996-2009, [v]1990-2002, [vi]2000-2009, [vii]1998-2009, [viii]1996-2009, [ix]1992-2009. Refer to Table 2.

made minor progress between 1990 and 2009, demonstrated by the state's national and peer-state rankings improving a few places during this period (see Figure 1). Kentucky's average ranking improved slightly to about 42nd (42.4) over the last five years of the index compared to 45th during the first five years of the index. Likewise, Kentucky's ranking among the seventeen peer states improved from 12th during the early 1990s to 10th for the last part of the 2000s.

While the overall trend for Kentucky between 1990 and 2009 was one of slow but steady progress, the state remains well below the national average. Sustaining a commitment to high-quality, accessible education at all levels is essential for achieving broad based prosperity, and continuing improvements in education should help boost Kentucky's future ranking.

These results raise important questions, like whether we have included the "right" variables or whether others should be included, what public policies helped produce the large increases in rank evidenced by New York, Illinois, South Dakota, and Virginia,[12] whether these policies are transferable to other states, and why Kentucky's economic rank has been "sticky" and slow to improve despite the state's substantial improvement in educational attainment and achievement.

---

[1]See for example, The Role of Amenities and Quality of Life in Rural Economic Growth, Steven C. Deller, Tsung-Hsiu Tsai, David W. Marcouiller and Donald B. K. English, *American Journal of Agricultural Economics* , Vol. 83, No. 2 (May, 2001), pp. 352-365. They find that "predictable relationships between amenities, quality of life, and local economic performance exist."

[2]Most Kentuckians take measurable pride in their communities. Approximately 42 percent said they are extremely proud and 57 percent said they were somewhat proud of their communities in 2008. The rest of the population, about 4 percent, expressed no pride at all in their communities—a typical percentage going back to 1996. See *Visioning Kentucky's Future: Measures and Milestones 2008* (Frankfort, KY: Kentucky Long-Term Policy Research Center): 39.

[3]The peer states include Alabama, Arkansas, Florida, Georgia, Illinois, Indiana, Kentucky, Louisiana, Michigan, Mississippi, Missouri, North Carolina, Ohio, South Carolina, Tennessee, Virginia and West Virginia. These are the states that Kentucky has historically measured itself against with respect to tax competitiveness and economic development.

[4]See Table 2 for information on data availability.

[5]The program can be downloaded at <http://cber.uky.edu>

[6]*America's Health Rankings 2011 Edition*, available at http://www.americashealthrankings.org/SiteFiles/Reports/AHR%202011Edition.pdf

[7]See http://www.volunteeringinamerica.gov/rankings.cfm

[8]http://www.forbes.com/2007/10/16/environment-energy-vermont-biz-beltway-cx_bw_mm_1017greenstates.html

[9]http://247wallst.com/2010/12/16/the-environmental-state-of-the-union-a-survey-of-pollution-energy-use-and-policy-in-all-50-states/

[10]http://www.morganquitno.com/edrank.htm

[11]If a category or a variable is assigned a "normal" weight then its value is multiplied by 1.0, compared to 0.5 for "low" and 1.5 for "high."

[12]From 1990 to 2009, New York increased by 10 spots, Illinois improved 9 places, Virginia jumped 8 places, and South Dakota increased its position by 7.

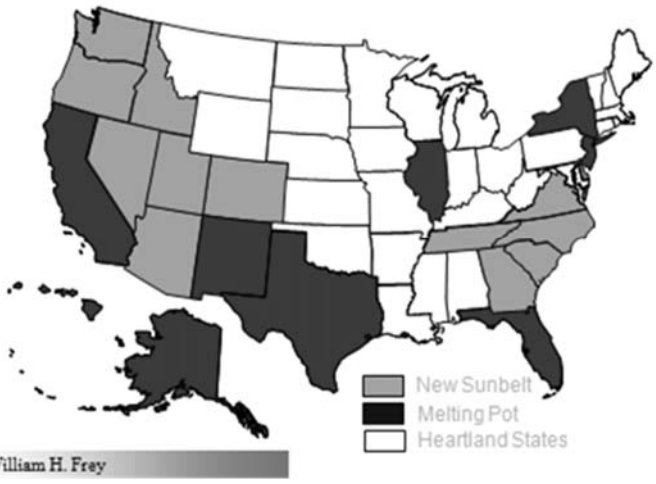
Kentucky Population Growth:
What Did the 2010 Census Tell Us?

Michael Price

Over the last decade, Kentucky demonstrated two very unequal patterns of population growth. In much of Eastern and Western Kentucky, population growth was slow or negative. Young adults were likely to move away leaving an older population and dampened natural increase. In stark contrast, the metro areas of Northern and Central Kentucky grew faster than the U.S. as a whole. These communities attracted domestic and international migrants which in turn enhanced natural increase. Clearly, these demographic patterns will have important implications for Kentucky's future economic development. In this chapter, the results of the 2010 Census are used to examine the demographic trends behind these growing disparities.

The distinguished demographer William Frey divides U.S. states into three regions based on patterns of population growth (Figure 1). The New Sunbelt represents states with high rates of domestic in-migration as well as substantial gains from international migration. In these fast growing states, the influx of younger migrants boosts natural increase by raising birth rates and lowering death rates. The Melting Pot is comprised of states serving as major points of entry into the U.S. where international migration is the dominant component of population growth and domestic migration is typically low or negative. These states are becoming more racially and ethnically mixed at an accelerated pace. The majority of states, including Kentucky, are in the American Heartland where population growth is relatively slow. These states have low migration attraction and low natural increase. Their populations are more homogeneous and generally older.

FIGURE 1
America's New Regions



Source: William H. Frey

But is Kentucky really part of the slow growing Heartland? The 2010 Census reported 4,339,367 people in Kentucky, a 7.4 percent increase from the 2000 Census population of 4,041,769. Although 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. Tennessee, nominally part of the New Sunbelt, grew by 11.5 percent, while neighboring Heartland states Indiana (6.6 percent), Ohio (1.6 percent), and West Virginia (2.5 percent) grew slower than Kentucky. Frey's regional typology is illustrative, but using states as units of analysis often masks over important sub-state variations in growth patterns. For example, Illinois of the Melting Pot is comprised of the large Chicago metro area, the actual Melting Pot, and the remainder to the South which more resembles the Heartland.

Across Kentucky, population growth has been widely disparate. Many communities typify the

FIGURE 2
Kentucky County Population Growth: 2000-2010

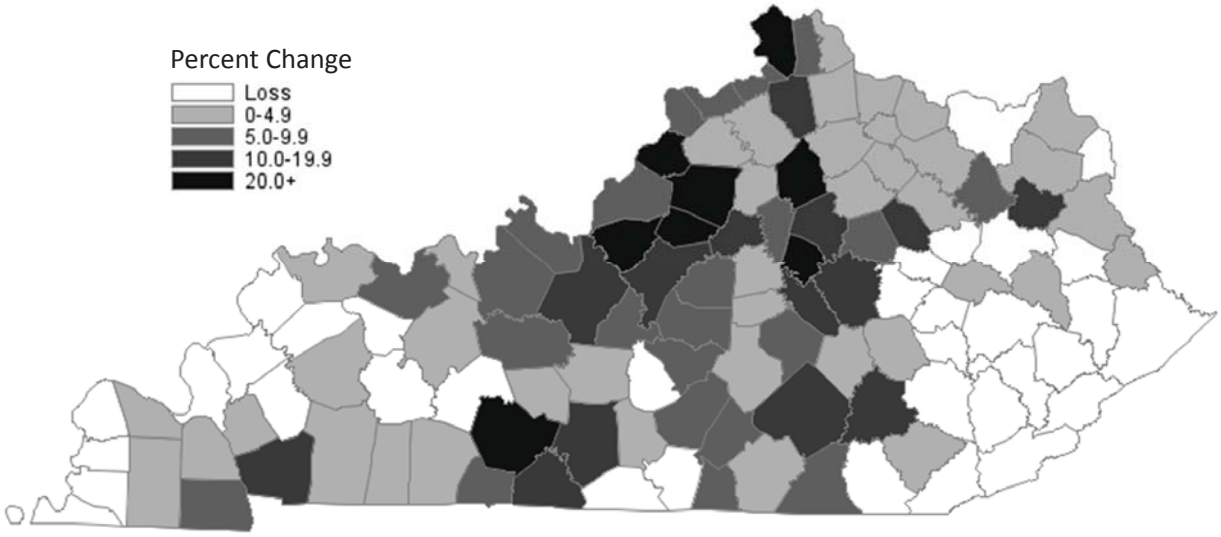


FIGURE 3
Metro and Micro Areas

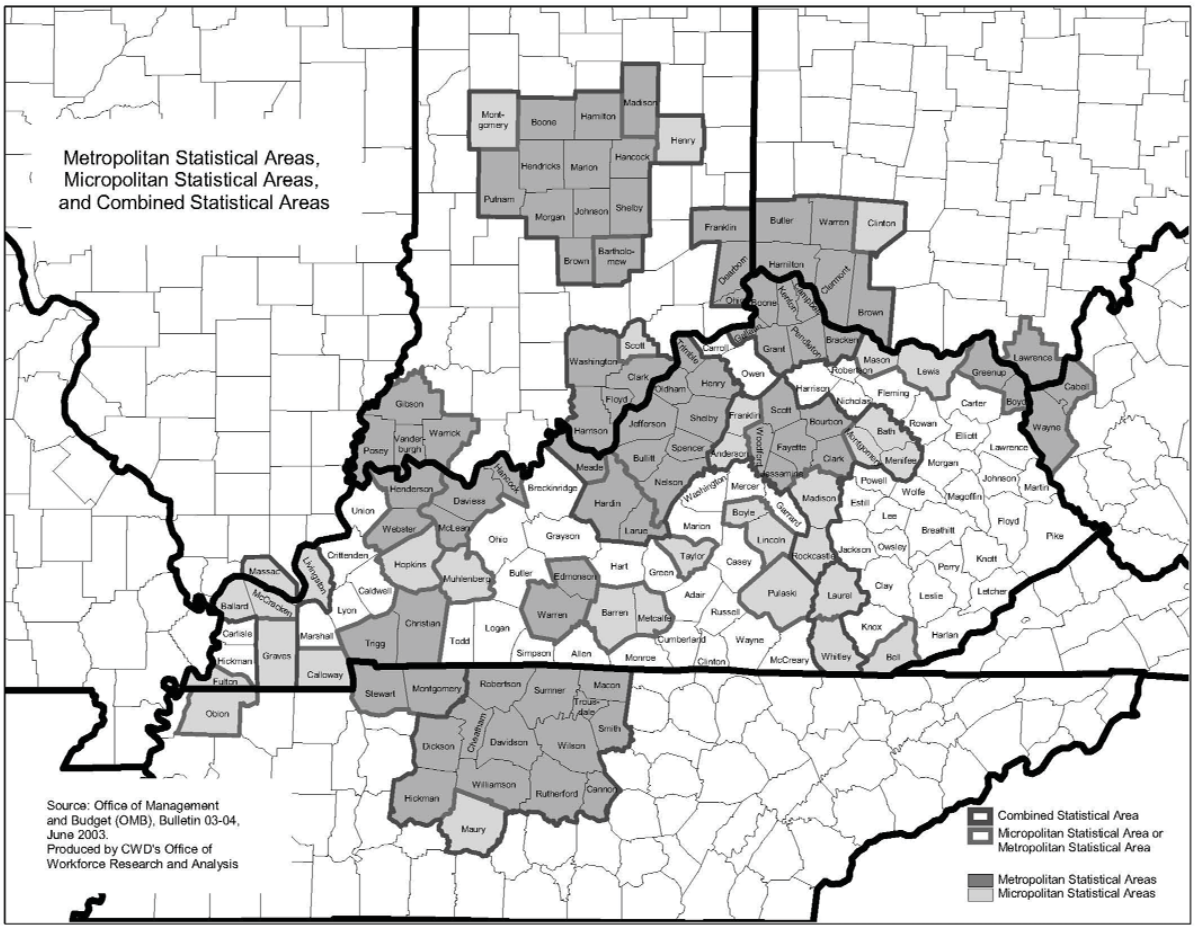


TABLE 1
Kentucky Total Population in Metro, Micro, and Rural Areas: 2000 and 2010

			Change	
Geographic Region	**2000**	**2010**	**Number**	**Percent**
State	4,041,769	4,339,367	297,598	7.4
Metro Areas	2,272,494	2,523,770	251,276	11.1
Bowling Green	104,166	125,953	21,787	20.9
Cincinnati	378,994	425,483	46,489	12.3
Clarksville-Hopkinsville	84,862	88,294	3,432	4.0
Elizabethtown	107,547	119,736	12,189	11.3
Evansville	58,949	59,871	922	1.6
Huntington-Ashland	86,643	86,452	-191	-0.2
Lexington	408,326	472,099	63,773	15.6
Louisville	933,132	1,031,130	97,998	10.5
Owensboro	109,875	114,752	4,877	4.4
Micro Areas	763,170	805,509	42,339	5.5
Campbellsville	22,927	24,512	1,585	6.9
Central City	31,839	31,499	-340	-1.1
Corbin	35,865	35,637	-228	-0.6
Danville	51,058	53,174	2,116	4.1
Frankfort	66,798	70,706	3,908	5.9
Glasgow	48,070	52,272	4,202	8.7
London	52,715	58,849	6,134	11.6
Madisonville	46,519	46,920	401	0.9
Mayfield	37,028	37,121	93	0.3
Maysville	30,892	31,360	468	1.5
Middlesborough	30,060	28,691	-1,369	-4.6
Mount Sterling	40,195	44,396	4,201	10.5
Murray	34,177	37,191	3,014	8.8
Paducah	83,604	83,333	-271	-0.3
Richmond	87,454	99,972	12,518	14.3
Somerset	56,217	63,063	6,846	12.2
Union City	7,752	6,813	-939	-12.1
Rural Areas	1,006,105	1,010,088	3,983	0.4

Source: 2000 and 2010 Census

extreme Heartland and have seen their populations decline. As migration selectively removes young adults, local birth rates drop and death rates rise. Over the last decade, 20 Kentucky counties had negative natural increase—more deaths than live births, and a dozen more are at this tipping point. In stark contrast, other Kentucky communities are relatively fast growing. New migrants have revitalized city neighborhoods and expanded established suburbs. Their natural increase is above the U.S. rate. These places look more like the New Sunbelt.

Figure 2 displays the geographic distribution of state population growth from 2000 to 2010. Population losses and slow growth were pervasive throughout the mountain communities of Eastern Kentucky and the river communities of Western Kentucky. Thirty-six counties experienced decreases in population size and another 40 grew by less than five percent. The largest declines were in Harlan County (-3,924), Pike (-3,712), Floyd (-2,990), and Clay (-2,826). The fastest declines were in Breathitt (-13.8 percent), Fulton (-12.1), Harlan (-11.8), and Clay (-11.5). However, in much of Northern and Central Kentucky, population growth has been rather robust. Five counties with the largest growth—Jefferson (47,492), Fayette (35,291), Boone (32,820), Warren (21,270), and Oldham (14,138), accounted for over half of the state total population growth. The fastest growing counties were Spencer (45 percent), Scott (42.7), Boone (38.2), and Oldham (30.6).

Underlying these disparities in growth, Kentucky mirrored three of the most salient U.S. trends of the last decade. First, large urban areas grew much more than smaller places and rural areas. Second, minorities through immigration and natural increase grew faster than the non-Hispanic white majority. And third, the population got older, and the stage is set to get much older in the coming decades as the boomers surge into the upper age group. These trends are interrelated—population growth impacts population composition which, in turn, impacts population growth. This demographic momentum can be positive or negative with

TABLE 2
Kentucky Components of Population Growth in Metro, Micro, and Rural Areas: 2000 to 2010

	Live Births		Deaths		Natural Increase		Net Migration	
	Number	Rate	Number	Rate	Number	Rate	Number	Rate
State	563,633	13.5	396,737	9.5	166,896	4.0	130,702	3.1
Metro Areas	335,512	14.0	203,268	8.5	132,244	5.5	119,032	5.0
Micro Areas	100,108	12.8	82,189	10.5	17,919	2.3	24,420	3.1
Rural Areas	128,013	12.7	111,280	11.0	16,733	1.7	-12,750	-1.3

Note: Rates are the average annual number of events per 1,000 persons. Birth and death data are for 2000 through 2009. Preliminary birth data for 2007-2009 were adjusted by the author.
Source for birth and death data: Kentucky Cabinet for Families and Health Services, Vital Statistics Branch.

vastly different consequences for local communities.

Urban Growth

To define urban-rural, we use the U.S. Office of Management and Budget classifications of metropolitan and micropolitan statistical areas. Metro and micro areas are collectively known as core based statistical areas (CBSA). A metro area contains a core urban area population of 50,000 or more. A micro area has a smaller core urban population of 10,000-49,999. Each metro and micro area consists of one or more counties—the counties containing the core urban area, and adjacent counties linked by a high degree of commuting to and from the urban core. This typology recognizes the important role that medium size population centers play in their regional economies. Figure 3 shows that within the Kentucky state border, there are either all or part of nine metro areas made up of 35 counties and 17 micro areas comprised of 26 counties. In this report, counties outside of CBSAs are referred to as rural areas.

Table 1 presents the 2000 and 2010 Census counts for each metro and micro area in the state. The five metro areas in Northern and Central Kentucky—Cincinnati, Louisville, Lexington, Elizabethtown, and Bowling Green, each grew faster than the U.S. last decade. The Louisville metro area had the largest growth (97,998) and the Bowling Green metro area grew the fastest (20.9 percent). Although growing slower than state, the Owensboro and Clarksville-Hopkinsville metros remain critical population centers in Western Kentucky with growth above the regional average. The Kentucky part of the Huntington-Ashland metro did not grow last decade, but still managed to increase its share of the regional population.

Population growth in the state's micro areas was more varied. Six micro areas grew faster than the state as a whole—Richmond (14.3 percent), Somerset (12.2 percent), London (11.6 percent), Mount Sterling (10.5 percent), Murray (8.8 percent), and Glasgow (8.7 percent). On the down side, eight micro

FIGURE 4
2010 Total Resident Population

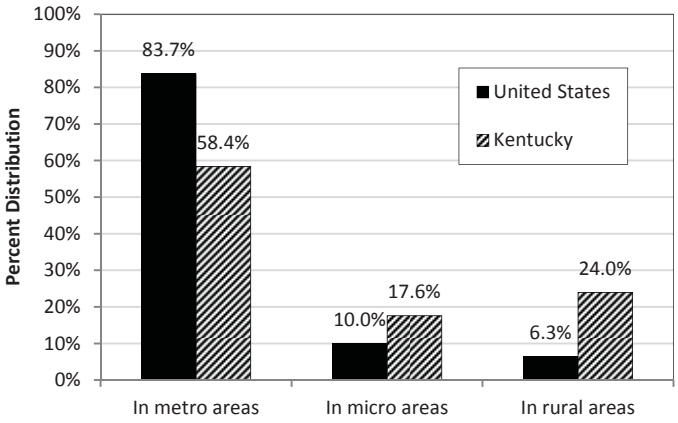


FIGURE 5
Population Growth, 2000-2010

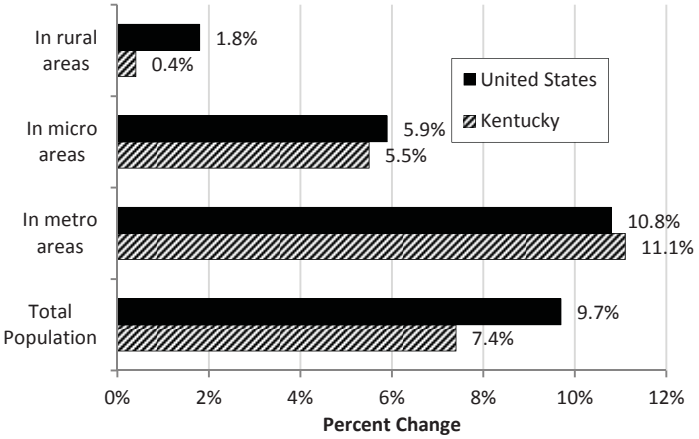
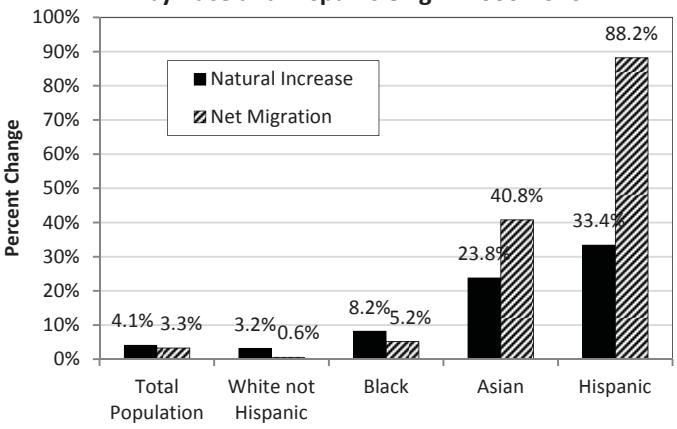


FIGURE 6
Kentucky Components of Population Growth by Race and Hispanic Origin: 2000-2010



areas either lost population or grew by less than two percent.

Although the majority of Kentuckians in 2010 lived in metro areas (58.4 percent), the U.S. population was a good deal more concentrated in metros (83.7 percent), as shown in Figure 4. One in four Kentuckians (24.0 percent) lived in rural areas, compared to only 6.3 percent in the U.S. Kentuckians were also more likely to live in the in micro areas (17.6 percent vs. 10.0 percent).

Figure 5 reveals that the population in all Kentucky metro areas grew last decade at a rate just above the metro population nationwide (11.1 percent vs. 10.8 percent) and twice as fast as the population in state micro areas (5.5 percent). The population in rural areas grew very slowly—1.8 percent in the U.S. and only 0.4 percent in Kentucky. Of the state total population growth (297,598), 84 percent occurred in metro areas.

Table 2 breaks down the state population growth over the last decade by the components of live births, deaths, natural increase, and net migration. The United States has one of the highest natural increase rates among industrialized nations. From 2000 through 2009, the U.S. average annual natural increase rate was 5.4 (per 1,000 persons).[1] Over the same period, Kentucky's natural increase rate was 4.0, 35 percent below the national rate. However, in the state's metro areas, the natural increase rate was 5.5, above the national rate. Of the state growth through natural increase (166,896), 79 percent occurred in metro areas. Outside the metros, birth rates were lower and death rates were higher. The natural increase rate was 2.3 in Kentucky micros and 1.7 in rural areas.

Net migration shows a similar pattern. Of the state net migration growth (130,702), 91 percent occurred in metro areas. The balance of migration to and from the state metros added 119,032 at an annual rate of 5.0 (per 1,000 persons). Migration increased the population in micro areas by 24,420 (3.2 per 1,000), but resulted in loss of 12,750 (-1.3 per 1,000) in rural areas.

Minority Growth

According to the latest population projections from the Census Bureau, the United States, fueled by immigration and higher fertility among

TABLE 3
Kentucky Population by Race and Hispanic or Latino Origin in Metro, Micro and Rural Areas: 2000 and 2010

	2000		2010		Change 2000-2010	
State	Number	Percent of Total Population	Number	Percent of Total Population	Number	Percent
Total Population	4,041,769	100.0	4,339,367	100.0	297,598	7.4
White not Hispanic	3,608,013	89.3	3,745,655	86.3	137,642	3.8
Minorities	433,756	10.7	593,712	13.7	159,956	36.9
Black	293,639	7.3	333,075	7.7	39,436	13.4
Hispanic or Latino	59,939	1.5	132,836	3.1	72,897	121.6
Metro Areas						
Total Population	2,272,494	100.0	2,523,770	100.0	251,276	11.1
White not Hispanic	1,933,739	85.1	2,051,010	81.3	117,271	6.1
Minorities	338,755	14.9	472,760	18.7	134,005	39.6
Black	237,620	10.5	276,269	10.9	38,649	16.3
Hispanic or Latino	44,154	1.9	102,065	4.0	57,911	131.2
Micro Areas						
Total Population	763,170	100.0	805,509	100.0	42,339	5.5
White not Hispanic	709,712	93.0	736,066	91.4	26,354	3.7
Minorities	53,458	7.0	69,443	8.6	15,985	29.9
Black	31,885	4.2	32,268	4.0	383	1.2
Hispanic or Latino	6,925	0.9	14,651	1.8	7,726	111.6
Rural Areas						
Total Population	1,006,105	100.0	1,010,088	100.0	3,983	0.4
White not Hispanic	964,562	95.9	958,579	94.9	-5,983	-0.6
Minorities	41,543	4.1	51,509	5.1	9,966	24.0
Black	24,134	2.4	24,538	2.4	404	1.7
Hispanic or Latino	8,860	0.9	16,120	1.6	7,260	81.9

Source: 2000 and 2010 Census

minorities, is expected to be a majority-minority—less than half of the population is white and not Hispanic or Latino—before 2050.[2] Kentucky may also get to this state, but it will take longer, maybe by the end of the century. In 2010, minorities comprised 36.3 percent of U.S. population and 13.7 percent of the Kentucky population. Kentucky's racial and ethnic composition breaks down like this: white not Hispanic (86.3 percent), black (7.7 percent), Hispanic or Latino (3.1 percent), two or more races (1.5 percent), Asian (1.1 percent), and all other races including native populations (0.2 percent).[3]

Table 3 presents Kentucky's 2000 and 2010 Census counts by race and Hispanic origin. From 2000 to 2010, the state minority population grew almost 10 times faster than the non-Hispanic white majority (36.9 percent vs. 3.8 percent). However, the majority population increased faster in Kentucky than nationwide (1.2 percent). Non-Hispanic whites grew by 6.1 percent in metro areas and 3.7 percent in micro areas, but declined (-0.6 percent) in rural areas.

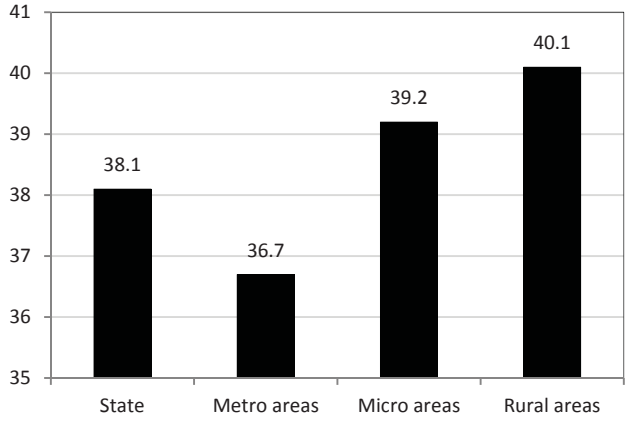
The state minority population is more concentrated in metro areas than the total

TABLE 4
Kentucky Population by Age in Metro, Micro, and Rural Areas: 2000 and 2010

	2000		2010		Change 2000-2010	
State	**Number**	**Percent of Total Population**	**Number**	**Percent of Total Population**	**Number**	**Percent**
Total	4,041,769	100.0	4,339,367	100.0	297,598	7.4
Under 20	1,113,644	27.6	1,146,204	26.4	32,560	2.9
20-24	283,032	7.0	289,968	6.7	6,936	2.5
24-34	568,108	14.1	566,216	13.0	-1,892	-0.3
35-44	642,665	15.9	576,662	13.3	-66,003	-10.3
45-54	556,932	13.8	643,097	14.8	86,165	15.5
55-64	372,595	9.2	538,993	12.4	166,398	44.7
65 and above	504,793	12.5	578,227	13.3	73,434	14.5
Metro Areas						
Total	2,272,494	100.0	2,523,770	100.0	251,276	11.1
Under 20	634,447	27.9	679,109	26.9	44,662	7.0
20-24	163,446	7.2	176,494	7.0	13,048	8.0
24-34	331,377	14.6	348,260	13.8	16,883	5.1
35-44	371,353	16.3	337,552	13.4	-33,801	-9.1
45-54	310,690	13.7	372,980	14.8	62,290	20.0
55-64	195,406	8.6	299,868	11.9	104,462	53.5
65 and above	265,775	11.7	309,507	12.3	43,732	16.5
Micro Areas						
Total	763,170	100.0	805,509	100.0	42,339	5.5
Under 20	203,943	26.7	207,954	25.8	4,011	2.0
20-24	54,781	7.2	54,768	6.8	-13	0.0
24-34	102,537	13.4	96,899	12.0	-5,638	-5.5
35-44	116,198	15.2	104,977	13.0	-11,221	-9.7
45-54	105,194	13.8	117,691	14.6	12,497	11.9
55-64	75,360	9.9	103,843	12.9	28,483	37.8
65 and above	105,157	13.8	119,377	14.8	14,220	13.5
Rural Areas						
Total	1,006,105	100.0	1,010,088	100.0	3,983	0.4
Under 20	275,254	27.4	259,141	25.7	-16,113	-5.9
20-24	64,805	6.4	58,706	5.8	-6,099	-9.4
24-34	134,194	13.3	121,057	12.0	-13,137	-9.8
35-44	155,114	15.4	134,133	13.3	-20,981	-13.5
45-54	141,048	14.0	152,426	15.1	11,378	8.1
55-64	101,829	10.1	135,282	13.4	33,453	32.9
65 and above	133,861	13.3	149,343	14.8	15,482	11.6

Source: 2000 and 2010 Census

FIGURE 7
Kentucky Median Ages, 2010



population. In 2010, four of every five persons of color in Kentucky lived in metro areas. Minorities comprised 18.7 percent of the metro population, 8.6 percent of the micro population, and 5.1 percent of the rural population. Moreover, minorities are increasing faster in metro areas. Last decade, the minority population grew by 39.6 percent in metro areas, 29.9 percent in micro areas, and 24.0 percent in rural areas. The concentration of minorities is especially the case for the state's black population. From 2000 to 2010, 63 counties, mostly rural and micro, experienced a decrease in their number of black people. Of the state black population growth (39,436), a remarkable 98 percent occurred in metro areas—57 percent in Jefferson County alone and 19 percent in Fayette County. Blacks increased by 13.4 percent statewide—16.3 percent in metro areas, 1.2 percent in micro areas, and 1.7 percent in rural areas.

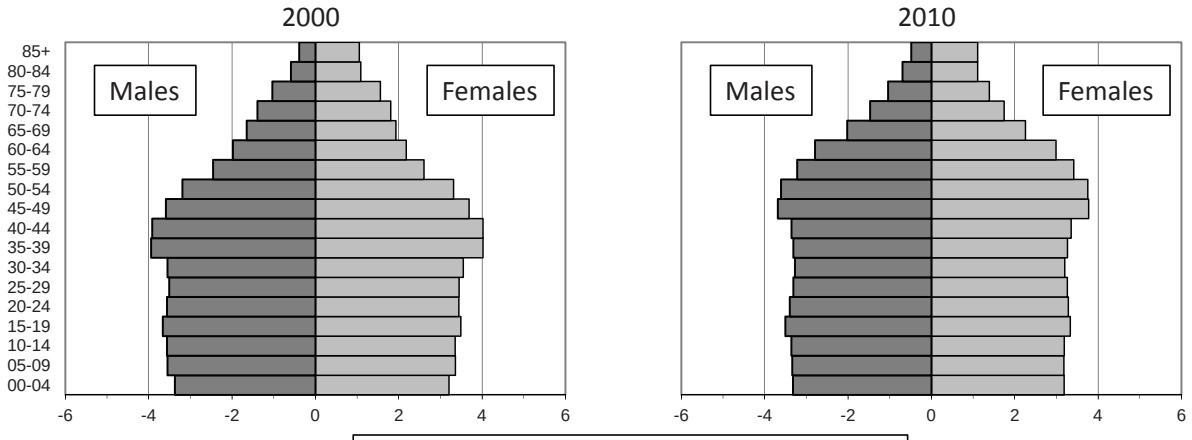
Hispanic growth was much more pervasive throughout Kentucky. Only ten counties saw their Hispanic populations decline last decade. Statewide, Hispanics grew by 72,897 or 121.6 percent, and their share of the total population rose from 1.5 percent to 3.1 percent. Seventy-nine percent of the state Hispanic growth occurred in metro areas. In 2010, Hispanics comprised 4.0 percent of the state metro population, but less than two percent of micro and rural populations. In the U.S., the Hispanic share was 16.3 percent.

Figure 6 presents Kentucky natural increase and net migration, as percent change 2000-2010, by race and Hispanic origin. For white not Hispanic and black populations, natural increase accounted for more growth than net migration. Among Asians and Hispanics, migration was the dominant component of growth. But the major influx of these minorities has brought younger populations to the state with very high natural increase.

Getting Older

The sheer size of the baby boom generation has produced an actuarial inevitability. Their presence has impacted the age structure—lowering the median age from 1950 to 1970, and raising it over each decade since. Table 4 presents the 2000 and

FIGURE 8
Kentucky Population by Sex and Age: 2000 and 2010



Note: Sex and age data shown as percent of total population.
Source: 2000 and 2010 Census SF1

2010 Census counts of the Kentucky population by age. Over this last decade, the state median age rose from 35.9 years to 38.1 years (Figure 7). The U.S. median age was 37.2 years in 2010. Persons aged 55-64 in Kentucky grew far more than any other age group as the first half of the boomers entered. They increased by 166,398 or 44.7 percent. Their share of the state total population rose from 9.2 percent to 12.4 percent. The second half of boomer generation actually increased the 45-54 age group by 86,165 (15.5 percent) above the first half's presence in 2000. As boomers age, their wake is shown by the decline in the age groups left behind. Persons aged 35-44 decreased by 66,003 or 10.3 percent.

The number of persons aged 65 and above increased by 73,434 or 14.5 percent last decade. The elderly share of the total population rose only slightly, from 12.5 percent to 13.3 percent. The population under age 20 increased by 32,560 (2.9 percent), but the youth share fell from 27.6 percent to 26.5 percent.

Age composition varies quite a bit across the state as the result of the differential patterns of growth described before. Metro areas are generally younger, the result of more migration and higher birth rates. In metro areas, the 2010 median age was 36.7 years, and 33.9 percent of the total population were under 25. The elderly share was 12.3 percent. In contrast, the median age was 39.2 years in micro areas and 40.1 years in rural areas. The youth population under age 25 made up 32.6 percent in micro areas and 31.5 percent in rural areas. The elderly comprised 14.8 percent of population outside of metro areas.

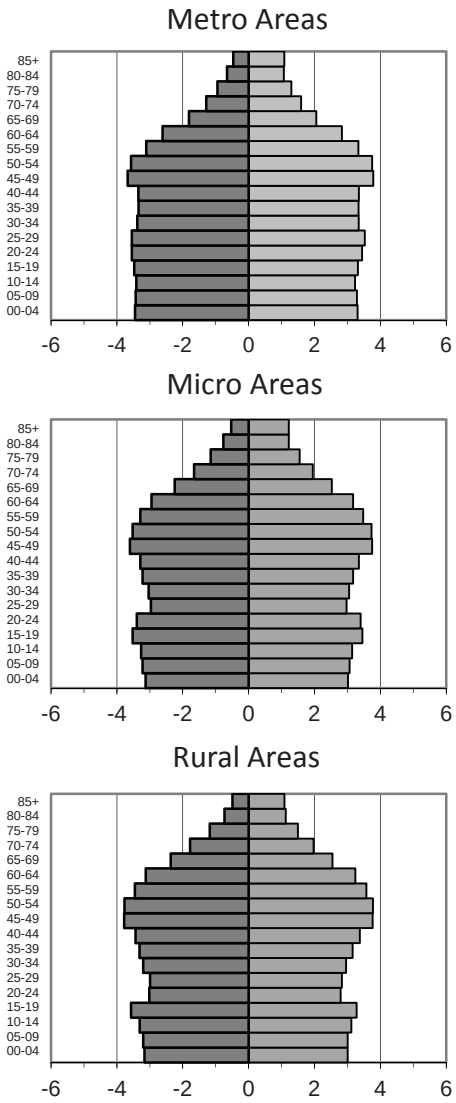
In Kentucky metro areas, all age groups except persons aged 35-44 (the boomer wake) increased last decade. In rural Kentucky, however, all age groups under age 45 declined. This hollowing out of the population over decades has produced an hour glass age structure (Figure 9).

Conclusions

Because Kentucky, compared to the United States as a whole, is more rural, less minority, and somewhat older, the Kentucky population has grown more slowly than the U.S. population. Yet, Kentucky's metropolitan areas, especially in Northern and Central Kentucky, have positive population momentum. These urban communities are attracting younger workers and families, many of whom are minorities. Birth rates have risen and death rates remain relatively low. With substantial migration gains and high natural increase, the state's central urban region looks very much like Frey's New Sunbelt.

In rural Kentucky, however, the dilemma of the American Heartland is quite evident. Throughout much of the delta regions of Western Kentucky and the mountains of Eastern Kentucky, negative population momentum has been building for

FIGURE 9
Kentucky Population by Sex and Age
2010



Note: Sex and age data shown as percent of total population. Bottom bars are ages 0-4 and top bars are ages 85 and above. Males on left and females on right. Source: 2010 Census SF1

decades. Out-migration over generations has reduced the youth population and suppressed natural increase. What we see emerging in many rural communities is a top-heavy age structure which increases demand for medical and other services for the elderly, while reducing the supply of labor to provide these services. As a result, the viability of these communities is threatened.

Can the tide by turned? The answer is difficult. The development of rural Kentucky's abundance of natural resources has historically failed to stabilize population growth. But if demand for labor does indeed rise, whether for human services or resource development, the solution may come from outside the U.S. International migrants, especially Hispanics, Asians, and Africans, are filling the labor voids throughout rural America. Until most recently, most rural Kentucky communities have been isolated from the latest waves of immigration. That may change.

---

[1]U.S. Census Bureau, Population Estimates (http://www.census.gov/popest/national/asrh/). Calculations by author.

[2]U.S. Census Bureau, Population Projections (http://www.census.gov/population/www/projections/).

[3]All race categories exclude Hispanics or Latinos.

State Gross Domestic Product and Employment:
The Effect of Electricity Prices

John Garen, Christopher Jepsen & James W. Saunoris

A number of new or pending environmental regulations issued by the federal government are expected to have significant effects on the cost of electric power generation, and therefore on the price of electricity. Thus, it is important to gain a better understanding of the relationship between electricity prices and economic outcomes. In this annual report article, we estimate the likely effects of increased electricity prices on production as measured by state Gross Domestic Product (GDP) and on employment. Our estimates and simulations indicate that price increases in electricity will have sizable negative effects on Kentucky's GDP and employment growth if the price increases are not accompanied by other changes, such as technological advances, that might alter the consequences of electricity price increases. As with any estimates, however, they involve a degree of uncertainty.

A number of new or pending environmental regulations issued by the federal government are expected to have significant effects on the cost of electric power generation, and therefore on the price of electricity. Thus, it is important to gain a better understanding of the relationship between electricity prices and economic outcomes. In this annual report article, we estimate the likely effects of increased electricity prices on production as measured by Gross Domestic Product (GDP) and on employment. Our estimates and simulations indicate that price increases in electricity will have sizable negative effects on Kentucky's GDP and employment growth if the price increases are not accompanied by other changes, such as technological advances, that might alter the consequences of electricity price increases.

These regulations generally entail more stringent regulation regarding sulfur dioxide, nitrogen dioxide, particulate matter, lead, ozone, carbon monoxide, water quality, and coal ash disposal.[1] Because these requirements are expected to cause substantial increases in the cost of electricity generation and therefore in the price of electricity, a quantitative examination of the relationship between electricity prices and economic output is warranted. In this annual report article, we estimate the likely effects of increased electricity prices on production as measured by Gross Domestic Product (GDP) and employment.[2]

In order to ascertain the effects of changes in energy prices on macroeconomic aggregates (i.e. employment and production), we develop and estimate a model based on a partial adjustment mechanism to investigate the dynamic relationship between energy prices and macroeconomic conditions. Using these estimates, we develop policy scenarios and corresponding estimates to produce simulations of the long-run effects of electricity price shocks on state GDP and employment. This exercise should be viewed as "all else constant" simulations in the sense that we assume that only an electricity price increase and no other relevant events, such as technological advance, occurs. Also, the results should be interpreted with caution since our simulations are based on estimates that involve a degree of uncertainty.

Examining the Relationship among Energy Prices and Production and Employment

In this section we examine the relationship among energy prices (i.e. crude oil, electricity and natural gas), production (measured by gross state product), and total employment. In order to investigate these relationships we adopt an agnostic partial adjustment model to estimate the effect of energy prices on GDP and employment. The partial adjustment model assumes that GDP and employment, after a price shock, adjust to their new long-run values only partially each period, but eventually full adjustment is made.

Formally, the partial adjustment framework is given by the following equation:

$$Y_{i,t}-Y_{i,t-1}=\lambda(Y^*-Y_{i,t-1})$$

where subscripts i and t indicate state and time, respectively. The variable Y is our macroeconomic variable of interest, either production or employment, and Y* is the equilibrium level of production or employment. The parameter λ represents the adjustment coefficient. When λ=1 there is instantaneous adjustment and when λ=0 there is no adjustment, so that $Y_{i,t}=Y_{i,t-1}$

Solving for $Y_{i,t}$ we get:

$$Y_{i,t}=(1-\lambda)\, Y_{i,t-1}+\lambda Y^*$$

From here, we assume that the equilibrium values of production and employment are a function of energy prices, in particular, the prices of crude oil, electricity, and natural gas. So if we let $Y^*=\alpha_i+\beta X_{i,t}$ where $X_{i,t}$ are energy prices and α_i are state-specific intercepts, then we get the following:

$$Y_{i,t}=\lambda\alpha_i+(1-\lambda)\, Y_{i,t-1}+\lambda\beta X_{i,t}=\delta_i+\delta_1\, Y_{i,t-1}+\delta_2\, X_{i,t}$$

The main benefits of this model are its ease in implementation and the lack of need for a complex underlying model. The estimates reveal the equilibrium outcomes of changes in energy prices.

Using annual data from 1970 to 2010 allows us to capture the large historical variations in energy prices and enhances identification of the underlying causal relationships. The cross-state aspect of our data enables us to utilize cross-sectional variations in the prices of electricity and natural gas. Our approach assumes contemporaneous effects of changes in energy prices on state GDP and employment. In particular, we view the price of electricity, natural gas, and crude oil as affecting production and employment. Also, we consider effects on both the level and growth of GDP and employment. To control for other factors that affect production at a point in time or that are unique to each state (such as regulatory issues), we add in state fixed effects and time effects. Additionally, to capture lagged influences, we include lagged values of energy prices as explanatory variables.

From the estimates of these equations, we then conduct a series of policy scenarios in which we perturb energy prices and simulate the changes in production and employment over time. Because federal environmental policies typically result in higher-priced electricity, our simulations focus on the effects of an increase in the price of electricity.

Our baseline model includes estimates containing the 48 continental U.S. states, and we estimate a model for a subset of states (labeled Group) similar to Kentucky in energy reliance. Group is constructed based on coal generated as a percent of total electricity and total electricity consumption as a share of real gross state product. We chose states above the 37.5th percentile in order to capture states with similar reliance on energy as Kentucky. These states with their corresponding values of electricity generated from coal as a percent of total electricity generation and electricity consumption as a share of real gross state product are listed in Table 1.

Tables 2 and 3 show the findings for the production growth and production level equations. Individually, the coefficients provide little insight, but the sum of the current and lagged values provide estimates for the marginal short-run effects. Nevertheless, Tables 2 and 3 display an overall negative relationship between energy prices and production. With respect to crude oil,

TABLE 1
Energy Intensive States

	(1)	(2)
States	**% of Electricity Generated From Coal**	**Electricity Consumption (bil. BTU) per Dollar of Real State Gross Domestic Product**
Alabama	62.31%	1.94
Arkansas	55.08%	1.65
Arizona	46.09%	1.02
Georgia	64.65%	1.09
Iowa	84.41%	1.13
Indiana	95.07%	1.33
Kansas	72.53%	1.13
Kentucky	**96.84%**	**1.87**
Missouri	82.13%	1.08
Montana	61.25%	1.82
North Carolina	62.10%	1.15
North Dakota	92.84%	1.39
Nebraska	63.41%	1.15
New Mexico	85.43%	1.01
Nevada	53.35%	0.99
Ohio	86.92%	1.17
Oklahoma	64.17%	1.46
Tennessee	64.92%	1.45
Virginia	51.51%	1.00
Wisconsin	70.93%	0.99
West Virginia	98.21%	1.80
Wyoming	95.78%	1.95

a price increase in period t-1 induces a positive impact on contemporaneous growth and level of production followed by a negative impact in period t, with the sum of the effects being negative. Also, increases in natural gas prices do not exhibit any contemporaneous effect on growth and level of production, but in period t-1 an increase in natural gas prices decrease growth and level of production. Finally, electricity prices reveal similar patterns of adjustment to changes in crude oil prices.

When focusing on energy-reliant states, estimates in column 2 of Tables 2 and 3 show that the effect of oil price increases generate no additional effect on energy-reliant states.[3] Alternatively, energy-reliant states are affected more by increases in natural gas and, to some extent, electricity prices compared to the national estimates.

Table 4 provides the results from estimating each this specification for employment growth. In column 1, crude oil and natural gas prices exhibit a statistically significant and negative effect on employment growth both in period t-1 and period t. Electricity prices reveal a negative effect in period t, but this effect is damped by a positive effect in period t-1, though overall effects are negative. Estimates regarding the interactions with the group of similar states do not show statistical significance.

Table 5 shows the findings for the level of employment in the states. They are generally consistent with the results pertaining to the level of GDP. However, the lagged oil price is negative for employment, and the lagged electricity price is higher in magnitude compared to the effect on GDP. Again, Group interaction effects are not statistically significant.

Policy Scenarios

In this section we explore a number of hypothetical policy scenarios and their effects on production and employment. Throughout

TABLE 2
Growth in State GDP, with Current and Lagged Prices

	(1)	(2)
Variables	**Baseline**	**Group Interaction**
GDP Growth (t-1)	0.281*** (0.0547)	0.276*** (0.0542)
Oil Price	-0.0625*** (0.00465)	-0.0619*** (0.00659)
Oil Price (t-1)	0.0295*** (0.00336)	0.0283*** (0.00420)
Oil Price (interaction)	—	-0.00226 (0.00965)
Oil Price (interaction) (t-1)	—	0.00323 (0.00618)
Natural Gas Price	0.00822 (0.0111)	0.0145 (0.0129)
Natural Gas Price (t-1)	-0.0241** (0.00970)	-0.0274** (0.0129)
Natural Gas Price (interaction)	—	-0.0120 (0.0107)
Natural Gas Price (interaction) (t-1)	—	0.00394 (0.0102)
Electricity Price	-0.0285 (0.0202)	-0.0301 (0.0183)
Electricity Price (t-1)	0.0163 (0.0182)	0.0265 (0.0190)
Electricity Price (interaction)	—	0.00542 (0.0404)
Electricity Price (interaction) (t-1)	—	-0.0222 (0.0362)
Constant	0.176*** (0.0160)	0.174*** (0.0184)
Observations	1,872	1,872
R-squared	0.509	0.512
Number of States	48	48

*Notes: Robust standard errors in parentheses. Asterisks denote significance at the following levels: *** p<0.01, ** p<0.05, * p<0.1. The interaction variable is the interaction between states that are energy reliant and corresponding prices. These give the added marginal effect of each price on growth in production conditional on states being energy reliant.*

TABLE 3
Total State GDP, with Current and Lagged Prices

	(1)	(2)
Variables	**Baseline**	**Group Interaction**
GDP Level (t-1)	0.965*** (0.00636)	0.965*** (0.00698)
Oil Price	-0.0709*** (0.00510)	-0.0726*** (0.00677)
Oil Price (t-1)	0.0342*** (0.00518)	0.0321*** (0.00502)
Oil Price (interaction)	—	0.00168 (0.0109)
Oil Price (interaction) (t-1)	—	0.00460 (0.00477)
Natural Gas Price	0.00523 (0.0114)	0.0155 (0.0130)
Natural Gas Price (t-1)	-0.0281*** (0.00922)	-0.0295** (0.0132)
Natural Gas Price (interaction)	—	-0.0193* (0.0115)
Natural Gas Price (interaction) (t-1)	—	0.00183 (0.0116)
Electricity Price	-0.0382* (0.0206)	-0.0424** (0.0187)
Electricity Price (t-1)	0.0231 (0.0175)	0.0360* (0.0197)
Electricity Price (interaction)	—	0.0122 (0.0398)
Electricity Price (interaction) (t-1)	—	-0.0291 (0.0349)
Constant	0.631*** (0.0769)	0.626*** (0.0838)
Observations	1,872	1,872
R-squared	0.992	0.992
Number of States	48	48

*Notes: Robust standard errors in parentheses. Asterisks denote significance at the following levels: *** p<0.01, ** p<0.05, * p<0.1. The interaction variable is the interaction between states that are energy reliant and corresponding prices. These give the added marginal effect of each price on total production conditional on states being energy reliant.*

these scenarios it is important to keep in mind the difference between a one-time shock and a permanent shock in energy prices. In this analysis, we consider only permanent shocks in the price of electricity. This seems a likely scenario because implementation of energy policies usually persists for many years at a time.

Another important caveat in these scenarios is the strong assumption that the electricity price shock is not accompanied by other changes such as technological advances. Such technological advances could lessen the impact of the shocks. Therefore, our scenarios should be treated as simulations of future conditions under the status quo (except for the shock) rather than forecasts or estimates of future growth.

The third and final caveat is that the estimated policy effects are just that – estimates. There is a degree of imprecision with these estimates, and therefore the results should be interpreted as estimates rather than exact numbers.

The policy scenarios are carried out using estimates for all U.S. states (U.S. estimates) and estimates for the group of states similar in energy reliance to Kentucky (Group). The model scenarios are geared to understanding the size of the Kentucky economy.

We assume a baseline growth rate of 3.0% for production and an annual gross domestic product $163.3 billion. The former is the long-run historical growth rate of GDP for the U.S. economy and $163.3 billion was Kentucky's GDP in 2010. Table 6 contains the simulated effects of the 10% and 25% increases in the price of electricity on economic growth and GDP level. These increases in the prices of electricity are hypothetical increases assumed to be induced by policy. Panel A of Table 6 gives the short-run (SR) and long-run (LR) growth rate of production following a 10% and 25% permanent shock to electricity prices.

TABLE 4
Employment Growth, with Current and Lagged Prices

	(1)	(2)
Variables	**Baseline**	**Group Interaction**
Employment Growth (t-1)	0.607*** (0.0179)	0.604*** (0.0180)
Oil Price	-0.0143*** (0.00274)	-0.0142*** (0.00280)
Oil Price (t-1)	-0.0211*** (0.00185)	-0.0204*** (0.00201)
Oil Price (interaction)	—	-0.000577 (0.00367)
Oil Price (interaction) (t-1)	—	-0.000846 (0.00236)
Natural Gas Price	-0.00146 (0.00374)	0.00104 (0.00402)
Natural Gas Price (t-1)	-0.00401 (0.00396)	-0.00750* (0.00426)
Natural Gas Price (interaction)	—	-0.00711 (0.00592)
Natural Gas Price (interaction) (t-1)	—	0.00732 (0.00504)
Electricity Price	-0.0369*** (0.00861)	-0.0342*** (0.00793)
Electricity Price (t-1)	0.0326*** (0.00837)	0.0316*** (0.00810)
Electricity Price (interaction)	—	-0.00653 (0.0175)
Electricity Price (interaction) (t-1)	—	0.00289 (0.0155)
Constant	0.135*** (0.00983)	0.136*** (0.0100)
Observations	1,872	1,872
R-squared	0.794	0.795
Number of States	48	48

*Notes: Robust standard errors in parentheses. Asterisks denote significance at the following levels: *** p<0.01, ** p<0.05, * p<0.1. The interaction variable is the interaction between states that are energy reliant and corresponding prices. These give the added marginal effect of each price on employment growth conditional on states being energy reliant.*

TABLE 5
Total Employment, with Current and Lagged Prices

	(1)	(3)
Variables	**Baseline**	**Group Interaction**
Employment Level (t-1)	0.968*** (0.00466)	0.968*** (0.00490)
Oil Price	0.0465*** (0.00600)	0.0463*** (0.00558)
Oil Price (t-1)	-0.0365*** (0.00294)	-0.0363*** (0.00279)
Oil Price (interaction)	—	6.76e-06 (0.00426)
Oil Price (interaction) (t-1)	—	-0.000534 (0.00371)
Natural Gas Price	-0.00355 (0.00446)	0.00158 (0.00500)
Natural Gas Price (t-1)	-0.00693 (0.00463)	-0.0105* (0.00572)
Natural Gas Price (interaction)	—	-0.0117** (0.00582)
Natural Gas Price (interaction) (t-1)	—	0.00711 (0.00670)
Electricity Price	-0.0458*** (0.00983)	-0.0434*** (0.00967)
Electricity Price (t-1)	0.0342*** (0.00817)	0.0360*** (0.00950)
Electricity Price (interaction)	—	-0.00380 (0.0210)
Electricity Price (interaction) (t-1)	—	-0.00456 (0.0169)
Constant	0.249*** (0.0462)	0.250*** (0.0479)
Observations	1,872	1,872
R-squared	0.997	0.997
Number of States	48	48

*Notes: Robust standard errors in parentheses. Asterisks denote significance at the following levels: *** p<0.01, ** p<0.05, * p<0.1. The interaction variable is the interaction between states that are energy reliant and corresponding prices. These give the added marginal effect of each price on total employment conditional on states being energy reliant.*

For the overall (U.S.) estimates, a 10% permanent increase in electricity prices would decrease the production growth rate to 2.88% in the short run and to 2.83% in the long run, all else equal. Using estimates for energy-reliant states, the growth rate would be reduced to 2.80% in the short run and 2.72% in the long run. Given the linearity of the forecasts, the estimates for the 25% shock to electricity prices are increased accordingly.

To complement Panel A, Panel B provides simulations of GDP levels over 5, 10, and 20 years. Column 1 gives the baseline results assuming a constant 3% annual growth rate in production over 5, 10, and 20 years. For instance, at a 3% growth rate, GDP would increase from $163.3 billion in year 1 to $189.31 billion in year 5; $219.46 billion in year 10; and $294.94 billion in year 20. Column 2 uses the annual growth rate generated from the long-run 10% increase in electricity price (found in Panel A). Here, at a 2.83% growth rate, GDP would decrease our baseline estimate by $1.56 billion in 5 years; $3.59 billion in 10 years; and $9.59 billion in 20 years. Estimates based off energy-reliant states, which decrease the growth rate to 2.72% would then decrease the baseline estimate by $2.56 billion in 5 years; $5.89 billion in 10 years; and $15.63 billion in 20 years. These results are exacerbated when electricity prices increase by 25% as shown in Panel B. Overall, these results illustrate the substantial impact of electricity price shocks on the economy, especially for energy-reliant states.

Table 7 contains the policy simulations for employment. Again, these are geared to simulate the size of the Kentucky economy. It is assumed that a steady state growth rate of employment is 1% which is the approximate historical, annual growth rate of employment for Kentucky. Also, the baseline level of employment is assumed to be 1,900 thousand, Kentucky's approximate labor force in 2010.

Replicating the above analysis using employment growth as the macroeconomic variable of interest, Panel A displays the short- and long-run effects of a 10% and 25% increase in electricity prices on employment growth. Not surprisingly, energy-reliant states bear a larger burden in terms of employment following energy price increases than other U.S. states. These scenarios show a long-run employment growth rate of 0.84% for a 10% electricity price increase, compare to a 0.89% growth rate based on total U.S. estimates.

Panel B of Table 7 is similar to Table 6, providing simulations of employment over 5, 10, and 20 years. Column 1 gives the baseline results assuming a constant 1% annual growth rate in employment over 5, 10, and 20 years. For instance, at a 1% growth rate, employment would increase from 1,900 thousand in

TABLE 6
Policy Scenarios and Production,
10% and 25% Price of Electricity Increase

Panel A: GDP Growth		
Relative to 3.0% Growth		
	U.S.	Group
10% Price Incr., SR	2.88	2.80
10% Price Incr., LR	2.83	2.72
25% Price Incr., SR	2.70	2.49
25% Price Incr., LR	2.58	2.30

Panel B: GDP Over Time			
	(1)	(2)	(3)
10% price increase	3% growth Baseline	2.83%	2.72%
5 years	189.31	187.75	186.75
10 years	219.46	215.87	213.57
20 years	294.94	285.35	279.31
25% price increase	3% growth Baseline	2.58%	2.30%
5 years	189.31	185.48	182.96
10 years	219.46	210.68	204.99
20 years	294.94	271.79	257.34

Notes: The estimates used to develop policy scenarios were extracted from Tables 2. SR=short run, LR=long run

TABLE 7
Policy Scenarios and Employment,
10% and 25% Price of Electricity Increase

Panel A: Employment Growth		
Relative to 1.0% Growth		
	U.S.	Group
10% Price Incr., SR	0.96	0.94
10% Price Incr., LR	0.89	0.84
25% Price Incr., SR	0.89	0.84
25% Price Incr., LR	0.73	0.61

Panel B: Employment Growth			
	(1)	(2)	(3)
10% price increase	1% growth Baseline	0.89%	0.84%
5 years	1,997	1,986	1,981
10 years	2,099	2,076	2,066
20 years	2,437	2,371	2,342
25% price increase	1% growth Baseline	0.73%	0.61%
5 years	1,997	1,970	1,959
10 years	2,099	2,043	2,019
20 years	2,437	2,279	2,212

Notes: The estimates used to develop policy scenarios were extracted from Tables 4. SR=short run, LR=long run

year 1 to 1,997 thousand in year 5; 2,099 thousand in year 10; and 2,437 thousand in year 20.

Column 2 uses the annual growth rate in employment generated from the long-run 10% increase in electricity price (found in Panel A). After 20 years, comparing columns 1 and 2, the increase in employment is 65,500 less following a 10% increase in electricity prices. For a 25% increase in electricity prices, the difference is 158,000 in employment. Energy-reliant states, following a 10% increase in energy prices would find their employment drop by 95,000 and for a 25% increase in energy prices employment would drop by 225,000 after 20 years.

Conclusion

This article looks at the relationship between electricity prices and two measures of economic conditions, GDP and employment. Specifically, we use a partial adjustment model for examining the relationship between energy prices and four measures of economic output: GDP levels, GDP growth, employment levels, and employment growth. We look at this relationship over time and across states nationally, and we also study whether the effect differs for states similar to Kentucky with respect to energy reliance. Across the models and outcomes, we find an expected negative relationship between electricity prices and economic output.

To summarize and illustrate our results, we conduct policy scenarios based on either a 10% or 25% permanent increase in electricity prices. We focus on the estimates for the pooled U.S. states and the energy-reliant states. Because these policy scenarios look only at the price shock and assume no changes in other factors such as technological innovations, these scenarios are simple simulations of future economic output under these assumptions rather than our forecast of expected future conditions. They are also estimates that are measured with error, and therefore the results should be interpreted with caution. In terms of GDP, we find that a 10% increase in electricity prices would decrease GDP growth from our baseline value of 3% annual growth (without the shock) to 2.88% in the short run and 2.83% in the long run based on the U.S.-wide estimates. The drop in growth is more pronounced for estimates based on energy-reliant states. Turning to employment growth, a 10% increase in electricity prices decreases employment growth rate from the baseline value of 1% annual growth (without the shock) to 0.96% in the short run and 0.89% in the long run, based on U.S.-wide estimates. The resulting reduction in the long-run growth rate in employment growth is larger for estimates based on energy-reliant states (0.84%).

These policy scenarios provide valuable information on the possible effects of electricity price increases. These scenarios illustrate that price increases will have sizable negative effects on Kentucky's GDP and employment growth if the price increases are not accompanied by other changes, such as technological advances, or other factors that might mitigate (or possibly exacerbate) the consequences of electricity price increases.

---

[1]See the summary in Max Neubauer, R. Neal Elliott, and Aron Partrick, "Kentucky Electricity and Natural Gas Price and Consumption Forecasts to 2035," American Council for an Energy-Efficient Economy, August 9, 2011 http://energy.ky.gov/Programs/Data%20Analysis%20%20Electricity%20Model/ACEEE%2008_09_11_B.pdf .

[2]This annual report article is based on a study we conducted for the Kentucky Department for Energy Development and Independence entitled "The Relationship between Electricity Prices and Electricity Demand, Economic Growth, and Employment." That report will be available shortly on the CBER website (http://cber.uky.edu).

[3]Interaction terms are generated by creating a variable G=1 if states are energy reliant and zero otherwise. This variable is multiplied by each of the price variables to create the interaction term. The interaction terms provides the added marginal effect on energy-reliant states.

Financing Roads & Bridges:
New Funding Solutions May Be Required

Sean Slone

Ideas, innovation, and intellectual capital form the foundation of the knowledge economy, but Kentucky, like many states, is still centered on making and growing things, extracting and transporting raw materials, and moving people and products to markets and workplaces. Consequently, the traditional transportation infrastructure – roads and bridges – are still an essential piece of the economic development puzzle. Yet, Kentucky's infrastructure needs exceed the ability to fund them. This chapter discusses some of these funding issues and how public-private partnerships are being used in neighboring states to fund infrastructure projects.

From I-75, the last link in a supply chain that brings Camry parts to the Toyota plant in Georgetown, to Frederica Street in Owensboro, the road that allows dozens of Wal-Mart employees to get to work each day, to the Louisville International Airport where the UPS international air express hub employs 20,000 and sorts 2,000 packages every 24 seconds for on-time delivery all over the world,[1] Kentucky's transportation infrastructure is a fundamental element of the state's economy.

Ideas, innovation, and intellectual capital form the foundation of the knowledge economy, but Kentucky, like many states, is still centered on making and growing things, extracting and transporting raw materials, and moving people and products to markets and workplaces. Around 42 percent of Kentucky's economy is in sectors like agriculture and manufacturing that are highly dependent on transportation, compared to about 33 percent nationally.[2] Indeed, according to the Kentucky Transportation Cabinet over 42,000 freight carriers are authorized to operate in the state,[3] and according to Census data Kentuckians spend an average of 21.5 minutes commuting to work each day, with 81.3 percent driving alone. And as evidenced by the closing of the Sherman Minton Bridge in Louisville, a disruption in the transportation system can cause major upheaval. Clearly then, the traditional transportation infrastructure—roads and bridges—are still an essential piece of the economic development puzzle.

The design, construction and maintenance of Kentucky's infrastructure are also a key part of the overall economy. The American Road and Transportation Builders Association (ARTBA) reports that, based on Census data, the transportation construction industry in 2010 supported the equivalent of about 43,000 full-time jobs in Kentucky. Those jobs are nearly evenly divided between those directly involved in transportation infrastructure construction and related activities, and those that are sustained by transportation design and construction industry employee and company spending throughout the region's economy. Those workers earn a total annual payroll of $1.7 billion and contribute an estimated $145.9 million in state and federal payroll tax revenue. There are at least 14,832 firms in Kentucky that are in some way directly involved in transportation construction related work. In addition, there are more than 1,158,749 full-time jobs in Kentucky in industries such as tourism, retail sales, agriculture and manufacturing that are dependent on the state's transportation infrastructure network.[4]

For all of these reasons and more, Kentucky's roads and bridges are vital to its economic health. But Kentucky faces significant challenges in the years ahead in maintaining and upgrading its infrastructure, not the least of which is a growing uncertainty about how those upgrades will be funded.

According to the American Society of Civil Engineers' 2009 Report Card on America's

Infrastructure, 19 percent of Kentucky's major roads are in poor or mediocre condition and 57 percent of Kentucky's major urban highways are congested.[5] Moreover, the Federal Highway Administration reports that some 31 percent of the state's bridges are structurally deficient or functionally obsolete.[6]

But it isn't just maintenance that's required on Kentucky's existing infrastructure. Added capacity is needed as well to better serve the state's 4.3 million residents. The most recent Kentucky Long-Range Statewide Transportation Plan in 2006 pointed out that: *While Kentucky's major highway network does provide good access to the major population and economic centers in the state, Kentucky still has 39 counties that do not have an interstate or parkway located within their county, nor do they have four-lane arterial access to an interstate or parkway. To remain economically competitive, Kentucky will need to continue development of an effective transportation network providing good access for moving freight and people to and from these locations.*[7]

All of which will cost a great deal of money of course. But those needs come at a time of some disagreement about how transportation should be funded going forward, both at the state and federal levels.

Funding Kentucky's Mega-Projects

Kentucky's so-called mega-projects are shown in Table 1. One of these, the Brent Spence Bridge, which carries Interstates 71 and 75 across the Ohio River at Cincinnati, is a key component in both the Kentucky and national economy. Originally built to carry 80,000 vehicles a day in 1963, it now handles 150,000, including 30,300 trucks. The bridge is considered functionally obsolete, according to the U.S. Department of Transportation's National Bridge Inventory, due to its capacity, sight distance and safety concerns. A 2011 regional freight plan for Ohio, Kentucky and Indiana said that while freight traffic on the bridge can see long delays now as a result of congestion (it's ranked among the 25 worst highway bottlenecks in the United States by the American Highway Users Alliance), a failure of the bridge would be catastrophic, causing the entire region to cease to function from a freight standpoint. According to the plan: *The only alternate highway routes to the Brent Spence Bridge are I-275 and I-471. These routes and their connecting roadways are not constructed to handle the large increase in vehicular traffic that would be diverted (in the event of a bridge failure). The result would be gridlock for truck freight, adding time and increasing costs for shippers. The inability to adequately serve freight traffic would have deleterious effects on business, employment and regional income.*

The Kentucky Transportation Cabinet considers a replacement for the bridge a top priority and environmental studies are underway. But at a projected cost of $2.3 billion, the question of how the bridge will be paid for is not yet answered.[8]

Kentucky's FY 2010-FY2012 Enacted Biennial Highway Plan says this about the Brent Spence replacement: *There are environmental issues, downtown redevelopment concerns, and physical alignment constraints that work together to make this a very challenging project. Accordingly, one of the most challenging considerations will be the project cost, which is estimated at over $2 billion. Kentucky's share of the project cost is estimated to be over $1 billion, with approximately $30 million currently available through federal congressional earmark funding for design, right-*

TABLE 1
Kentucky Mega Projects

Project	Description	Estimated Cost
Louisville Bridges	Includes replacement of the I-65 Kennedy Bridge, reconstruction of Spaghetti Junction (the confluence of Interstates 64, 65 and 71), new East End Bridge near Prospect	$2.9 Billion (Previous estimate was $4.1 Billion)
Brent Spence Bridge (Covington)	Would replace 48-year-old functionally obsolete bridge	$2.3 Billion (Kentucky's share is over $1 Billion)
Proposed Interstate 66 (Southeastern KY)	Would extend from I-65 near Bowling Green, along Cumberland Parkway to west of Somerset, along KY 80 and south to I-75 south of London, east along the Hal Rogers Parkway to Hazard and then along U.S. 23 through Pike County to U.S. 52 and the proposed I-74 Corridor near Matewan, WV	Somerset-to-London segment is over $500 Million, while the U.S. 23-to-U.S. 52 segment is more than $1 Billion
Proposed Interstate 69 (From Tennessee Line to Henderson)	The Kentucky portion of the Texas to Canada superhighway would follow the existing Purchase Parkway from the Tennessee line to I-24 to the Western Kentucky Parkway to the Pennyrile Parkway to north of Henderson. At Henderson, a new route (including a new Ohio River bridge) would connect to I-64 in southern Indiana.	Parkway upgrades are $700 million; and the new route & bridge at Henderson are $800 million

Source: Kentucky Transportation Cabinet. "Kentucky's FY 2010-FY2012 Enacted Biennial Highway Plan (As Approved by the May 2010 General Assembly): Appendix C: Kentucky's 'Mega-Projects.'" July 2010. Accessed from: http://transportation.ky.gov/Program-Management/Highway%20Plan/2010Appendices.pdf

of-way, and utility phases. Additional funding is made available for this project in the 2010 Enacted Biennial Highway Plan, but traditional funding will not be sufficient to fully cover Kentucky's share of costs for this project.[9]

The Ohio Transportation Review Advisory Council declined to put $27 million towards the project this year, pushing back design work by at least a year.[10] It is expected to take a decade or more to plan and build the bridge. U.S. Sen. Sherrod Brown (D-Ohio) has mentioned the Brent Spence as an ideal project for a proposed national infrastructure bank that would provide loans and loan guarantees along with direct federal financing for some projects. Currently there is no agreement yet in Washington on how such a bank might be structured. Some believe that it will likely be necessary to have tolls on the bridge, which will allow local governments to help pay for its cost.[11] But it remains to be seen if Kentuckians and their representatives in Frankfort will support tolling.

A plan to toll three existing bridges in the Louisville area to fund new Ohio River bridges as part of another of the state's transportation mega-projects prompted state Sen. Perry Clark to introduce legislation in January 2011 that would have prevented tolls from being charged on the Sherman-Minton, Clark Memorial and John F. Kennedy bridges as well as on any existing portion of the Interstate highway system in Kentucky. Senator Clark dubbed his bill, which was not approved by the General Assembly, the "Keeping Kentucky's Freeways Free Act."[12]

Future of Gas Taxes & User Fees

Freeways, of course, are not free. Even those already built and paid for by tax dollars must be regularly maintained and improved to meet changing transportation needs related to mobility, safety and access—all of which costs money.

In fact, a report earlier this year from the U.S. Public Interest Research Group Education Fund said that although highway advocates often claim that roads "pay for themselves" through gas taxes and other charges paid by motorists, they in fact do not and rarely ever have. Moreover, gas taxes are not actually "user fees" and that designation is simply used by highway advocates to argue for more spending on roads and less on public transit and other forms of transportation. The report also argued that:

- the amount of money a particular driver pays in gas taxes bears little relationship to his or her use of roads funded by gas taxes.
- federal gas taxes have typically not been devoted exclusively to highways.
- many states use gas tax revenue for a variety of purposes including not just highways but public transportation and non-transportation-related governmental purposes.
- since 1947, the amount of money spent on roads has exceeded the amount raised through gas taxes and other so-called "user fees" by $600 billion. Huge transfers of general government funds have been used to make up the rest.
- gas taxes and other so-called "user fees" today pay only about half the cost of building and maintaining the nation's highways and roads.

The report concludes that "to make the right choices for America's transportation future, the nation should take a smart approach to transportation investments, one that weighs the full costs and benefits of those investments and then allocates the costs of those investments fairly across society."[13]

Kentucky's gas tax compared to neighboring states is shown in Table 2. In general, the gas tax is seen as a revenue source in decline for a number of reasons. Increased fuel efficiency means Americans are paying less of the taxes. Those who drive electric cars are not paying any gas taxes at all. In most states, gas taxes are not adjusted to account for

TABLE 2
Kentucky's Gas Tax Compared to Neighboring States

State	Gas Tax (Cents Per Gallon)*
Kentucky	27.8
Illinois	35.1
Indiana	34.1
Missouri	17.3
Ohio	28.0
Tennessee	21.4
Virginia	18.1
West Virginia	32.2
Average of Neighboring States	26.6

Source: Kentucky Transportation Cabinet. "Comparing Kentucky's Gasoline Tax." Accessed from: http://transportation.ky.gov/Budget-and-Fiscal-Management/Pages/default.aspx

** Includes base excise tax, plus additional sales tax on gasoline in IL (6.25%), IN (7%) and WV (5%). Also includes other miscellaneous fees/taxes.*

inflation. That's despite the escalating costs of road construction. In July 2011, construction materials were 8.9 percent higher than they were in 2010, according to the Department of Labor's Producer Price Index.[14] Kentucky is one of the rare exceptions. It is among seven states that have either all or a portion of their motor fuel tax indexed to a local consumer price index or the wholesale price of fuel. Kentucky's indexing mechanism dates back to 1985.

But because the gas tax is not a sustainable revenue source for the long-term future, many are now contemplating and researching what could eventually replace it. Two national commissions have come to the conclusion that a collection system based on vehicle miles traveled (VMT) could more accurately correlate actual highway usage with what drivers pay to use them (and thus to repair and upgrade them).

A number of states have used pilot projects to test VMT-based collection systems, most notably Oregon. They remain controversial however and would face significant technological, institutional and political challenges to implement. Those who live in remote rural areas and frequently drive long distances fear they would be particularly burdened by mileage-based user fees. The cost of retrofitting vehicles with technology capable of tracking mileage and sending it to a central collection agency could also be a challenge. There may also be privacy concerns for some if a government agency is going to have access to data on where Americans go on a daily basis.

As Kentucky policymakers face significant infrastructure challenges, a declining revenue source and uncertainty about the level of federal investment in the years ahead, they likely also will face some difficult decisions about whether tolls, public-private partnerships and charging motorists by the mile will fit into Kentucky's future.

Public-Private Partnerships

With transportation funding mechanisms traditionally used by government in decline, many states have started to turn to private investors to help realize major projects. Public-private partnerships (sometimes called P3s for short) are collaborations between governments and private investment firms that aim to improve public services and infrastructure by capturing efficiencies associated with private sector involvement while maintaining the public accountability of government involvement.

Public-private partnerships are becoming a key strategy for funding infrastructure for many of Kentucky's neighbors, most notably Indiana, where state officials leased the Indiana Toll Road in 2006 to a Spanish/Australian consortium for 75 years. In return the state received $3.8 billion to put towards a 10-year, $10 billion infrastructure repair and construction plan called Major Moves. In the summer of 2011, Indiana Gov. Mitch Daniels marked the halfway point of the initiative, dubbing it a major success. Funding from the lease agreement has been used on more than 100 new transportation projects in the state adding 185 miles of a projected 413 miles of new highways; and over 100 restoration or preservation projects including the replacement or rehabilitation of 588 out of a projected 1,190 bridges and 2,800 out of a projected 4,000 miles of pavement.[15] Moreover, in the process, the state has reportedly created 60,000 jobs.[16] "Indiana is the envy of America today," Daniels said in June 2011. "We look forward to not being the exception and hope that other states find their solutions."[17] And in 2011, legislation was passed in Ohio giving Gov. John Kasich the authority to pursue a long-term lease agreement on the Ohio Turnpike, similar to the Indiana Toll Road deal.[18]

To Kentucky's east, Virginia is quickly becoming a hotbed of public-private partnership activity. International toll road developer and investor Transurban North America is involved in three infrastructure projects in the state, including the construction of high occupancy toll lanes on the Capitol Beltway (I-495) around Washington, D.C. In 2011, the state opened an Office of Transportation Public-Private Partnerships, which is responsible for developing and implementing a statewide program for transportation project delivery including the development of new P3 projects across all modes of transportation.[19] Virginia officials believe the office can help speed the delivery of transportation projects, encourage innovation, promote accountability, establish more uniform processes, achieve efficiencies and promote economic growth and job creation.[20]

Kentucky however does not have legislation on the books that allows it to enter into public private

partnerships for infrastructure development. An effort to pass P3 authorizing legislation by state Reps. Larry Clark, Kelly Flood and Sannie Overly during the 2011 Kentucky General Assembly did not succeed.[21] It is likely an issue Kentucky policymakers will need to revisit in the years ahead.

"When you add up the Louisville bridges projects, the Brent Spence Bridge project … and the I-69 project out by Henderson and Owensboro, those three projects are between 10 and 11 billion dollars alone," said Kentuckians for Better Transportation President Stan Lampe in a July 2011 interview. "(Kentucky) at least ought to have the tool in the toolbox to be used at the discretion of the (Transportation) Cabinet if investors would appear, if entities would appear that are interested in moving a project forward."[22]

Opposition to public-private partnerships in Kentucky has to this point centered to some degree around concerns about selling Kentucky's transportation assets to Spanish or Australian firms. Although most of the global investment firms investing in American infrastructure have American subsidiaries, many are based in other countries where the P3 industries are more developed. Policymakers and the public may also require convincing that agreements can be written that protect the interests of all involved. Lampe believes they can.

"I'm confident that agreements can be written and put into place that are careful and thoughtful and directed so that the state's interests and the taxpayers' interests are protected," he said. "But the state's interest and the taxpayers' interest also benefit if a project can be done 10 or 15 years early at half-a-billion dollars less. That's the win-win situation that you look for and I think that there's a lot of them out there. I think there is great opportunity because we simply don't have the ability to finance these multi-billion dollar projects through traditional bond sales … We've got to find new tools for our toolbox."

Lampe also believes tolling inevitably will be a part of Kentucky's future, as much as it was a part of its past. "Eastern Kentucky and Western Kentucky had toll roads for many, many years until just in recent times the tolls were taken off the parkways in Eastern Kentucky and Western Kentucky," he said. "I think by and large Kentuckians understand that highways aren't free."[23]

Conclusion

As Kentucky policymakers face significant infrastructure challenges, a declining revenue source and uncertainty about the level of federal investment in the years ahead, they likely also will face some difficult decisions about whether tolls, public-private partnerships and charging motorists by the mile will fit into Kentucky's future. Funding transportation megaprojects, improving access to Interstate-quality roads, and repairing our decaying roads and bridges will likely require a toolbox full of innovative solutions. The future vitality of Kentucky's economy may depend on implementing those solutions.

---

[1]Louisville Regional Airport Authority. "About the Airport: Cargo Operations." Accessed from: http://www.flylouisville.com/About-the-Airport/About-the-Airport.aspx

[2]These economic sectors are assumed to be more transportation dependent: agriculture, forestry, fishing, and hunting; mining; construction; manufacturing; transportation and warehousing; wholesale and retail trade.

[3]Kentucky Transportation Cabinet. "Kentucky Transportation At a Glance." Accessed from: http://transportation.ky.gov/Planning/Documents/KENTUCKY%20TRANSPORTATION%20AT%20A%20GLANCE.pdf

[4]American Road & Transportation Builders Association Transportation Development Foundation. "The 2010 U.S. Transportation Construction Industry Profile: Transportation Facts: Kentucky."

[5]American Society of Civil Engineers. "Report Card for America's Infrastructure: Kentucky." 2009. Accessed from: http://www.infrastructurereportcard.org/state-page/kentucky

[6]Federal Highway Administration. "Deficient Bridges By State and Highway System." December 2010. Accessed from: http://www.fhwa.dot.gov/bridge/nbi/defbr10.cfm

[7]Kentucky Transportation Cabinet. "2006 Kentucky Long-Range Statewide Transportation Plan." Accessed from: http://transportation.ky.gov/Planning/Documents/Ch%203%20State%20of%20the%20Commonwealth%20-%20part%201%20_pop%20-%20econ%20develop_.pdf

[8]Ohio-Kentucky-Indiana Regional Council of Governments. "OKI Regional Freight Plan: Final Draft." August 2011. Accessed from: http://www.oki.org/freight/pdf/finaldraft/OKI%20Regional%20Plan%20Final%20Draft%20full%20document.pdf

[9]Kentucky Transportation Cabinet. "Kentucky's FY 2010-FY 2012 Enacted Biennial Highway Plan: Appendix C: Kentucky's Mega Projects." July 2010. Accessed from: http://transportation.ky.gov/Program-Management/Highway%20Plan/2010Appendices.pdf

[10]Barry Horstman. "Brent Spence may lose Ohio funding." *The Cincinnati Enquirer*. March 24, 2011. Accessed from: http://cincinnati.com/blogs/nkypolitics/2011/03/24/brent-spence-may-lose-ohio-funding/

[11]Bill Price. "New push coming for needed Brent Spence Bridge replacement." WCPO-TV, Cincinnati. August 9, 2011. Accessed from: http://www.wcpo.com/dpp/news/region_central_cincinnati/downtown/new-push-coming-for-needed-brent-spence-bridge-replacement

[12]Keith Goble. "Kentucky bill would limit tolls." *Land Line Magazine: The Business Magazine for Professional Truckers*. January 11, 2011. Accessed from: http://www.landlinemag.com/todays_news/Daily/2011/Jan11/11011/11111-01.shtml

[13]Phineas Baxandall, Tony Dutzik and Benjamin Davis. "Do Roads Pay for Themselves? Setting the Record Straight on Transportation Funding." U.S. Public Interest Research Group Education Fund. January 2011. Accessed from: http://cdn.publicinterestnetwork.org/assets/28b773b9f18cdb23da3e48a8d7884854/Do-Roads-Pay-for-Themselves_-wUS.pdf

[14]U.S. Department of Labor, Bureau of Labor Statistics. "Producer Price Indexes—July 2011." News release. Accessed from: http://www.bls.gov/news.release/pdf/ppi.pdf

[15]Heather Gillers. "Daniels: Major Moves remaking Indiana's highways." *The Indianapolis Star*. June 29, 2011. Accessed from: http://www.ongo.com/v/1271848/-1/904E7ED5639F3AD1/daniels-major-moves-remaking-indianas-highways

[16]Sean Slone. "More From the Public-Private Partnerships Infrastructure Forum." The Council of State Governments Knowledge Center Blog. June 24, 2011. Accessed from: http://knowledgecenter.csg.org/drupal/content/more-public-private-partnerships-infrastructure-forum

[17]Gillers.

[18]"Ohio Gov. Kasich gets legislation to lease Turnpike—RFP must be OK'd." *Tollroads News*. July 4, 2011. Accessed from: http://www.tollroadsnews.com/node/5382

[19]Sean Slone. "States Take Their Time With Public-Private Partnerships." Capitol Ideas E-Newsletter. June 23, 2011. Accessed from: http://www.csg.org/pubs/capitolideas/enews/issue72_2.aspx

[20]American Association of State Highway and Transportation Officials. "Virginia DOT Opens Office of Transportation Public/Private Partnerships." AASHTO Journal Weekly Transportation Report. June 10, 2011. Accessed from: http://www.aashtojournal.org/Pages/061011virginia.aspx

[21]Kentucky General Assembly. "House Bill 488." 2011 Regular Session. Accessed from: http://e-lobbyist.com/gaits/KY/HB488

[22]Telephone Interview with Stan Lampe. July 2011.

[23]Ibid.

Economic Inefficiencies in Access Rates:
Kentucky's Intrastate Switched Telephone Access Charges

Christopher Jepsen, Frank Scott & Jesse Zenthoefer

This article examines the economic consequences of the current access rate system for intrastate long-distance calls, governed by the Kentucky Public Service Commission. In comparison, access rates for interstate long-distance calls are governed by the Federal Communications Commission. Many telephone companies charge much higher access rates for intrastate calls than for interstate calls. An economic inefficiency exists with this system because intrastate access charges are not set at the same price as interstate access charges, even though there is no difference to the provider for the cost of the service.

Telecommunications policy throughout most of the twentieth century was driven by the goal of universal access—a goal formally established by the Communications Act of 1934.* To accomplish that goal long-distance telephone rates were explicitly set above cost for many decades, and the profits were used to cross-subsidize rates for local telephone service that were set below cost. Competitive long-distance providers began to challenge AT&T's monopoly in the 1970's, leading to the breakup of the AT&T system in the mid 1980's. After the Bell Operating Companies were divested from AT&T, they continued to provide local telephone service while AT&T provided long-distance service in competition with MCI, Sprint, and others.

With the advent of broadband internet services, the information technology market has transformed itself since the early 1990's, and in the 21st century universal access to broadband is assuming the same, if not higher, level of prominence. Importantly, broadband Internet services allow for more than simple voice communication, and have brought changes to the U.S. economy, education and health-care system.

At the time of the AT&T break-up, local wireline telephone service was still a monopoly, provided by incumbent local exchange carriers (ILEC's), even though long-distance carriers were beginning to compete with one another for customers. Interstate telephone rates came under the jurisdiction of the Federal Communications Commission (FCC), but regulation of intrastate rates fell to the various state public service commissions. Thus, the rate charged to a long-distance carrier by a local telephone exchange carrier to connect an interstate call was regulated by the FCC, while the rate charged by the same local telephone exchange carrier to connect a long-distance call that originated within the state was (and is) regulated by the state.

In response to this sea-change in the telecommunication environment, Kentucky created an access rate system for telephone service in 1984. The system of intrastate switched access charges established subsidies that gave financial incentives for ILEC's to provide landline service to hard-to-reach customers, so that all Kentuckians would have access to landline phone service at "reasonable" rates. This system of implicit subsidies was created at a point in time when local residential and commercial customers had only one telephone option for connecting to the outside world—their local wireline provider.

Other than the changes it approved to Bell-South's access charges in 1999, the Kentucky Public Service Commission (PSC) has not revised the implicit subsidy mechanisms built into access charges for intrastate (i.e. within-state) long-distance calls since then.[1] In contrast, the FCC has made several changes in its regulation of interstate long-distance calls, rebalancing revenues away from carrier (ac-

*This article is a condensed version of the following report: Christopher Jepsen, Frank Scott, and Jesse Zenthoefer, "Intrastate Switched Telephone Access Charges in Kentucky," University of Kentucky Center for Business and Economic Research, November 2011, available at http://cber/uky.edu/researchreports.asp.

cess) charges to end-user charges.[2,3] The result is that many customers pay substantially more in per-minute charges for intrastate long-distance calls than for interstate long-distance distance calls, as illustrated in the next section.

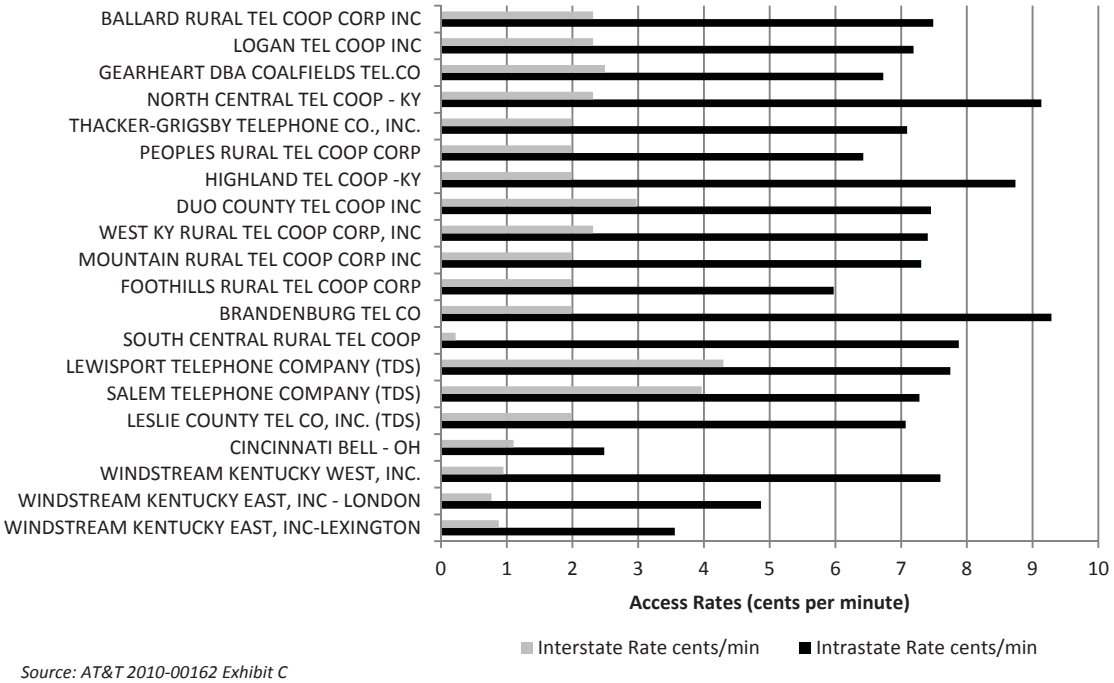
The Kentucky PSC has initiated an investigation into the intrastate switched access rates charged by incumbent and competitive local exchange carriers in the state.[4] This annual report article is motivated by that investigation. The first part of our analysis provides a general overview of long-distance access charges. The second section summarizes recent changes in neighboring states' access rate systems. The third section provides an overview of the underlying economic principles associated with the access rate system, highlighting economic inefficiencies that exist in the current system where prices for functionally identical products—interstate and intrastate access charges—are allowed to differ substantially.

Overview of Long-Distance Access Charges

From the days of Alexander Graham Bell until the 1970's, voice communication between persons in different locations flowed over copper wires in one nationally-interconnected system. The advent of wireless communication devices and the internet over the past several decades has drastically changed the current possibilities. Now one person may initiate a telephone call from a cell phone that taps into a copper or fiber-optic long-distance system and ends up connecting with another person who receives the call through an internet connection. Three or more different telephone service providers may be involved in completing the call. It is impractical for all three providers to bill the customer separately for the services each provides, necessitating a system of reimbursement among companies.

What are long-distance access charges? These charges, also known as switched access charges, are the prices that local telephone service providers charge wireline long-distance providers for connecting long-distance calls to their local exchange customers. Local exchange providers fall into two groups, incumbent local exchange carriers (ILEC's) and competitive local exchange carriers (CLEC's).[5] Wireline long-distance providers are known as interexchange carriers (IXC's). The originating and terminating LEC's incur costs when a long-distance call is placed, and they are allowed to charge the IXC for the origination and termination services provided. The costs that the LEC's incur in connecting a long-distance call do not differ by where the call is going or where it comes from. However, the amount the LEC's charge the IXC for

FIGURE 1
Kentucky RLEC Intrastate and Interstae Switched Access Rates



Source: AT&T 2010-00162 Exhibit C

access to their systems can differ greatly depending on whether the call crosses state boundaries.

Access charges differ considerably across local exchange carriers in Kentucky. Figure 1 illustrates the different interstate and intrastate long-distance access charges of Kentucky's rural local exchange carriers (RLEC's).[6] It can be seen that intrastate access fees vary greatly across providers, from over $0.09 per minute for Brandenburg Telephone Company to under $0.03 per minute for Cincinnati Bell. The interstate access fees are much more similar across carriers, with most carriers charging around $0.02 per minute.

Even though local telephone companies often have a virtual monopoly on access to their wireline customers, particularly in rural areas, the number of landlines and the number of calls made to those landlines have been decreasing over time as customers continue to substitute other forms of communications, including wireless phones and Voice over Internet Protocol (VoIP) such as Insight Phone and Vonage. The FCC documents that the number of wireline phone lines in Kentucky provided by incumbent local exchanges (ILEC's) dropped from nearly 1.7 million at the end of 2007 to approximately 1.3 million in June 2010, a decrease of 21.5 percent.[7,8] In contrast, the number of wireless subscribers in the Commonwealth grew from 3,291,000 to 3,654,000 over the same period, an increase of 11 percent.[9] And as of June 2010, there were approximately 260,000 VoIP phone lines in Kentucky.[10]

Recent Access Reforms in Other States

Table 1 illustrates that each of the states bordering Kentucky has addressed intrastate access charge reform in varying degrees. Illinois, Indiana, and West Virginia currently require providers to set their intrastate access charges to mirror their interstate access charges. Indiana is the clear leader in the region for reform, with the passage of HEA 1279 in March 2006. This bill served as the catalyst for telecommunications reform in Indiana and is considered the benchmark for other states interested in deregulation. Regarding intrastate access service, this legislation states that rates for intrastate switched or special access service are "just and reasonable" if intrastate rates mirror interstate rates for switched or special access service.

TABLE 1
Recent Intrastate Access Reforms in Kentucky and Surrounding States

	Addressed Access Rate Reform	Access Rate Legislation	Summary of Legislation
Kentucky	No	Kentucky has not revised access reform since 1999.	…
Surrounding States			
Illinois	Yes	Illinois Public Utilities Act Section 13-900.2	By July 1, 2012, each telecommunications carrier must reduce its intrastate switched access rates to mirror its then current interstate switched access rates and rate structure.
Indiana	Yes	HEA 1279	Rates and charges for intrastate switched or special access service are considered to be just and reasonable if the intrastate rates and charges mirror the providers' interstate rates and charges for switched or special access service.
Missouri	Yes	House Bill 1750	Beginning March 1, 2011 House Bill 1750 requires large ILECs to annually reduce their intrastate access rates by six percent of the difference between their intrastate and interstate access rates. This reduction will be completed over a period of three years.
Ohio	Yes	Case No. 10-2387-TP-COI	The intrastate access rates of mid-sized and small ILECs have been frozen at their 1997 levels. This commission ordered investigation would reduce the intrastate access charges for the carriers to their interstate levels.
Tennessee	Yes	House Bill 574	Any entity providing switched access service is prohibited from charging intrastate access charges that exceed the interstate switched access charges. There are several ways providers can choose to progress to this outcome, but intrastate rates cannot exceed interstate rates by April 1, 2016.
Virginia	Yes	Case No. PUC-2003-00091	Verizon was ordered to reduce intrastate access charges by August 1, 2005 and again on February 1, 2006.
West Virginia	Yes	Case No. 06-1935-T-PC and 05-0040-T-PC	Each of these cases mandated West Virginia's largest and second largest ILECs to reduce their traffic sensitive intrastate switched access rates to the same level as the interstate switched access rates.

Illinois, Tennessee, and West Virginia have followed Indiana's lead with recently passed legislation requiring their providers to set intrastate rates to mirror interstate rates. In December 2010 Illinois passed PUA Section 13-900.2, requiring each telecommunications carrier providing Illinois switched access service to reduce their rates to mirror their interstate rates by July 1, 2012.

West Virginia has also set legislation in motion, but it is not as uniform as Indiana and Illinois. Traffic-sensitive intrastate switched access rates in West Virginia are being lowered to the interstate level for most of the state as a result of several WV Public Service Commission orders. This is being phased in over different periods of time depending on whether the carrier is an ILEC or a CLEC.

In April 2011, Tennessee House Bill No. 574 amended Senate Bill No. 598 concerning intrastate access rates. Any entity providing switched access service is prohibited from charging intrastate access charges that exceed the interstate switched access charges. There are several ways providers can choose to progress to this outcome, but intrastate rates cannot exceed interstate rates by April 1, 2016.

Ohio, Missouri, and Virginia have also instituted measures to reduce intrastate access charges. Of these three states Ohio is the closest to the broad reforms of Indiana, Illinois, Tennessee, and West Virginia. Currently, Ohio's large incumbent local carriers, AT&T and Frontier, as well as all of the competitive local exchange carriers, set their intrastate access charges to mirror their interstate access charges. There is also a current Public Utilities Commission order to investigate whether the remaining carriers should reduce their rates as well. Missouri does not require that intrastate and interstate access rates be equal, but in 2010 the state passed legislation which will lead to the reduction of intrastate rates. House Bill 1750 requires the large ILEC's to reduce their rates annually by six percent of the difference between a company's intrastate access rates and its interstate access rates. This reduction will be completed over a three-year period, beginning March 1, 2011. Virginia has not taken such broad measures as the previously mentioned surrounding states but has targeted specific providers. The Virginia State Corporation Commission ordered Verizon, Virginia's largest telephone company, to reduce its intrastate access charges on August 1, 2005 and again on February 1, 2006.

Because intrastate access charges have remained under the control of state regulatory commissions, reform has occurred more slowly and unevenly.

Underlying Economic Principles

The prices that result from a competitive market process are socially beneficial for the following reason. Competition among sellers leads to prices that reflect the economic costs of supplying a product. Seeing such prices, consumers will choose to purchase products which they value more than the cost of producing and will choose not to purchase products which they value less than the cost of producing. Producers will similarly be induced to supply products where consumers' valuations exceed costs, but will not supply products where the price consumers pay does not cover production costs. Such an outcome is deemed economically efficient.

Federal telecommunications policy has economic efficiency as a primary goal. In the Telecommunications Act of 1996, Congress directed the FCC and the states to eliminate implicit subsidies for universal service contained in access charges and make support for universal service explicit instead.[11] The FCC has explicitly stated that it seeks "an approach to intercarrier compensation that will encourage efficient use of, and investment in, telecommunications networks, and the efficient development of competition."[12] The FCC's pursuit of economic efficiency has led to interstate access charges that vary very little across local exchange carriers and largely reflect the economic cost of providing origination and termination services.

Because intrastate access charges have remained under the control of state regulatory commissions, reform has occurred more slowly and unevenly. In Kentucky, as in some other states, intrastate access charges for some ILEC's and CLEC's are set at levels considerably higher than the economic cost of providing origination and termination services to IXC's. These above-cost access charges distort the economic decisions of consumers of telecommunication services and of

other telecommunications providers. As such, the system of intrastate access charges that currently exists in Kentucky is out of step with national telecommunication goals and policy. In 2009 the FCC, directed by Congress, developed the National Broadband Plan (NBP). This plan outlines a course of action toward universal broadband service reaching every American. The NBP explicitly addresses intercarrier compensation (ICC), stating that ICC has not been reformed to accommodate changes in technology and consumer behavior.[13] The plan elaborates on several specific economic disincentives, ultimately concluding that "the current ICC system is not sustainable in an all-broadband Internet Protocol world."[14]

This section provides an overview of the underlying economic principles behind the access rate system. We pay particular attention to how these principles have changed as a result of technological innovation since the access rate system was designed in 1984.

Higher Costs for Consumers. Currently in Kentucky, intrastate access charges exceed the costs to provide access service for many local exchange carriers. These excessive charges generate positive profits for the access provider, the local telephone company. However, the excessive charges raise the costs of inter-exchange carriers providing long-distance service who have to pay these access fees. The IXC's have to include these charges in the prices they charge consumers for intrastate long-distance service. Consequently, consumers end up paying higher prices for intrastate long-distance calls—prices that do not reflect economic costs. As a result, consumers are inefficiently induced to substitute away from landline-to-landline calls handled by an IXC, and end up using other calling options such as wireless or VoIP instead.

Artificially high access charges reduce competition in the intrastate long-distance market.

If intrastate access charges were reduced to a level that reflected economic costs, intrastate long-distance prices would fall. There is considerable competition among IXC's to provide intrastate long-distance service, and IXC's also compete with wireless providers for many intrastate calls. Competition among firms leads to prices that reflect costs. A reduction in input costs will lead to lower prices being charged by IXC's for intrastate long-distance service. In other words, a reduction in access charges would lead to a reduction in consumers' intrastate long-distance rates. Such a reduction occurred for interstate long-distance calls after the FCC reduced interstate access charges in the 1990s.

Consumers will also benefit indirectly as a result of reductions in intrastate long-distance costs incurred by businesses. When businesses have to pay more for long-distance calls, they pass these higher costs on to consumers by charging higher prices for the products they sell. The amount of the reduction in price by any particular business would depend on how important long-distance communication is in its total cost of production. For example, a large automotive plant in Kentucky often calls its suppliers in the state to coordinate deliveries and other logistical issues that are crucial to the success of the automotive plant. As the price of a long-distance call rises, the plant may call its suppliers less often and suffer production delays and other negative consequences. In an extreme case, they may consider relocating just outside Kentucky in a neighboring state in order to reduce their long-distance telephone costs.

Thus, a reduction in access charges would lead to lower prices for intrastate long-distance services, as well as potentially lower prices for other goods whose input prices include intrastate long-distance calls.

Reduced Competition. Artificially high access charges reduce competition in the intrastate long-distance market. Currently, wireless phone operators generally have lower intrastate access charges than wireline phone operators. In fact, most wireless phone calls in Kentucky would be considered "local" calls because they are made within the same Major Trading Area (MTA), which is the local service area for wireless calls.[15] The substantial disparities in access rates paid by wireline versus wireless carriers create a competitive advantage for wireless long-distance services.

Because wireless companies have lower access charges, they are able to offer substantially lower prices for intrastate long-distance calls. If the cost

that an ILEC or CLEC incurs in providing local exchange access for wireless were lower than for wireline long-distance providers, then this outcome would be efficient. But charging higher access charges for the same access functionality puts the wireline long-distance carriers at a competitive disadvantage for no reason related to relative efficiency or value of service provided. When some companies are favored vis-à-vis other companies by regulatory rules that are unrelated to underlying costs of doing business, the result is economically inefficient. In this case, the inefficiency means that wireline long-distance carriers are less competitive than wireless long-distance carriers due to the higher access fees paid by wireline carriers.

Consequently, people make fewer wireline long-distance calls due to the artificially high access rates, resulting in a "deadweight" or inefficiency loss. The amount of the deadweight loss is the value to consumers from the wireline long-distance calls they would have preferred to make on their wireline network, but that were made in another way or not at all due to the excessive access charges. There is suggestive evidence to support that this may be occurring in Kentucky, discussed earlier in this article. The number of wireline phone lines in Kentucky has decreased by 21.5% while the number of wireless subscriptions has increased by 11% from the end of 2007 to June 2010.

Another economic concern is that the current access charge system leads to inefficient investment in the present and the future. Specifically, it leads to over-investment in landline technologies and under-investment in broadband and wireless technologies.

Inefficient Investment. Another economic concern is that the current access charge system leads to inefficient investment in the present and the future. Specifically, it leads to over-investment in landline technologies and under-investment in broadband and wireless technologies. AT&T argues that, over time, such inefficient investment will put the state of Kentucky at a competitive disadvantage for economic development relative to other states with more efficient access charges.[16] At the national level, several companies have made similar claims to the FCC that artificially high access charges discourage the adoption of broadband technology.[17]

For example, the current access charge scheme provides the perverse incentive for local carriers to continue to invest in low-quality timed-division multiplexing (TDM) networks that are ill-equipped for handling broadband-based traffic rather than investing in networks than are equally adept at voice and broadband traffic. In an extreme example, one provider is forced to convert its broadband-based voice traffic into lower-quality "traditional" voice traffic so that a local carrier can collect access charges.[18]

The greatest concern about infrastructure investment comes from smaller companies, often based in rural areas. These companies argue that, in fact, a reduction in access charges would reduce rather than increase broadband development. However, Beard and Ford (2008) develop a simple economic model showing that reduced charges would actually lead to greater broadband deployment rather than lower deployment.[19] They also note that some of the equipment used for handling broadband traffic does not rely on large economies of scale, so that small, rural systems would not suffer a large cost disadvantage due to the small number of customers using the service. Furthermore, Aron and Ingraham (2011) have documented a positive relationship between the price of local telephone service and broadband adoption even after accounting for broadband availability.[20] In other words, people with low prices for local telephone service are less likely to have broadband than otherwise similar individuals with higher prices for local telephone service.

Because the current system provides local carriers with access fees often well in excess of costs, local carriers have reduced incentive to provide broadband access that could potentially compete with its local wireline service, thereby decreasing revenues from these access fees. AT&T argues that the current access charge system provides incentives for "carriers to cling to the traditional voice model, discouraging broadband adoption."[21] Free Press, a consumer advocacy group, states that the current access charge system produces a "strong incentive for rural carriers to delay the full transition to the broadband world."[22]

Arbitrage Opportunities. An additional economic inefficiency of the current access charge

system is that it creates arbitrage opportunities by charging different prices for essentially the same product. Because local access providers receive access charges significantly above their costs, they have an incentive to increase the volume of intrastate long-distance calls. It would be very lucrative for local access providers to identify or even create businesses within their service areas that receive large numbers of intrastate long-distance calls. The local access provider would make a profit by generating these calls. A fictitious example would be for an access provider to set up a UK basketball chat line. The access provider might give the chat line an extremely low, if not zero, price for local service. In addition, the access provider could even pay the chat line a fee or share of the access margin to make the chat line its customer. Sometimes arbitrage-based businesses like the hypothetical chat line are referred to as "call-pumping" schemes because they use arbitrage opportunities like that created by the access fee differential to create business.

An additional perverse economic effect of the differences in interstate and intrastate access charges is that they create incentives for access providers to misclassify calls as intrastate even if they may actually be interstate or local. Similarly, long-distance carriers have incentives to misclassify calls as interstate rather than intrastate. As a consequence, scarce resources must be devoted to the process of identifying and classifying wireline calls. Mechanisms must be established for identifying whether wireline traffic is intrastate or interstate. Phone call data must be reviewed to ensure that calls are not intentionally or accidentally misclassified. Disputes over phone call classifications must be resolved.[23]

The bottom line is that arbitrage opportunities resulting from differential intrastate and interstate access charges result in wasteful spending of public and private resources that could be avoided.

Conclusions

Kentucky is one of several states where intrastate long-distance access charges in many cases are substantially higher than interstate long-distance access charges even though the two services provided are identical. A number of states have taken steps to bring these two access charges closer to parity. In fact, all of Kentucky's neighboring states require at least some companies to lower their intrastate access charges to match their interstate access charges. Many states such as Indiana require similar rates for all ILECs. In April 2011, Tennessee enacted legislation requiring parity in rates by 2016.

There are economically sound reasons why two products with similar functionality and similar costs—intrastate and interstate long-distance connection services to local exchanges—should have similar prices. Higher access charges lead to higher prices for intrastate long-distance services, as well as higher prices for other goods whose production processes require intrastate long-distance communication. Inefficiently high access charges reduce competition in the intrastate long-distance market.

Another economic concern is that the current access charge system leads to suboptimal investment in the present and the future. A final economic inefficiency of the current access charge system is that it creates arbitrage opportunities by charging different prices for essentially the same product, resulting in wasteful spending that could be avoided.

Furthermore, a proactive effort to reform access charges in Kentucky would allow for a collaborative development process that includes all stakeholders in the existing system, allowing rural local exchange carriers a significant ability to assist in the crafting of new regulation that benefits all parties. The implicit subsidy system is not sustainable, because implicit subsidies are not the price signals the market needs and result in the erosion of long distance usage, thereby further reducing the implicit subsidies themselves upon which rural LECs depend. In addition, the shift in technology to other methods of communication such as wireless voice service, VoIP, and various forms of e-communication continues to move consumers away from a non-access charge mechanism, a fact noted by the FCC in the National Broadband Plan.[24]

---

[1]Order, *In the Matter of the Tariff Filing of BellSouth Telecommunications, Inc. to Mirror Interstate Access Rates*, before the Kentucky Public Service Commission, Case No. 98-065, (March 31, 1999); Order, *In the Matter of: Application of BellSouth Telecommunications, Inc., d/b/a South Central Bell Telephone to Modify Its Method of Regulation*, before the Kentucky Public Service Commission, Case No. 94-121 (August 2, 1999).

[2]Order on Remand and Report and Order and Further Notice of Proposed Rulemaking, In the Matter of High-Cost Universal

Service Support and Federal-State Joint Board on Universal Service et al., before the Federal Communications Commission, FCC 08-262, (released November 5, 2008), (hereafter FCC 08-262).

[3]Sixth Report and Order in CC Docket Nos. 96-262 and 94-1; Report and Order in CC Docket No. 99-249; Eleventh Report and Order in CC Docket No. 96-45; commonly referred to as CALLS (Coalition for Affordable Local and Long Distance Service) Order; Federal Communications Commission, May 31, 2000.

[4]*An Investigation into the Intrastate Switched Access Rates of All Kentucky Incumbent and Competitive Local Exchange Carriers*, before the Kentucky Public Service Commission, Case No. 2010-00398.

[5]Incumbent Local Exchange Carriers are the companies (or their successor companies) originally franchised by the Kentucky Public Service Commission as the sole provider of local telephone service within a specific geographic area. After the industry was deregulated by Telecommunications Act of 1996, several companies may offer service in a single area. New companies that have entered the market are called Competitive Local Exchange Carriers. See Kentucky Public Service Commission, "Incumbent Local Exchange Carriers," August 27, 2007.

[6]Although not reported here, we see similar variation in the intrastate long-distance access charges of Kentucky's competitive local exchange carriers (CLEC's).

[7]Federal Communications Commission. September 2010. *Trends in Telephone Service*. Industry Analysis and Technology Division Wireline Competition Bureau.

[8]Federal Communications Commission. March 2011. *Local Telephone Competition: Status as of June 30, 2010*. Industry Analysis and Technology Division Wireline Competition Bureau.

[9]Ibid.

[10]Ibid.

[11]Federal Communications Commission. September 2010. *Trends in Telephone Service*. Industry Analysis and Technology Division Wireline Competition Bureau, p. 14.

[12]Federal Communications Commission, Notice of Proposed Rulemaking, April 2001, p. 3.

[13]Federal Communications Commission. March 2010. Connecting America: *The National Broadband Plan*. p. 142. Hereafter "National Broadband Plan"

[14]National Broadband Plan, p. 142.

[15]See http://wireless.fcc.gov/auctions/data/maps/mta.pdf for a map of MTAs in the U.S. As mentioned previously, Kentucky has four MTAs, but most of the state's population is covered in a single MTA (number 26 in the map).

[16]AT&T 2010.

[17]National Broadband Plan.

[18]National Broadband Plan, page 142.

[19]T. Randolph Beard and George S. Ford, "Do High Call Termination Rates Deter Broadband Deployment?" Phoenix Center Policy Bulletin No. 22, October 2008. Hereafter, "Phoenix Center Bulletin, 2008."

[20]Debra J. Aron and Allan Ingraham, "The Effects of Legacy Pricing Regulation on Adoption of Broadband Service in the United States," Industrial Organization: Regulation Antitrust, and Privatization eJournal, Volume 3, Number 75, May 10, 2011.

[21]Letter from Brian Benison, AT&T, to Marelene H. Dortch, Secretary, FCC, CC Docket Nos. 01-92 and 96-45,
WC Docket Nos. 05-337, 99-68, 07-135 (Aug. 5, 2008), Attachment at 2, as quoted in Phoenix Center Bulletin 2008.

[22]Letter from Ben Scott, Free Press, to Marlene H. Dortch, Secretary, FCC, CC Docket Nos. 96-45 and 01-92,
WC Docket Nos. 05-337 and 06-122 (Oct. 13, 2008), at 2, 5, as quoted in Phoenix Center Bulletin 2008.

[23]See, for example, "Complaint of Sprint Communications Company LP against Brandenburg Telephone Company and Request for Expedited Relief," before the Kentucky Public Service Commission, Case No. 2008-00135.

[24]National Broadband Plan.

Collective Genius:

Innovation, Entrepreneurship, & Commercialization

H. Dan O'Hair

The role that universities play in economic development has received substantial attention in recent years. In 2009 the White House Office of Science and Technology Policy issued a Request for Information asking for input into the issues of university commercialization, the valley-of-death, innovation and entrepreneurship, and proof of concept centers. This chapter is an analysis of those responses. While the responses were varied and eclectic, one theme was conspicuous and ubiquitous – America's research universities are squandering resources, talent, and economic opportunities by the inability to transform research into meaningful products and services. The chapter concludes with five recommendations that seek to invigorate the innovation and entrepreneurship processes at universities.

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 of course favorable timing. In the churning world of small business, however, firms come and go as quickly as the Greek God of opportunity, Kairos, whose ephemeral presence offers a fleeting chance of success to those prepared to grasp it. There are many obstacles thinning the ranks of would-be entrepreneurs, but self-imposed unrealized potential—a business that never gets started because the would-be entrepreneur did not act on his or her idea—is the most insidious. While research confirms what common sense suggests, that the intellectual prowess found at the nation's universities has tremendous innovation and commercialization potential,[1] there is also a strong sense that much of this potential goes unrealized. What Thomas Edison famously said decades ago is equally true today, "the value of an idea lies in the using of it."

The role that universities play in economic development has received substantial attention in recent years. As government budgets tighten, policymakers, as well as taxpayers, increasingly expect a positive return on investment from scarce public resources. Serious concerns have been raised about the ability or willingness of American research universities to push their research findings out into the marketplace. According to Gary Locke, the former U.S. Department of Commerce Secretary, "America has a broken innovation ecosystem that does not efficiently create the right incentives or allocate enough resources to generate new ideas, develop those ideas with focused research, and turn them into businesses that can create good jobs. . . . America simply does not have an efficient system to take new ideas from government, academic, and private sector research labs and translate them into commercially viable products and businesses."[2]

National Innovation Strategy

In September 2009, President Obama released his national innovation strategy; at the center of this initiative were two closely related goals—sustaining economic growth and creating quality jobs. Intrinsic to this strategy is capitalizing on basic research at U.S. research universities and the ensuing commercialization of research discoveries. Unfortunately, the commercialization of university research is a persistent challenge—often referred to as "the valley of death." By their very nature, university researchers are most talented in seeking answers to questions that are not necessarily practical or suitable for the end-user. This "valley" that separates viable research discoveries from reaching consumers, patients, and businesses costs the U.S. economy billions of dollars in unrealized economic valuation.

To better understand this process, the National Economic Council and the Office of Science and Technology Policy issued a Request for Information (RFI) entitled "Commercialization of University

Research." Ultimately, the goal is to increase the economic impact of Federal investment in university R&D and the innovations being fostered in Federal and private proof of concept centers (POCCs) by facilitating more productive partnerships with all stakeholders—universities, companies, Federal research labs, entrepreneurs, investors, and non-profits.[3]

The RFI was constructed to gather ideas for promoting the commercialization of federally funded research. The first section of the RFI focused on soliciting best practices for the commercialization of university research. The second section of the RFI turned its attention to proof of concept centers and their ability to stimulate the commercialization of early-stage technologies by bridging the "valley of death." Information obtained from responses to the RFI is expected to be used by the National Economic Council and the Office of Science and Technology Policy to shape the Administration's future policy on the commercialization of federally funded research.

Method

A total of 205 individuals and organizations representing consortia, foundations, non-profits, proof of concept centers, private companies, and universities responded to the RFI in 2010. Responses to the RFI were placed on the U.S. Economic Development Administration's website in a location entitled "Commercialization of University Research Request for Information."[4] The 205 responses were grouped into the following categorizations by the EDA: Alliances (2); Associations (3); Consortium (3); Foundations (2); Government (6); Private Individuals (21); Institutions (3); Non-profits (20); National Science Foundation Engineering Research Centers (5); National Science Foundation Industry/University Cooperative Research Centers (2); Proof of Concept Centers (10); Private Companies (30); and Universities (98).

The author compiled a large database that included direct excerpts from most respondents. Some responses were quite biased—rants—and deemed unusable. Verbatim excerpts were taken from the responses and placed in a matrix that identified the author and the author's company or institution.[5] Excerpts were identified and selected primarily through a focused set of criteria intended to capture (a) the essence of the response; (b) uniqueness from other responses; (c) emphasis on entrepreneurship and innovation; and (d) clear recommendations for furthering economic development. The data were cleaned for obvious errors and formatted in a consistent manner. The author re-read through the resulting data base (matrix) and identified additional errors not related to content. In all phases of the transcription process, verbatim original language was retained unless the language was incomprehensible.

In order to reduce the large data set to a manageable level that allowed more sophisticated analysis, a proven qualitative analysis technique known as constant comparative analysis was employed with these data. Constant comparative analysis, based on grounded theory, argues for the inductive discovery of knowledge through the systematic analysis of the data. This approach stresses consistency, reproducibility, and generalizability, and is helpful for generating key concepts for large collections of data such as those found here. The reasons for using this approach are twofold: first, existing research in the areas of interest is controversial and therefore substantial research must be conducted before any hypothesis or conclusions are constructed; and second, the very nature of the phenomenon is often proprietary, consequently limiting access to the population and reducing the methodologies available for research.

Consistent with Glaser and Strauss' formulation of the constant comparative method process, four steps were taken in this analysis. First, key ideas were marked with a series of codes extracted from the text. Second, extracted codes were grouped into similar concepts. Third, concept categories (and labels) were formed from these concepts. These categories later became the basis for the creation of the recommendations. Fourth, continuous iterative coding was employed to reduce categories and refine elements within them. The experience of processing the data showed that constant comparative analysis is particularly useful for the examination of large corpora of data, such as the rich data produced by responses to the RFI.

Initially, 112 independent themes evolved from the analysis.[6] The data appearing in the categories are almost entirely verbatim comments from the responses. Only minor stylistic and grammatical editing was applied to the comments. The reader will notice some level of redundancy and duplication as

well as fragmentation and awkward phrasing due to maintaining the integrity of the verbatim responses. From those themes, 12 critical issues emerged that summarized the respondent data more succinctly. The following section presents those critical issues with implications drawn from data.

Critical Issues

While the responses were varied and eclectic, one theme was conspicuous and ubiquitous—America's research universities are squandering resources, talent, and economic opportunities by succumbing to the "valley of death," or the inability to transform research into meaningful products and services. Alternative points of view were expressed and sharp lines of argument were evident in a majority of responses. One clear message was consistent among most—few regard the status quo as desirable. Most agree that the valley of death is alive and well, but not all sing with harmonizing chords. Some approaches lay the responsibility at the feet of the federal government with strong calls for additional funding of research programs targeted for universities and research laboratories. Others feel it is the local communities that should take greater interests in the research findings of universities and develop stronger partnerships that could bridge the valley. Still others support ideas that it is angel and venture capital (VC) investors who should step up to the plate and enrich university research with more early-stage funding as a way of incentivizing commercialized research. Many others lay the blame directly on universities and an archaic research culture.

From the conceptual standpoint, universities will have to show their capacity to cope with unpredictability, and, their ability to respond swiftly. In the past universities have changed, but they have done so gradually.[7]

A 5-stage, iterative process was employed for summarizing comments into a manageable set of common themes. The final analysis resulted in twelve categories to portray the data: Challenges, Collaboration, Communication, Ecosystem, Education, Entrepreneurship, Funding, Leadership, Interdisciplinary, Proof of Concept, Risk, and Strategy. Each is described in more detail below.

Challenges: Challenges is one of the broadest categories and serves as a useful gathering place for comments that tended toward the shortcomings in the system and culture and the pessimistic viewpoint on university research commercialization. One respondent cited a study by the Association of University Technology Managers (AUTM) that more than 20,000 new ideas for product and service innovations are generated from federally-funded research each year, but only "25% of these ideas are licensed by companies for commercial development. 75% of new ideas perish at this stage."[8] That number drops to 10% of ideas actually being commercialized depending on whom you cite.[9] Respondents point to the culture and system in place that reinforces the valley of death. Research faculty do not perceive the incentive for them to remove their fundamental research hats and replace them with translational hats that move innovations into commercialization. Lack of incentives and reward structures are cited as barriers to changing the culture, as is the absence of a potent and visible infrastructure than stands as a tower of support as one ventures into areas undefined and risky.

One issue that is inescapable is the near consensus that the valley of death looms as a substantial impediment to economic growth, especially of new start-up businesses. Three caveats should be considered when stating such claims. First, not all university research is suitable for translational missions or commercialization. A great deal of basic research at universities does a good job supporting applied research efforts. Second, not all commercialized inventions from research are successful in the marketplace. They were weak ideas to start with and no level of entrepreneurship is going to produce a silk purse from a sow's ear. Third, moving a university culture from one where basic research whose products found in refereed journal articles are considered the gold standard will resist change with strong will. New metrics for assessing research that brings into view commercialized ventures as worthy pieces of the academic portfolio is an obvious means of promoting innovation and entrepreneurship. This type of culture change will require both top-down and lateral support.

Collaboration: There was no shortage of opinions surrounding the need for better collaboration among the various stakeholders in the broader realm of research commercialization.

Respondents suggested forums that would bring researchers and entrepreneurs together to share ideas and develop joint strategies. It was clear that many felt the need for university members to more frequently and extensively engage with private industry. In multiple instances, respondents recommended engaging with end users of the products or services that were being innovated. The idea was to get their thoughts on what the market would bear and modify upstream research accordingly. Universities should seek out faculty that are skilled at networking and relationship building and partner with them as university connections are made in local communities. In general, universities were encouraged to be much more active in local business communities. Since "place" matters, it is important to leverage local opportunities and assets that produce mutual benefits. One way of greater industry collaboration could come through advanced communications and virtual technologies. Open Collaboration Research Labs were suggested as venues for collaboration and one respondent thought that universities should pursue agreements with companies that foster "Open Innovation" programs. Virtual Incubators were suggested where universities can offer temporary office facilities, assistance with market research, strategy development, business plan development, and access to research support (such as Georgia Institute of Technology). A frequent recommendation was greater use of student engagement, especially with local business communities.

The smart course of action is to view them (universities) as being within the sphere of new opportunities, rather than to position themselves reactively against them. An example of this is the requirement on universities to participate in regional development. Against this backdrop it is vital to create effective strategic alliances between universities, governments and industry.[10]

There is an obvious need for boundary spanners within university ranks to connect inventors and industry. Universities have a unique opportunity to take leadership in this boundary spanning role for two reasons: (1) university members (faculty, staff and students) are generally well respected in their local communities. Community members appreciate efforts that demonstrate a connected relationship between town and gown. Leveraging this respect and transforming it into trusting relationships may be more easily facilitated by university members who reach out to the larger community; and (2) most students and many faculty members find intrinsic value in translating and applying their research in the real world. However, it is the researchers and students who can make the research understandable and meaningful, not community members. Collaborative activities involving the community are time-expensive and the net value is often questioned in the halls of academic buildings. Nevertheless, the investment made by university boundary spanners in these collaborative efforts can pay important dividends when innovation, entrepreneurship, and commercialization of research become priorities in a university context.

What do all promising practices and successful models of technology transfer have in common? High-bandwidth feedback loops between the university and industry, promoted by fast, easy negotiations with technology transfer offices over intellectual property rights.[11]

Communication: While communication is also a broad category, the concerns and recommendations for more frequent and enhanced processes of communication were numerous throughout respondents' comments. Several individuals called for better messaging that told the "innovation story" to key audiences such as policy makers, students, faculty, potential partners, and the American public. While face-to-face communication was deemed critical to partners and collaboration, similar to comments grouped in the "collaboration" category, respondents suggested technology as a means of communicating with distant but compatible audiences. Two other communication issues emerged from several respondents: Presentation skills and team science. Regardless of the context, respondents seemed to suggest a low tolerance for presentational abilities of those pitching ideas to angel investors or floating inventions in proof of concept meetings. Clear, concise, relevant, brief and audience-centered messages are expected in all contexts. The second

area of team science or group communication stood out as a critical issue as well. On several occasions, respondents mentioned the lack of skills in team problem solving and in team management contexts.

Multiple levels of communication worthy of attention were identified in the analysis. At the individual level, enhancing listening skills and more concise communication styles need to be developed among those members of the entrepreneurial team who will be interacting with the business sector. Second, innovation success seems highly dependent on emphasizing the team-building nature of entrepreneurial groups and insisting on group communication principles seems essential. Team leaders must be ever vigilant in promoting and modeling strong communication skills. Third, a communication campaign should be developed that promotes the innovation and entrepreneurship goals and plans of the university. Key audiences should be identified, messages targeted, and channels selected for carrying the messages that promote university research in all of the most appropriate contexts.

A university forms an ideal nexus for innovation ecosystems: with its faculty and students generating groundbreaking ideas, its teaching mission, strong brand and links with alumni, commitment to the local community, and ability to serve as a neutral convener of partnerships with industry.[12]

Ecosystem: One respondent commented, "Public-Private partnerships that connect universities, national laboratories, and industry are a key strategy. Those partnerships should recognize 'the power of place' or location and involve regions and local government. Transformational change leading to an environment for disruptive innovations with commercial potential and leadership in the 21st century world economy requires a connected and layered ecosystem."[13] The fact that innovation ecosystems were mentioned a number of times is likely a result of the RFI making specific reference to this idea. Nevertheless, the notion that universities have the opportunity to serve a pivotal role in nurturing and energizing ecosystems is an outstanding opportunity for academic and economic advancement. It is essential to point out, however, that playing a willing but passive partner in the supposed ecosystem is unlikely to instigate and sustain the type of activities and synergy necessary for making ecosystems vibrant and strong.

Some regions and cities are more naturally inclined toward developing earnest partnerships with likeminded individuals and institutions such as universities. Others are not. Perceptions of territoriality, comforts of silos, and threats from unpredictable realities stand as formidable challenges to partnership development—the essential building block to ecosystem development. Most theories of system success highlight trust among members as critical to system development. Sustained and genuine communication lays a foundation for reducing the uncertainties that then serve as trust-building strategies. When members feel unencumbered from the tethers of closed networks and silos, they are able to reach out to fellow innovators with openness and collaboration that defines innovation ecosystems.

Education: One respondent remarked "students are our secret weapon," and in spite of the RFI's focused inquiry on research commercialization and proof of concept a number of individuals highlighted the role of education in their activities and plans. The Kauffman Center, whose mission is to marry entrepreneurship and education, was aggressive in promoting the value of higher education in the innovation enterprise (and many respondents were complimentary of the Kauffman Center's accomplishments). A number of ideas were expressed for new entrepreneurship courses and programs across America's universities. Many of these ideas urged an interdisciplinary approach to entrepreneurship, expanding current program beyond business and engineering schools. Business Plan Competitions were mentioned frequently as

At a policy level, this implies strongly that if we would like to see research commercialized, we should be developing educational programs to prepare our academics and disciplinary experts to be an effective part of the innovation process. This does not mean turning them into entrepreneurs, necessarily. But it does mean teaching creativity and design thinking; business and finance; intellectual property basics; identification of opportunities and needs; and skill in communicating ideas to a general audience.[14]

a means for getting students and faculty engaged in entrepreneurial activity. Some programs open their competitions for university-wide participation; others have even invited other campuses to compete. A somewhat popular strategy is enlisting the support and talent of an "entrepreneur-in-resident" (EiR) as part of the educational mission. A common template for this role is to recruit someone locally who has been successful as an entrepreneur, and who shares the belief that education is a critical component of entrepreneurial thinking and innovation networks. Some universities compensate EiRs either on a full- or part-time basis. In other instances, EiRs provide their services as a contribution to the university. Attention was also directed to the need for culture change among universities as an essential strategy to affect long-term involvement in entrepreneurship and research commercialization. Faculty are less likely to invest and own such programs unless the inventive structure is modified to accommodate such programs. Culture change would necessarily include revising performance metrics and reward systems. Interest was also expressed in seeing a new avenue of university-based research on entrepreneurial processes and innovative practices. Additionally, reaching out to high school students was mentioned as an important strategy.

The biggest obstacle to "becoming entrepreneurs" is the courage to try and possibly fail. People that gravitate towards University careers seldom have this essential quality but instead are too attached to their tenure to be risk takers.[17]

A key take away from the analysis is the importance of nurturing entrepreneurial thinking at universities. As respondents noted, universities are well positioned to serve as the nexus for innovation ecosystems in their home communities and regions. Universities have a natural proclivity for encouraging creative academic thought on their campuses; they have demonstrated less proficiency in transforming creativity into useful and practical innovations. As mentioned elsewhere in this report, universities are on the threshold of transformative change and new approaches of academic enterprise will become more evident. Building into the curriculum and research agenda innovative thinking and entrepreneurial practices is a suggested means of creating value for students, faculty and other stakeholders of the university. Entrepreneurs-in-residence seemed to be a preferred strategy for transitioning programs into a model of commercialization. One respondent suggested that instituting a Federally-funded mechanism for Entrepreneur in Residence (EiR) programs could be advantageous since EiRs could serve two roles for universities. First, they could proactively "scout" for innovations "that could be the basis for creating a new venture, and second, they act as educators for faculty, students, and staff on real-world issues associated with entrepreneurship."[15] As mentioned above, numerous respondents urged universities to develop programs that encourage multidisciplinary collaboration between faculty and students in different disciplines. Such programs require a fairly intensive time commitment and incentive structure are likely to vary across disciplines necessitating creative approaches to joint, collaborative work.

Perhaps Kauffman Foundation stated it best in their response, "Two principles are paramount for stimulating universities in this sphere. The first is that the faculty members are the key agents. In addition to leading research projects, they teach and influence students, chair departments and programs, and tend to be active in both university and civic affairs. . . . The other principle for stimulating entrepreneurship at universities is that there is no single model for success. What works best may depend on a university's research strengths, the nature of the related industries, the related industries, the nature of the region (big city, rural, etc.), and other variables. The only common thread is the need for a well-developed ecosystem of innovation."[16]

Entrepreneurship: Because the RFI requested comments on various aspects of entrepreneurship, it is understandable that most respondents were forthcoming with suggestions and recommendations. Several offered guidance on the essential characteristics of entrepreneurship such as systems thinking, leadership, communication, collaboration, marketing, and learning. Still others compared and contrasted human and capital assets as essential to the process. One respondent in particular was adamant for where emphasis should be placed. "My essential message is that a constant emphasis on access to substantial pools of risk capital in order to make technologies successfully commercialized is an ongoing mistake and extraordinary waste of

time, intellectual capital, money and opportunity itself. The essential ingredient in successful new companies is the entrepreneur, the person with the vision, risk tolerance and ability to aggregate the variety of resources necessary for a new company and the ability to steer them into an acceptable market."[18] For the most part, respondents were laudatory about the effects that an entrepreneurship program could provide for universities including the skills that students (and faculty) can develop, the effects on the local community, and the positive implications entrepreneurship can have on the commercialization of university research.

Most respondents supported the call for a more active entrepreneurial posture on American university campuses. Several examples of role models and best practices were mentioned including the more obvious ones that reside at MIT, UC-San Diego, Utah, and the dozen or so "Kauffman Campuses." Consistent throughout this theme were the tangible and intangible benefits from the presence of entrepreneurial thinking. Universities were profiled as the logical choice for nurturing entrepreneurship and innovative practices—they inherently cultivate a culture of creativity and risk-seeking. Why not enlarge that culture to one that finds value in transforming ideas into products and services, and technologies that benefit the marketplace? In essence, entrepreneurship becomes the lynchpin for connecting disparate forces that could bridge the valley of death, while at the same time benefitting students, faculty, and local communities.

The most powerful tool the federal government has to influence universities behavior is the overhead rate. The people that need to be influenced are not the presidents; it is the chief academic officers who have titles like provost and senior vice president. You will never win a chief academic officer's heart. The only solution is to buy their soul. And you do this by giving a 10% overhead incentive to support successful commercialization (and you only give it for demonstrated success, not promises). Buying the soul of chief academic officers is actually much cheaper than starting programs.[19]

Funding: Funding constituted a broad, catch-all category that gathered in topics related to overhead rates, federal grant and contract programs, and economic incentives associated with licensing arrangements, disclosure procedures, and patenting processes. Respondents held contrasting opinions on many of the topics. Most viewpoints were favorable toward the Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs and recommended increased funding in these areas. Not all respondents were in agreement for how the various phases were structured or funded however. The Industry/University Cooperative Research Centers program drew praise but again not everyone expressed satisfaction with the level of funding or how awards were determined. A number of suggestions were made for how product licensure could be enhanced with sides clearly drawn between private investment and university interests. Enhanced tax credits, federal and local, were common among respondents as well. With a retrenched federal budget extending for ten years to accommodate debt ceilings, it is unlikely that the fresh, new sources of funding are going to reach universities with the same flow pattern as before. That is not to say that intense lobbying and persuasion should not be directed toward our elected officials to "invest" in innovation and entrepreneurship, especially if the program can demonstrate tangible returns on the investment.

In general, support was strong for increased funding levels for federal programs that directly or indirectly support university research. Such a level of agreement should be expected given the nature of the RFI and the respondents that chose to comment. Less agreement was noted for how universities license their innovations, nor for the types of incentives provided for commercialization. In an era of reduced federal spending overall, and with state-sponsored programs experiencing rather large reductions, it is unlikely to expect much help from government-sponsored programs. Universities may find their best source of funding for entrepreneurship and commercialization programs from the private sector, and many respondents argued for this course of action. Developing partnerships with local communities and equity stakeholders seems like a promising venture that could benefit all sides of the partnership. Unfortunately, university research presents so much risk for most investors that it has been either the universities themselves that underwrite the

research or outside agencies, primarily the federal government, that support research activities. Funds need to be prioritized and sequestered that supply "gap funding" to worthy projects as the valley of death is crossed. These funds add value to research by "making money available to do further research, proof of concept, or due diligence."[20] Improving the overhead rate on basic research and incentivizing the commercialization back-end as suggested in previous sections would be a productive start to accumulating these gap funds.

Leadership: References to leadership as an essential component to university entrepreneurship were numerous and appeared often when the respondent was describing program or role attributes. References to leadership were both tangible and philosophical and were directed to university faculty, administrators and students, but also focused on the private sector. Multiple suggestions were made in reference to 21st Century leadership and what that might entail. Instilling a leadership environment was also mentioned, referring to the conditions necessary to produce adaptive and collaborative conditions for change and innovation. One respondent stressed the need for leadership in reducing challenges associated with change—"[e]go and turf protection are early barriers to establishing an effective team. Establishment of an outcomes-driven philosophy is extremely useful in overcoming these barriers, providing a common mission that is more important than individual preferences and an objective basis for evaluating capabilities and contributions by other team members."[22] Calls for leadership courses as part of entrepreneurship programs were voiced by respondents as were requests that leadership at all levels of the socio-political strata be evidenced more strongly and visibly. Federal leaders were called out on numerous occasions. A common theme was clearly articulated—entrepreneurs are leaders, and working to develop capacity in leaders (especially students) would lead to greater creativity and entrepreneurial activity.

Based on responses to the RFI, leadership is an inescapable characteristic of entrepreneurship, or is the reverse true? Perhaps a symbiotic relationship exists where one is not whole without the other? If the quote from the section opening is accurate, changes confronting universities in the near future will require healthy doses of both entrepreneurship and leadership in order to evolve to a point where they play essential roles in a new world order. In a very real sense, universities can no longer assume a privileged role in merely admitting students, accepting research funds, and assuming that they will act as good stewards of their bounty. Alternatively, universities must confront the challenge of exerting leadership on many fronts through entrepreneurial activity and they must demonstrate the role model they have only imitated for centuries. By triangulating the responses to the RFI one vivid picture is developed that characterizes leadership emanating from multiple directions and from diverse sources converging into innovative practices and entrepreneurial thinking that transforms university culture, while at the same time positioning higher education as a key element of economic development and society well-being.

> *If universities are to spearhead change they must implement courageous and flexible strategic planning that establishes qualitative objectives in the framework of a new university culture. Basically, we are talking about a revision of the mission of universities, adapting it to the requirements of a new society that calls for the definition of a new social contract. Within this framework, the institution must plan in the short, medium and long term, based on quantitative actions. To overcome the intrinsic difficulties, this process means that each university must have a number of skilled teachers. The latter must convince all those who are reticent (generally speaking, this may be a numerous group). Furthermore, they must take risks in the less productive part of the s-curve. And it will be precisely risk, unpredictability, participation and questioning of classical paradigms that constitute the most appealing intellectual elements to encourage the most prestigious academics to come on board.*[21]

Interdisciplinarity: The term interdisciplinarity was chosen as a category label for two reasons. First, this was the term frequently used to argue for a broader set of collaborators in advancing entrepreneurship in universities. Second, although multidisciplinary, transdisciplinary and cross-disciplinary were also used as terms for the same

description, interdisciplinarity seemed to capture the notion that multiple players are necessary to create the type of innovation program necessary for influencing genuine change—forming a more symbiotic whole. The commercialization of research is frequently described as a linear process involving engineering, medical, or technology disciplines becoming entwined with technology transfer offices, frequently adding law and business schools into the mix to facilitate the process. The success of this linear model is open to interpretation, according to respondents, with statistics profiling enough failures that provide credence for the valley-of-death notion. Instead of a handful of disciplines acting relatively independently of one another until time and circumstances become critical, a new interdisciplinary model is proposed where universities encourage innovation practice and entrepreneurial thinking among all of its members. As one respondent put it, "Entrepreneurship centers and programs are widespread nationally, yet few have broad impact beyond the business schools. Ideally, programs would be university-wide and focus on innovation-based and high growth entrepreneurship that will drive new industries. . . [N]ot all innovation is driven from the engineering and medical departments in universities. Although technology is often what leads to great scale, new companies and products can spring from a variety of disciplines. In fact, usually some of the most exciting opportunities lie at the intersection of disciplines. As a result, the administration should put a premium on supporting programs that engage all corners of the university rather than being housed in any one particular school."[24] In this way, interdisciplinary efforts meld the strengths of two or more disciplines to create a new focus of inquiry.

Programs that encourage multidisciplinary collaboration between faculty and students of different disciplines lead to technologies with more commercial potential than programs that are not multidisciplinary. These programs are difficult to initiate and require an ongoing commitment of resources to manage the programs.[23]

New opportunities for entrepreneurial programs at universities seem to lie at the interaction of seemingly disparate disciplines. The usual suspects in a mash up of entrepreneurial actors include schools of engineering, medicine, technology, business, pharmacy, and applied sciences. Lesser known players mentioned in responses to the RFI were communications, law, and liberal arts. It makes sense that interdisciplinarity be pursued due to its potential for catalyzing ideas from different philosophies and practices and through engaging unique individuals in common purposes that advance innovation. University-wide programs are difficult to start and even more challenging to sustain. Beyond the allocation of scare resources, interdisciplinary programs can experience the natural but insidious forces such as territoriality, disciplines-promoting silos, and the expense of time commitment. Nevertheless, approaching entrepreneurship from an interdisciplinary perspective offers the chance to provide a meaningful educational experience for students and create spaces for faculty to engage one another across disciplinary limes.

Proof of Concept: The RFI asked specific questions about proof of concept centers as mechanisms for bridging the valley of death. A common definition of proof of concept is the following: "that point at which a nascent idea for an innovation/invention derived from a research discovery first occurs, typically in a university research laboratory."[26] Almost every respondent offered an opinion in the area, although viewpoints varied in terms of success rates and preferred methodology. Some respondents felt that proof of concept centers (POCCs) should specialize in particular technologies or processes. Other respondents felt that POCCs should be involved early in the invention process in order to take advantage of diverse thinking such as marketing. Echoing sentiments

Today, more than at any time on the past, universities are the platform for innovation for America and the world. The evidence is clear and the reasons can be identified in the investment behaviors of publicly held companies. Because of this, federal investment in both fundamental discovery-oriented research as well as "translational research" or research that moves ideas into proof-of-concept work so it can become attractive for private investment is essential to our national innovation ecosystem.[25]

from the previous section on interdisciplinarity, one respondent suggested, "POCCs seem to thrive in ecosystems characterized by interdisciplinary academic research centers. They have ample external and philanthropic funding. They use experienced entrepreneurs."[27] One message was clear. POCCs should be intimately involved with entrepreneurs outside the university, in essence fostering interdependent knowledge networks where university researchers and entrepreneurs can benefit from market thinking and product development realities. This notion relates nicely with the campaign for ecosystem development in local communities mentioned in a previous section.

> *The biggest obstacle to "becoming entrepreneurs" is the courage to try and possibly fail. People that gravitate towards University careers seldom have this essential quality but instead are too attached to their tenure to be risk takers.*[28]

Benchmarking successful POCCs is a strategy that many universities would find beneficial. While some respondents self-nominated their own programs, a fair number identified characteristics in POCCs thought to be noteworthy regardless of institution. A sampling of these include (a) using seasoned entrepreneurs, (b) involving students, (c) using market research throughout the process, (d) establishing critical milestones, (e) rapid prototyping capabilities, (f) seed funding, and (g) focusing on the "pull" of market needs. A near consensual response to the RFI in this area was the call for additional funding support from the federal government to support POCCs.

Risk: One of the more logical and frequent explanations given for the lack of university research commercialization was the sizable risk perceived by angel investors and venture capitalists. As related by one respondent, "[a]n important element to driving the commercialization of University technologies and the attraction of private industry investment is risk mitigation. Over the last ten years, the venture capital industry has substantially changed showing much less tolerance for commercialization risk, while focusing primarily on opportunities that involve fewer regulatory hurdles and less research and development. Unfortunately, this bypasses many of the opportunities with the highest potential for economic and social impact."[29] A common theme described risk as a condition of uncertainty regarding whether university discoveries can be developed and scaled to meet commercial production requirements. A concern was also expressed about the elongated timeframe to market for immature technologies. Several respondents mentioned the risk tolerance inherent in an entrepreneur and urged more entrepreneurism within university ranks in order to push out technology and invention without fear of failure.

> *[I]f the university does not change under its own initiative, its transformation will be managed for it. If it is unable to reinvent its mission, a new mission will be imposed on it. The smart approach would be to abandon distance, jump over the barricade and from the other side play a central role in changing twenty-first-century society. A change in which many new factors such as complexity, diversity and sustainability emerge. These and other factors must be considered, directly or indirectly in the university's response to the challenges of the present century.*[32]

Finding methods and procedures to mitigate risk is a priority in developing successful commercialization processes at universities. Risk management can be approached by identifying risks and then converting the inherent uncertainty into a defined risk status, and then managing the various forms of risks. For example, risk types to be managed include: product risk (can this product be successfully developed?); market risk (is there a viable market for this invention?); financial risk (can reliable sources of financing be found?); IP risk (can the technology be protected and licensed?); management risk; operational risk; and regulatory risk (regulatory requirements for bringing the product to market?).[30] Risk seeking is a paradoxical enterprise for universities. On one hand students are urged to stretch themselves and assume risks in their thinking and analysis; on the other hand universities are known for being some of the most risk averse and conservative institutions in society. Risk should be embraced and as one respondent put it, "Failure can be success! Taking risks means some failures will occur, but that is success overall. It is very easy in this game to be trapped by one-dimensional thinking."[31]

Strategy: As the broadest of all categories, Strategy was used to encapsulated themes that suggested policies and approaches that address the challenges of research commercialization and university entrepreneurship. A few respondents echoed what many in the entrepreneurial community strongly urge about risk-taking, "failing quickly and often." Such overtures harken back to notions that if you aren't failing you aren't trying. More than a few respondents advised universities to pursue market-pull strategies, rather than technology push approaches ("Technologies in search of markets rarely win").[33] In concert with comments in the Collaboration section, connecting with the market prior to full product development can save time and resources if commercialization is a goal. This is compatible with a comment regarding juxtaposition of basic and applied research—"Universities should balance the knowledge driven mission with a user-driven approach." Other strategies suggested that university technology transfer offices (TTOs) should change their profile from a licensing-driven focus to a long-term business development mission, and that "Universities should be open to deferred rewards rather upfront licensing fees."[34] In terms of unlocking hidden commercialization potential in universities, the 4M analysis was suggested, where universities determine where they reside within one of four cells in a matrix that is bounded by axis's of how large the research enterprise is against the robustness of the entrepreneurial ecosystem. The four cells or commercial pathways are described as Scrappy (robust ecosystem; small research enterprise); Niche (nascent ecosystem; small research enterprise); Under Exploited (nascent ecosystem; large research enterprise); Advanced (robust ecosystem; large research enterprise).[35] By examining their strengths and weaknesses in each of the four commercialization pathways, universities should be able to establish priorities and strategies for enhancing either their research enterprise or entrepreneurial ecosystems.

This section identifies some novel approaches to innovation and entrepreneurship. One of the more unique strategies was an approach to philanthropy where business models and accountability are key elements in fund raising campaigns. In essence universities will continue asking for support from erstwhile donors but with the "recognition that philanthropy can be used to drive positive but important 'disruptive' change to existing approaches." A major premise is "attracting new individuals to philanthropy based on its business focused, outcome oriented process that is dedicated to improving local economy through new companies and new jobs."[36] Donors invest in university research based on an expectation that tangible results will ensue that benefit the living conditions and the economy of local communities. Additional recommendations that we found worthy of consideration included processes that commoditize intangible assets that could find value in the marketplace. In terms of cooperating with local entrepreneurs, universities could serve as virtual incubators offering assistance with market research, strategy development, business model development, and meeting facilities. Social entrepreneurship was mentioned by several respondents and is an enterprise that seeks to address social and/or community issues through innovation. Sometimes associated with non-profit entrepreneurship, social entrepreneurship can lead to financial outcomes such as economic growth and jobs creation. Moreover, social entrepreneurship can instill idealism among students about innovation and entrepreneurship that leads to outcomes beyond financial returns.[37]

Recommendations

We present five recommendations that seek to invigorate the innovation and entrepreneurship processes at universities and to advocate for research commercialization. A predisposition in formulating the recommendations was for proactive strategies by universities instead of simply asking elected officials to improve funding in existing program or changing tax structures. Recommendations were prioritized into the following areas: (1) privileging transformational leadership, (2) cultivating strategic partnerships, (3) fostering entrepreneurial thinking, (4) nourishing innovation ecosystems, and (5) transforming university culture.

Privileging Transformational Leadership: An ever-present theme among respondents to the RFI was the call for stronger leadership in making innovation and entrepreneurship in universities a reality. The appeal for leadership among the top executives at universities is a reminder that top-down support for academic research and engagement programs is a prerequisite for success.

Leadership must also be exerted among faculty, staff, and students as they engage in creative efforts that transform ideas into action. Resources will be required to create space and place for leaders to cultivate and nurture creativity, innovation, and entrepreneurship. In turn, finding resources to support these activities depends on leadership and will most surely wane without it.

Another way of viewing the influence of leadership is in developing programs in entrepreneurship studies. As mentioned in a previous section, elements of leadership and entrepreneurship overlap considerably and I contend that exerting influence in either domain would be difficult without the other as a guidepost and companion. Leadership development is an enterprise found on every university campus. Many academic disciplines count leadership as one of the staples of their applied focus. The virtues and manifestations of leadership—communicating values, instilling trust, taking risks, following through, inspiring others—are commonly taught in these programs. These are qualities of the entrepreneur as well. It would therefore be less arduous to develop entrepreneurship programs if established leadership development programs could be leveraged appropriately.

Cultivating Strategic Partnerships: Respondents seemed clear about the need for more frequent communication with stakeholders and more opportunities for collaboration with colleagues, community members and policy makers. Two recommendations seem warranted to open avenues for interaction. First, reward systems should venture into this realm by providing incentives for faculty to engage more frequently with the actors described above. Development and philanthropy divisions make relationship development a specific metric with frequency of contacts as an evaluation item. The same standards (adjusted for circumstances) could be instituted for those involved in entrepreneurship programs. Partnership development goes from being an intangible non-evaluated metric to one that is held in esteem, counted, and rewarded accordingly. The second recommendation for improving partnership cultivation involves staffing opportunities, where professional staffs are hired who bring considerable interpersonal and networking skills with them and structure relationship development opportunities for students, faculty and other staff. Universities hire communications professional for a variety of other posts (public relations, relations, public affairs, publicity, advertising and promotion) and it would make sense to do the same for entrepreneurship programs. Communication and collaboration can be perceived as natural processes and outcomes of doing business and therefore concerted efforts at listening, crafting messages, asking questions, honing interpersonal (and presentation) skills are expected to happen easily and naturally. Nothing could be further from the truth. It takes vision, strategy and structure to perfect systems of communication that develop meaningful collaborative partnerships. Boundary spanning activities can also improve partnership development as can pursuing and demonstrating how "weak ties" can improve inter-organizational communication.

Entrepreneurship and innovation will require more than theoretical prowess and strong research methods. As one respondent urged, "most investment in technology today focuses solely on funding the technical work. A very important piece that is not adequately funded today is the business expertise and relationship building with industry that is critical to driving a technology towards a commercially viable product."[38] Numerous comments extolled the virtues of robust partnerships comprising networks of diverse professionals. Partnership Engagement Programs is the concept that best describes how to maximally affect relationship management processes. Defined in different ways, one view of partnership engagement casts a net around a few key contributors to positive professional relationships. These include invoking relationship management processes, strategic communication with stakeholders, developing mutual identity profiles, engaging in planned change processes, and managing the knowledge learned along the way. Strategic partnering is about giving relationship management, communication, and organizational learning the priorities they deserve. In a Government Accountability Office report entitled "High Performing Organizations,"[39] experts from both the private and public sectors agreed on the few basic assumptions driving organizational excellence. These assumptions include a culture that emphasizes a results-oriented, customer/client centered, and collaborative climate. These experts argued that this type of organizational culture is

sustained through the strategic use of partnerships, the nurturing of common identities, an emphasis on metrics that measure success, and establishing knowledge-sharing networks. Funding priorities should be placed on partnership engagement initiatives that evolve innovation ecosystems.

Fostering Entrepreneurial Thinking: Entrepreneurial thinking is a way of approaching problems and opportunities from a risk-free and innovation seeking perspective. Universities are an ideal forum for e-thinking and a number of them have established entrepreneurship programs and centers whose track record is the envy of other institutions. While not all universities will find a fit with existing models, several key characteristics seem common among these e-centers. First, centers should have a substantial focus on students. Second, e-centers should find mechanisms to connect seamlessly with their local communities and regions enabling a robust system or network of likeminded individuals. Third, some form of an entrepreneur-in-residence program would be an important component to develop. Fourth, e-centers should be interdisciplinary, reaching into many academic areas of the university and providing a welcoming place for students of any major. Fifth, e-centers should capture the imagination and support of upper administrators by securing independent sources of revenue to demonstrate viability and sustainability. Finally, e-centers should be risk-seeking entities. In all of their activities risk should be a companion that is not to be feared or avoided. Student and faculty alike need to understand that if risk cannot be embraced at universities, where can it be?

Successful entrepreneurship centers provide universities and its members with benefits that far exceed the costs of start-up and sustainability. Students benefit from the intellectual stimulation and the practical skills that are developed in such programs. Faculty enjoy opportunities to move their research into latter stage invention and innovation that establish conditions for commercializing their work. Alumni, local community members and other stakeholders take advantage of relationships and networks created by an open flow of knowledge from faculty and students benefiting society and the marketplace. Entrepreneurship centers serve as the hub of a heightened mix of talent, ideas, and energy, creating intellectual synergies that would otherwise remain unrealized. Of course, e-centers also have great potential for generating revenue, and the economies of most local communities as well as the universities themselves can easily appreciate financial support.

One strong example repeatedly championed among university entrepreneurs is MIT's Deshpande Center. Using it as a benchmark, university e-centers would become active in making connections with the business community; educating and mentoring students; developing networks of regional businesses; providing grants or seed money; and connecting faculty and students. According to Susan Hockfield from MIT, the Deshpande Center "serves the entire MIT community, including students, researchers, faculty, staff, alumni, and members of the local business community. This ecosystem is founded on the concepts of: 1) nurturing and mentoring potential entrepreneurs; 2) pursuing patent protection for technological innovations resulting from MIT research to foster commercial investment in bringing such innovations to the marketplace to benefit the public; 3) engaging deeply with the surrounding business and VC community; 4) integrating entrepreneurship and innovation across all schools and departments; and 5) focusing on long-term relationships, rather than short-term gains."[40]

Funding must be provided to develop academic programs of innovation and entrepreneurship. Matching internal reallocation funds with grants from the National Collegiate Inventors and Innovators Alliance[41] and the Kauffman Foundation would allow universities to plan and deliver courses, certificates, and programs that attract scientists, engineers, artists, humanists, and other college students to their programs. Such programs would support "student innovation or venture projects from disciplines across campus (STEM, business, entrepreneurship, design, humanities, etc)."[42]

Nourishing Innovation Ecosystems: A rich and complex research infrastructure is believed to be a key ingredient in the knowledge-based society's potential for economic growth.[43] According to one respondent, "a key difference between the hot spots for innovation in the Midwest and the nationally acclaimed engines for innovation at such institutions as MIT, Cal Tech, UCSD, UC Berkeley and UCSF is critical mass. Each of those institutions resides

in a large metropolitan area that has evolved an ecosystem highly tailored to the needs of innovators and has demonstrated the art of marshaling the innovation resources needed to create risky but highly promising new ventures based on university research."[44]

Regional Innovation Ecosystems, a term often used by government officials, is touted widely as a promising strategy for economic development given its focus on partners among stakeholders from diverse but compatible organizations (universities, business, local government) and the synergies expected to be realized. Common ecosystem attributes include great science, high-risk funding, entrepreneurial culture, business-push, technology-pull, early stage VC funding, and rich networking opportunities. Not all ecosystems must focus on similar products, and, in fact, they should be unique depending on the players and interests involved. As one respondent mentioned,"magic bullets may score occasional hits, but ecosystems flourish with many pathways to the commercial market."[45] In fact, some of the issues to raise regarding the function of the ecosystem for a particular region include mission, purpose, role, responsibilities, and priorities, including matters such as economic development, wealth creation, workforce development, jobs, as well as university-prioritized issues such as research, development, innovation, technology transfer, invention disclosures, patents and licenses. Each of these are elements in the ecosystem and play a role in the commercialization of university research.[46]

It appears that innovation ecosystems are most likely to succeed if a sizable research university serves as the hub with partners from the region finessing and leveraging not only the nascent and unexploited research but also the talents and energies from the university members. The geographic size of a ecosystem has not been well articulated—many of the more successful ones such as Silicon Valley, Boston, and Austin have been located in large metropolitan areas. However, several respondents did not feel that population was the critical factor of success. Rather, having an inventory of solid research with commercialization potential, willing and talented faculty and students, and an eager business community seemed to be much more essential. Even a lack of concentrated VC investors should not deter ecosystem success as one respondent noted, "all capable investors and managers will be attracted to the same basic ingredients of value creation: high quality technology with appropriate protection, faculty with sophisticated and reasonable expectations and university decision makers who know how to get a fair deal done. If you have these ingredients, and are consistent in how you communicate available opportunities and negotiate deals, VCs and entrepreneurs will find you."[47]

A key element will be finding the means of leverage existing talent, infrastructure, and organizations. A starting place is determining what characteristics of a innovation ecosystem are doing well and how well those elements are networked. Conducting asset mapping research and economic development audits are ways that can provide a profile of where the ecosystem enjoys strengths and diagnose where attention should be directed to shore up shortcomings. Engaging in network developing activities would be a primary opportunity to build the base of the ecosystem.

Transforming University Culture: Universities are wonderful institutions that provide intellectual safe havens for the curious and imaginative minds of its students. At the same time, they are safe harbors for a level of institutionalism that resists change to its long-standing practices such as tenure, reward systems, and territoriality. Research universities that survive the great recession will do so by challenging the status quo and changing their culture so ideas can flow more easily to the greater society in less time and with more communicability. Those that support universities will expect better return on their investment whether those dividends are manifested in enriched workforce pipelines, with research that makes a difference in society and the marketplace, or with greater networking opportunities through practical engagement.

Changing university cultures to accommodate innovation and entrepreneurial thinking will come at a price. Some faculty may pursue other careers that offer a better fit if they feel the old culture was more comfortable for them. Other costs may come in the form of disquieting discourse among late adopters who believe the university took the wrong path. Drawing from economic theory, opportunity costs are always present, and determining the level of investment in entrepreneurship programs could displace other viable prospects in limited budgetary

times. Nevertheless, calls for change among university funding mechanisms and repeated criticism toward unproductive faculty and staff require new models of innovation and adjustment to the culture will be required. How long it will take to effect change will depend on leadership and the level of investment a university is willing to make.

In spite of varying opinions about the nature of proof of concept centers, few respondents took issue with the theory itself. Moving ideas from university bookshelves and file cabinets to the marketplace was universally accepted; finding the appropriate mechanism was often the bone of contention. How proof-of-concept is implemented at particular universities is most likely to be successful when locally designed for research streams that are (a) based on strong scholarship, and (b) interested in connecting with society in meaningful ways. Not all disciplinary tastes are suited to a commercialization diet. Some will never dine at the trough of applied research. Resources could be wasted trying to tempt the never-adopters. For those in other parts of the S-curve proof of concept centers could prove to be a valuable resource. One respondent found POCCs "a useful transition to industrial utilization of technology developed within a University environment. It is sometimes apparent that the more fundamental work undertaken at a University needs significant additional work to allow industrial adoption. This is often a barrier to industry as it is not always clear what needs to be done." We believe that a center that is guided, in principle, by interested industrial members, would be a successful approach to proving concepts and would be welcomed by many companies."[48]

Universities will also have to think about their funding streams for innovation and commercialization programs. Similar to the notion of philanthropicapitalism mentioned in a previous section, venture philanthropy employs venture capital strategies as a means of attracting charitable giving. According to the National Venture Capital Association, it "focuses on leadership, bold ideas, developing strong teams, active board involvement, and long-term investment."[49] Common characteristics of venture philanthropy include: willingness to experiment and 'try new approaches'; focus on measurable results—donors and grantees assess progress based on mutually determined benchmarks; readiness to shift funds between organizations and goals based on tracking those measurable results; giving financial, intellectual, and human capital; funding on a multi-year basis - typically a minimum of 3 years, on average 5-7 years; focus on capacity building, instead of programs or general operating expenses; and high involvement by donors with their grantees.[50] Some examples of venture philanthropy foundations include Venture Philanthropy Partners, NewSchools Venture Fund, Grassroots Business Fund, Acumen Fund, and New Profit Inc.[51]

Conclusion

The findings, critical issues and recommendations presented in this chapter represent the "collective genius" of 205 individuals and organizations with expertise on innovation, entrepreneurship, and the commercialization of university research. The unifying theme is this—we have to change. Wally "Famous" Amos, Albert Einstein, and Yogi Berra—each entrepreneurial and innovative in unique ways, whether marketing chocolate chip cookies, describing the universe, or making the obvious sound profound—are credited for variations of the quote, "If you keep doing what you're doing, you'll keep getting what you've got." In this world of global competition, constrained resources, and increased accountability, our universities have to change what they are doing because we cannot afford to keep getting what we've got. While not every research endeavor will lead to a commercialized product or service—nor should it—it is frustratingly obvious that there is significant unrealized economic and commercial potential languishing in the halls of academe. Invigorating the innovation and entrepreneurship processes at universities will require multifaceted and sustained efforts to restructure incentive structures and create a culture of risk-taking.

[1]Jinyoung Kim and Gerald Marschke, How Much U.S. Technological Innovation Begins in Universities?, Federal Reserve Bank of Cleveland (April 2007): <http://www.clevelandfed.org/Research/Commentary/2007/041507.cfm>.

[2]*The Power of Place 2.0: The Power of Innovation*, Association of University Research Parks: <http://www.aurp.net/assets/documents/AURPPowerofPlace2.pdf>.

[3]The RFI was published in the Federal Register on March 25, 2010 [Federal Register Volume 75, Number 57; Pages 14476-14478] with a deadline of April 26, 2010: <http://www.eda.gov/PDF/WH%20RFI%20Announcement.pdf>.

[4]http://www.eda.gov/commrfi-responses
[5]H. Dan O'Hair, *Collective Genius: Innovation, Entrepreneurship, and the Commercialization of University Research* (2011), Appendix D: <http://issuu.com/ukcis/docs/collectivegenius>.
[6]*Collective Genius*, Appendix C.
[7]Manuel J. Tello, "The university in the twenty-first century: Challenges and uncertainties," in F. Tejerina (Ed.), *The University: An Illustrated History* (2011): 295.
[8]*Collective Genius*, Appendix C, Key Point #48.
[9]Ibid., Key Point #201.
[10]Gustaf A. Soderlind, *Research Institutes and Knowledge Transfer* (2011): 306.
[11]*Collective Genius*, Appendix C, Key Point #2.
[12]Ibid., Key Point #48.
[13]Ibid., Key Point #37.
[14]Ibid., Key Point #197.
[15]Ibid., Key Point #187.
[16]Ibid., Key Point #31.
[17]Ibid., Key Point #11.
[18]Ibid., Key Point #13.
[19]Ibid., Key Point #125.
[20]Ibid., Key Point #15.
[21]Suely Vilela, *World-Class Universities* (2011): 330.
[22]*Collective Genius*, Appendix C, Key Point #188.
[23]Ibid., Key Point #65.
[24]Ibid., Key Point #202.
[25]Ibid., Key Point #142.
[26]Ibid., Key Point #37.
[27]Ibid., Key Point #178.
[28]Ibid., Key Point #11.
[29]Ibid., Key Point #90.
[30]Ibid., Key Points #90 & #203.
[31]Ibid., Key Point #37.
[32]Tello, op. cit.
[33]*Collective Genius*, Appendix C, Key Point #97.
[34]Ibid., Key Point #158.
[35]Ibid., Key Point #187.
[36]Ibid., Key Point #46.
[37]Ibid., Key Point #197.
[38]Ibid., Key Point #109.
[39]*High Performing Organizations* (2004), GAO-04-343SP.
[40]*Collective Genius*, Appendix C, Key Point #162.
[41]NCIIA awards up to 20 Course and Program grants each year to faculty to strengthen existing curricular programs or build new experiential courses and programs in invention, innovation, and technology entrepreneurship, with an increasing emphasis on creating positive impacts on society and the environment. Successful programs use creative pedagogical approaches that generate and deploy student innovation/invention teams (E-Teams), bringing real-life needs and problems into the classroom setting and encouraging the pursuit of innovative economically generative solutions in the form of products and businesses. Promising ideas are taken through the early prototype stage enabling further scientific and technical evaluation and the development of plan for commercialization. The best programs link these educational programs with opportunities for further commercial development in the form of intensive workshops or boot camps for start-up teams as well as material support and advising.
[42]The NCIIA awards up to 20 E-Team grants each year to provide student innovation teams (E-Teams) with financial support they need to begin to bring an innovative product or technology from idea to prototype, and eventually to market. An ideal E-Team has strong content expertise, consisting of at least two graduate or undergraduate student innovators working with a faculty advisor in a multidisciplinary team (technical, business, entrepreneurship, humanities expertise, etc.). In addition, the team recruits industry and business development advisors and mentors. Successful E-Team proposals demonstrate an idea's technical feasibility, social impact, and potential for scaling and commercialization over a period of 18 months. Participating E-Teams are engaged in the NCIIA's Venture Lab and Advanced Invention to Venture workshops that provide high intensity entrepreneurship and strategy development training.
[43]Soderlind, op. cit., p. 301.
[44]*Collective Genius*, Appendix C, Key Point #192.
[45]Ibid., Key Point #31.
[46]Ibid., Key Point #37.
[47]Ibid., Key Point #147.
[48]Ibid., Key Point #62.
[49]http://www.nvca.org/index.php?option=com_content&view=article&id=104&Itemid=171
[50]http://en.wikipedia.org/wiki/Venture_philanthropy
[51]http://en.wikipedia.org/wiki/Venture_philanthropy

Healthy Organizations in Kentucky:

An Integrated Approach to Promote Employee Health

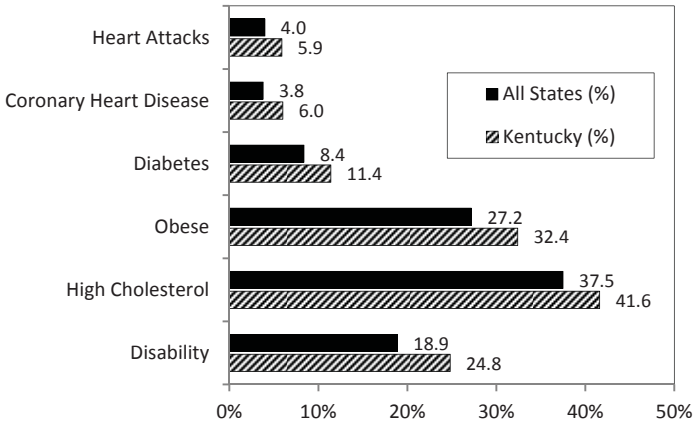
Jennifer E. Swanberg, Jess Miller Clouser & Lee Ann Walton

Employers today face a host of challenges as budgets contract, the workforce ages, and health care costs mount. Kentucky employers are acutely affected by ill health as Kentucky leads the nation in chronic disease prevalence. An emerging strategy to stem health-related costs is the creation of healthy organizations where employee well-being is integrated into the culture, operations, and business strategy of an organization. To help employers navigate the process of infusing health into one's organization, the Institute for Workplace Innovation (iwin) interviewed 23 Kentucky organizations about their health-related programming and conducted an extensive literature review on the organization-wide benefits of integrated health promotion strategies. Findings from this research are presented in this chapter.

Employers today face a host of challenges as budgets contract, the workforce ages, health care costs mount and chronic disease becomes a chronic concern. Emerging research reveals many of these challenges to be interlinked with employee health, a connection that presents vast opportunities for innovative problem-solving strategies. One such strategy is the development of healthy organizations where employee well-being is integrated into the culture, operations, and business strategy of an organization.

Although many employers increasingly understand the opportunities offered by a healthy work environment, many do not know how to begin the transition into actually creating one. In order to provide best practice examples and evidence-based tools for developing integrated worksite wellness initiatives, the Institute for Workplace Innovation (iwin) conducted research that is presented in its *Creating Healthy Organizations: Promising Practices in Kentucky* report.* Sponsored by the National Institute for Occupational Safety and Health (NIOSH), CVS Caremark, and UK HealthCare, this report provides a process to create healthy organizations (the HealthIntegrated Model) and case studies featuring Kentucky employers who are integrating health into their business processes and culture. This article summarizes (1) the argument for creating healthy organizations, (2) case study findings of the *Creating Healthy Organizations* report, and (3) iwin's HealthIntegrated Model.

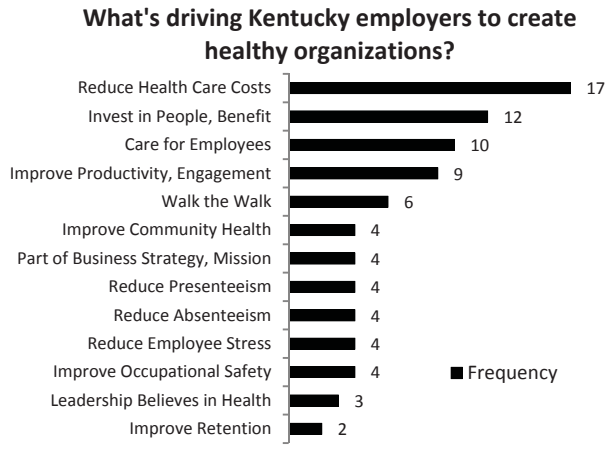
FIGURE 1
Chronic Disease Prevalence, % Population[2]



Background

Chronic Disease in the Commonwealth. Although employers nationwide struggle with increasing health care costs and chronic disease,[1] Kentucky employers are acutely affected by ill health as Kentucky leads the nation in chronic disease prevalence (See Figure 1).[2] Over two-thirds of Kentuckians are overweight or obese[2] and in 2009, Kentucky had the 2nd highest prevalence of heart attacks among all states and the 5th highest prevalence of diabetes.[2] Kentucky ranks in the top quartile on an index of seven major chronic diseases (including cancers, diabetes, heart

**Creating Healthy Organizations: Promising Practices in Kentucky* is available online at http://iwin.uky.edu.



disease, hypertension, stroke, mental disorders and pulmonary conditions),[3] and is 49th among all states in Gallup's national index of well-being.[4]

Cost Burden of Chronic Disease. The cost of health insurance has increased 87% since 2000, far outpacing both the rate of inflation and wage growth.[5] In 2008, U.S. health care spending ($7,681 per resident) accounted for 16% of the nation's Gross Domestic Product (GDP), among the highest of all industrialized countries.[6] According to the 2006 Medical Panel Survey, almost 85% of health care spending was attributed to people with chronic conditions.[1]

Direct medical expenditures are just the beginning of ill-health costs. An unhealthy workforce is associated with increased disability and workers' compensation costs, absenteeism, turnover, decreased productivity,[7] and disengagement due to stress or mental illness.[3,8] In fact, it is estimated that only 22% of the economic impact of chronic disease in Kentucky is due to actual health expenses. The majority (78%) comes from lost productivity.[3]

TABLE 1
Relationship Between Control Over Work & Health Outcomes

Work Characteristic	Health Outcome
Greater schedule flexibility	⇨Reduced cholesterol[11] ⇨Fewer physical symptoms[11,12] ⇨Improved self-reported health[13,14] ⇨Less health-related impairment at work[15] ⇨Improved mental health[16,17] ⇨Less stress and burnout[11,13,18,19]
Lack of control over work schedule	⇨Poorer health & well-being[20-22]
Perceived stress	⇨Less likely to quit smoking[23] ⇨Decreased likelihood of physical activity[23] ⇨Increased drinking[23] ⇨Increased risk of obesity[23] ⇨Increased risk of diabetes[23]

Many forward-thinking companies understand that employee well-being increases organizational value across a number of indicators such as productivity, absenteeism, and workers' compensation expenses,[9] a detail that becomes even more meaningful during lean economic times.

However, this relationship also runs the opposite direction: research reveals that employee health is influenced by the work environment. In fact, many of the risk factors that are responsible for the most expensive chronic illnesses—such as diabetes, obesity, and coronary heart disease—are influenced by specific health behaviors—such as smoking, poor eating habits, and lack of physical activity[10]—which may be influenced by work conditions (see Table 1).

Integrating Health into Work. Because of the extensive influence that employee well-being has on organizational performance, it is a business imperative that organizations learn how to manage for health. Work-site wellness programs are increasing in prevalence[24] and evidence reveals that they typically offer a 3-to-1 return on investment in health care cost savings and much more when considering other organizational outcomes.[10]

Methodology

Case Studies: Kentucky-based employers of all sizes and all industries were invited to participate in this study via an email invitation sent to iwin's employer network. Thirty-five employers responded. Employer representatives were asked to provide descriptions of their wellness initiatives. If a program reflected uniqueness, depth, or innovation, the organization was invited to participate in an in-depth interview (see Figures 2 & 4 for organization size and industry). Interviews were completed between June 2010 and January 2011.

Twenty-three interviews were conducted. These interviews collected detailed information from organizational representatives about their wellness initiative's history, goals, logistics, drivers, implementation and sustainability, employer communication strategies, and impact. Recommendations, lessons learned, and future plans were also collected.

Literature Review: A comprehensive review of the business and health literature was conducted to inform the development of iwin's HealthIntegrated Model and to provide context for the employer case

studies. Information gleaned from this literature review and from analysis of the in-depth interviews guided the creation of the model.

Advisory Panel: A diverse panel of employer representatives and wellness practitioners provided guidance on the development of the HealthIntegrated Model and on the overall project in order to ensure its relevance to the field of worksite health promotion and to Kentucky employers. Members of our employer panel are listed at the end of the article.

The HealthIntegrated Model

The HealthIntegrated Model (see Figure 3) consists of five key dimensions (Risk Recognition; Education, Activities, and Resources; Supportive Environment; Linkages; and Alignment) and four essential business processes (Incent, Evaluate, Demonstrate, and Communicate). The HealthIntegrated Model builds upon the framework of a comprehensive worksite wellness program adopted by the Centers for Disease Control and Prevention when drafting its Healthy People 2010 objectives.[25]

Employer Practices by Model Dimension

Interviews were analyzed and case studies were written describing practices that were particularly innovative. They are presented in the report with the dimension or essential business process they represent. The full case studies can be accessed by downloading the report at *iwin.uky.edu*. Definitions of the model dimensions and an overview of the practices highlighted in the report are provided below.

Risk Recognition: Risk recognition is achieved when a firm proactively assesses its health-related risks and target areas at the individual- and organization-level and provides information, treatment, and follow-up to staff. Health risk assessments (HRAs) and screenings are commonly utilized by employers. By looking at aggregated HRA results, claims data, prescription costs, total health care costs, and employee surveys, companies can assess employee health status at the organizational level and stratify their employee population by risk in order to better target intervention strategies. Featured practices that exemplify *Risk Recognition* include:

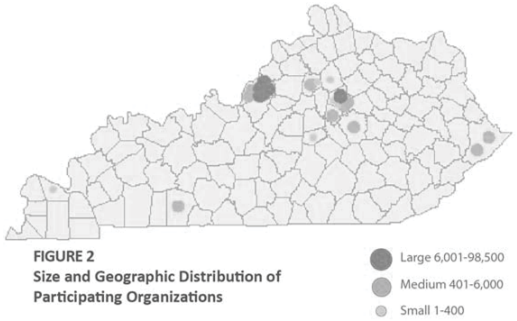
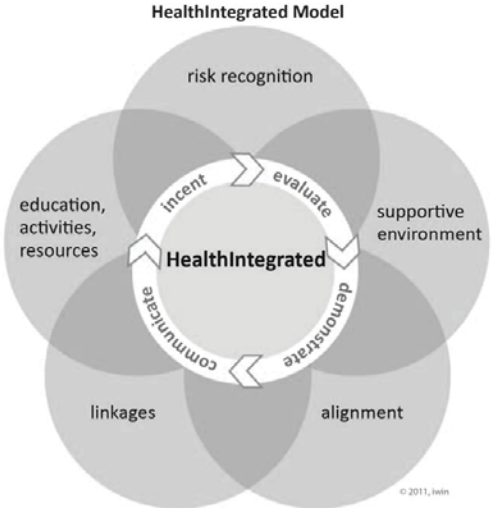


FIGURE 2
Size and Geographic Distribution of Participating Organizations

- leveraging internal expertise to assess organization-level health priorities and build a data-driven program, and
- identifying an organization's most prominent health issue(s) and providing convenient, frequent screenings to employees to minimize its threat.

Education, Activities and Resources: The most commonly adopted dimension of the HealthIntegrated Model is the provision of education, activities, and resources in order to empower employees in personal health management. Such programming promotes skill development, behavior change, and awareness building and is most successful when tailored to employees' interests and needs; when families are engaged; and when the physical, psychological, and social aspects of health are recognized. Four categories of programming efforts were reported by participants: the dissemination of literature or online resources, awareness-building events, classes or interactive group activities, and lifestyle (disease case) management programs. Featured practices that exemplify *Education, Activities, and Resources* include:

FIGURE 3
HealthIntegrated Model



- providing a range of programming to reflect employees' diverse interests and needs,
- integrating multiple aspects of well-being (e.g., physical, social, emotional, intellectual) in programming efforts, and
- engaging and empowering workers in managing their personal health.

Supportive Environment—Physical and Social: As organizations work to empower employees in managing their personal health, it is important for them to consider how the work environment may help or hinder employees as they try to adopt healthy behaviors. Supportive environments are those in which formal policies support the cessation of risky behavior and the promotion of healthy behavior; where jobs are designed to reduce physical, psychological, and environmental stressors; and where employees at all levels of the organization are engaged and empowered to support one another in leading healthy lifestyles. Several organizations support health by encouraging coworker support, creating formal policies, and providing onsite exercise facilities and healthy eating options. Featured practices that exemplify a *Supportive Environment* include:

- the organization's leadership modeling healthy behavior,
- using teams and testimonial-sharing to foster coworker support, and
- providing onsite facilities with policies in place that support their use.

Linkages: Linking health-related initiatives with other organizational programs helps to ingrain them into the firm's culture and establish employee well-being as an organizational priority. This is achieved when wellness goals are linked with those of other programs. Many Kentucky organizations recognized connections between their health and wellness goals and those of their talent management programs, work-life fit initiatives, corporate social responsibility efforts, and their occupational safety and health initiatives. Featured practices that exemplify *Linkages* include:

- connecting wellness activities to work-life initiatives by offering employees flexibility to manage work and non-work responsibilities (thus reducing stress),
- linking wellness to work-life fit initiatives by helping employees fit exercise into their routines, and

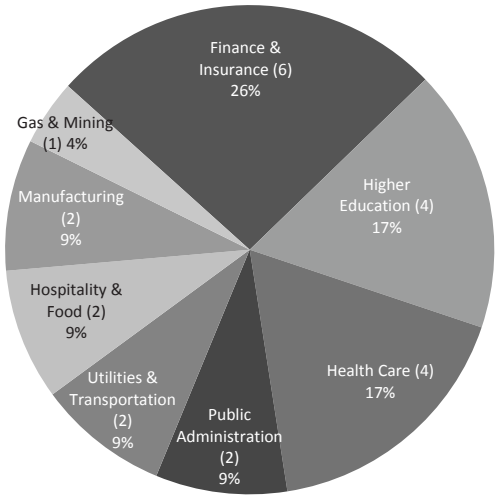
> *A HealthIntegrated organization is one that strategically integrates employee health and well-being into its culture and business objectives through collaborative and comprehensive initiatives, policies, and practices to achieve positive organizational and employee outcomes.*

- facilitating partnerships between the wellness program and occupational safety and health initiatives.

Alignment: For optimal employee and organizational performance, emphasis on employee health must be a part of the way that the organization conducts business. Employee health promotion initiatives must be aligned with the organization's business objectives, mission, and values. Often one of the first steps toward aligning employee wellness comes from formally designating staff and resources toward the effort, which many of our participating companies have done. Alignment is aided when wellness staff is well-connected to different work groups and within the administrative core. Featured practices that exemplify *Alignment* include:

- creating site certification processes to ensure that health-related goals are infused into an organization's systems and structure,
- creating standard management objectives that support safety and wellness,
- offering matching grants to managers to implement localized wellness programming, and

FIGURE 4
Participating Organizations by Industry Sector



- aligning wellness initiatives into a team-oriented management approach.

Essential Business Processes for HealthIntegration

In addition to representing the dimensions of the HealthIntegrated Model through their practices, Kentucky organizations also exemplify its essential business processes for HealthIntegration (Incent, Evaluate, Demonstrate, and Communicate). Definitions of these essential business processes are provided below along with brief descriptions of the practices that are highlighted in the report.

Incent: Strategic, continual incentives promote sustained behavior change and help link interim program goals to long-term organizational goals. Incorporating incentives—even small ones—into the strategic business plan can help communicate to employees that the organization cares about their well-being. One organization has extended a weight-loss competition and incentives for six additional months after its original end date in order to reward maintained weight loss.

Evaluate: As employees are central to an organization's success, their health is inextricably linked to its performance. Data collection across many categories (e.g., productivity, absenteeism, occupational illness/injury, claims, organizational performance, etc.) demonstrates this connection and can make the business case for health to senior management. Continual process, outcome, and impact evaluations ensure that initiatives meet programmatic and organizational goals to attain maximum impact. One company—with a well-established wellness initiative—continually evolves its data collection (e.g., employee surveys, absence records, workers' compensation, health care costs of participants vs. nonparticipants, etc.) to evaluate the needs and effectiveness of its wellness programming.

Participating Organizations
The Al J. Schneider Company
Benefit Insurance Marketing
Central Bank and Trust*
Central Baptist Hospital*
City of Paducah
Community Trust Bank*
Eastern Kentucky University
EQT Corporation*
Farmers National Bank
Frankfort Regional Medical Center
GE Appliances & Lighting*
Georgetown College
Kentucky Chamber of Commerce
Kentucky Employers' Mutual Insurance (KEMI)*
LG&E and KU Energy LLC*
Logan Aluminum*
Norton Healthcare, Inc.*
Papa John's International, Inc.*
R. J. Corman Railroad Group*
SHPS, Inc.
University of Louisville*
University of Kentucky*
WellPoint, Inc. (Anthem Blue Cross and Blue Shield)*
**denotes iwin Innovative Employer Roundtable Partner*

Demonstrate: Leadership commitment to and support of employee well-being is the cornerstone of a health and wellness initiative's success. This support must be clearly displayed through leadership's endorsement of and participation in activities. One organization's founder and owner demonstrates his commitment to employee well-being by participating in exercise competitions with staff, continuously sponsoring community wellness events, and making exercise facilities a prominent part of the physical work environment.

Communicate: In order for any initiative to achieve success, communication must be inclusive and constant. Employee input, feedback, and buy-in is crucial, as is communicating results to leadership. Utilizing the communication channels that are most relevant to staff (whether that is email, social media, company intranet, fliers, or supervisors/managers) and engaging them early results in employees who feel ownership of the initiative. One organization utilizes a variety of communication avenues—including the labor union— to reach its diverse workforce, solicits regular feedback from staff, and includes wellness topics in Directors' meetings.

Conclusion

This employer-engaged research project had two main goals. First, we aimed to develop a healthy organization model that could serve as a guide for employers interested in (1) creating an organizational structure and culture that supports health by recognizing its relationship with organizational performance and (2) understanding how integrated strategies can reduce health-related and business costs by addressing organizational factors that influence health. We developed the HealthIntegrated Model by reviewing the scientific literature and by gathering information from employers. Second, we aimed to gather and highlight promising practices that reveal creative ways Kentucky employers address worker health so

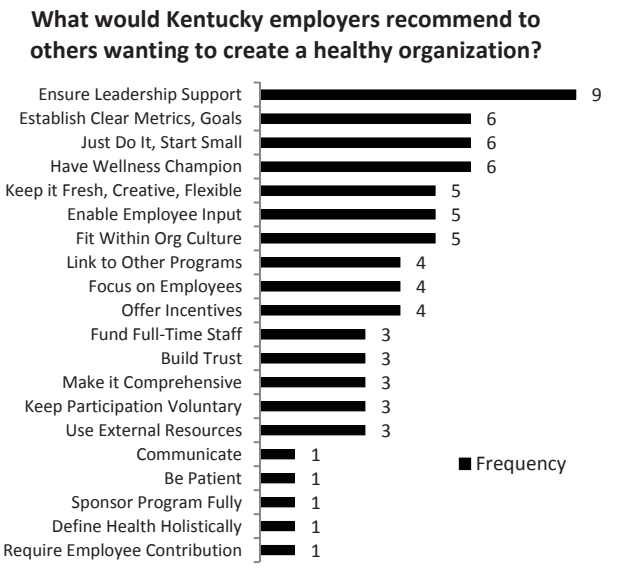
that other employers can learn by example. When possible, we've illustrated the metrics employed to evaluate the effectiveness of these initiatives.

To stimulate organizational learning, this report describes a range of diverse approaches to maintaining and improving employee health in a variety of industries and firm sizes. Some of the wellness programming efforts we profile in this report began 20 years ago, and others are in their first year. The resources available to large versus small firms or established versus new programs are understandably different. Likewise, certain industry sectors may view employee well-being in a way that is critical to their lines of business (e.g., a manufacturing firm that links employee wellness to occupational safety and health outcomes), but which may be eye-opening for other sectors. However, across all organization types, best practices were achieved when organizations leveraged their unique resources and engaged employees in program development.

It is clear through our research that Kentucky employers are taking strides to address the health of their employees, and we celebrate their efforts. Nonetheless, our research illuminates several opportunities for growth.

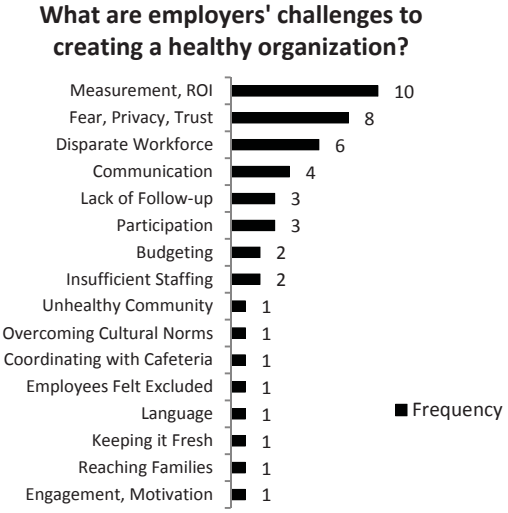
HealthIntegrated Remains a Goal: Kentucky organizations are beginning to infuse wellness into their worksites and have developed, piloted, and expanded a range of initiatives toward that end. Yet few organizations have fully achieved HealthIntegration. This is understandable as many organizations are new to offering such programming (in Kentucky, the number of organizations offering some form of health and wellness program has increased from 34% in 2007 to 63% in 2010[24]), and the concept of health as a part of productivity management is new for many.

Employee Health and Productivity Management: Although some employer representatives spoke about the increased productivity of healthy employees, health care costs, not human capital-related goals, were the most frequently-cited driver for wellness initiatives among the companies we interviewed. Thus, many wellness programs are comprised of reactive programming efforts rather than representing a shift in a firm's strategic thinking about the organizational benefits of healthy employees.



Despite this gap in strategic thinking, we were encouraged by the number of employers that were serious about incorporating health into their culture and business objectives. Changing one's culture can be tricky, as culture is hard to define, but many organizations understood this process as one of integration, not substitution. Similarly, including health in a firm's business objectives is difficult because doing so necessitates new ways of thinking about accountability, management and supervisory practices, and personal responsibility. Despite these difficulties, many Kentucky organizations have evaluated their needs, assessed their strengths and resources, and molded projects to the needs and character of their employee population with promising results.

Challenge of Evaluation: Kentucky employers understand intuitively that employee health is



important, yet many of them have not quantified its bottom-line impact. This local problem of evaluation parallels national trends. In one national study of Fortune 500 companies, almost every participant (97%) agreed that their senior manager was committed to health promotion, but only a third (37%) collected data across various systems to evaluate the impact of their health promotion programs.[9] Quantifying the impact of a health promotion program on the organization's bottom line is a powerful tool and makes the business case for continued support of such programs.

Next Steps

Evidence linking employee health to numerous organizational outcomes— such as employee engagement, organizational commitment, reduced health care costs, and productivity—continues to build. As the demand grows for organizational models that address employee health, iwin is poised to continue its research and employer outreach initiatives in ways that help employers navigate the process of integrating health into their operations and culture.

---

[1]Anderson G. Chronic care: making the case for ongoing care [Internet]. Princeton, NJ: Robert Wood Johnson Foundation; 2010 March [cited 2011 Aug]. Available from: http://www.rwjf.org/pr/product.jsp?id=56888.

[2]Behavioral Risk Factor Surveillance System, BRFSS. Prevalence and trends data, 2009 [Internet]. Atlanta, GA: Centers for Disease Control and Prevention; 2009 [updated 2011 Aug 19; cited 2011 Aug]. Available from: http://apps.nccd.cdc.gov/brfss/page.asp?cat=OB&yr=2009&state=KY#OB.

[3]DeVol R, Bedroussian A. An unhealthy America: The economic burden of chronic disease. Santa Monica, CA: Milken Institute; 2007 October.

[4]Gallup-Healthways. State of well-being: state, city and congressional district well-being report, Kentucky. Gallup-Healthways; 2011.8 p.

[5]Kaiser Family Foundation. Employer health benefits 2006 annual survey. Menlo Park, CA: Kaiser Family Foundation; 2006. 8 p. Report No.:7528

[6]Kimbuende E, Ranji U, Lundy J, Salganicoff A. U.S. health care costs [Internet]. Menlo Park, CA: Kaiser Family Foundation; 2010 March [cited 2011 Aug]. Available from: http://www.kaiseredu.org/Issue-Modules/US-Health-Care-Costs/Background-Brief.aspx.

[7]Goetzel RZ, Ozminkowksi RJ. The health and cost benefits of work site health-promotion programs. Annu Rev Public Health. 2008;29:303-23.

[8]Kessler RC, Minnie Ames P, Hymel PA, Loeppke R, McKenas DK, Richling DE, Stang PE, Ustun TB. Using the world health organization health and work performance questionnaire (HPQ) to evaluate the indirect workplace costs of illness. J Occup Environ Med. 2004;46 (6 suppl):S23-S37.

[9]Goetzel R, Shechter D, Ozminkowski R, Marmet P, Tabrizi M, Roemer E. Promising practices in employer health and productivity management efforts: findings from a benchmarking study. J Occup Environ Med. 2007;49(2):111-30.

[10]Centers for Disease Control, CDC. Chronic diseases and health promotion [Internet]. Atlanta, GA: Center for Disease Control; 2010 July 7 [updated 2010 July 7; cited 2011 Aug]. Available from: http://www.cdc.gov/chronicdisease/overview/index.htm.

[11]Thomas LT, Ganster DC. Impact of family-supportive work variables on work – family conflict and strain: a control perspective. J Appl Psychol. 1995;80(1):6-15.

[12]Janssen D, Nachreiner F. Health and psychosocial effects of flexible working hours. Rev Saude Publica. 2004;38 Suppl:11-8.

[13]Butler AB, Grzywacz JG, Ettner SL, Liu B. Workplace flexibility, self-reported health, and health care utilization. Work Stress. 2009;23(1):45-59.

[14]Swanberg JE, Simmons LA. Quality jobs in the new millennium: incorporating flexible work options as a strategy to assist working families. Soc Serv Rev. 2008;82(1):119-47.

[15]Casey PR, Grzywacz JG. Employee health and well-being: the role of flexibility and work-family balance. Psychol-Manag J. 2008;11(1): 31-47.

[16]Jacob JI, Bond JT, Galinsky E. Six critical ingredients in creating an effective workplace. Psychol-Manag J. 2008;11(1):141-61.

[17]Ulione MS. Physical and emotional health in dual-earner family members. Fam Community Health. 1996;19:14-20.

[18]Galinsky E, Bond JT, Friedman DE. The role of employers in addressing the need of employed parents. J Soc Issues. 1996 Fall96;52(3): 111-36.

[19]Halpern DF. How time-flexible work policies can reduce stress, improve health, and save money. Stress Health. 2005;21:157-68.

[20]Golden L, Wiens-Tuers B. To your happiness? Extra hours of labor supply and worker well-being. J Socio-Econ. 2006;35(2):382-97.

[21]Trinkoff AM, Le R, Geiger-Brown J, Lipscomb J, Lang G. Longitudinal relationship of work hours, mandatory overtime, and on-call to musculoskeletal problems in nurses. Am J Ind Med. 2006;49(11):964-71.

[22]VanDer Hulst M, Geurts S. Associations between overtime and psychological health in high and low reward jobs. Work Stress. 2001;15(3):227-40.

[23]Rod NH, Grønbæk M, Schnohr P, Prescott E, Kristensen TS. Perceived stress as a risk factor for changes in health behaviour and cardiac risk profile: a longitudinal study. J Intern Med. 2009;266(5):467-75.

[24]Russell E. Lovely T. Kentucky worksite wellness tax credit health impact assessment. Paper presented at: Making Worksite Wellness Work for You, Trends 2011 Conference; 2011; Louisville, KY.

[25]Linnan LA, Bowling M, Childress J, Lindsay G, Blakey C, Pronk S, Wieker S, Royall P. Results of the 2004 National Worksite Health Promotion Survey. Am J Public Health. 2008;98(8):1503-9.

Acknowledgements

The authors would like to thank Dr. Diane Loeffler and Laura Hilliard for their hard work conducting interviews and writing the case studies for the full report. We also thank the participating organizations for their commitment to employee health and for their willingness to share their practices. Finally, we are grateful to the panel of employers who reviewed the HealthIntegrated Model and offered feedback and advice:

Jody Ensman
Health & Wellness Program Manager
University of Kentucky

Stephanie Marshall
Owner
Well by Design

Barbara Hawkins
Health and Safety Manager
LG&E and KU

Rose Douglass
Executive Vice President
Director of Human Resources
Central Bank and Trust

Bridgett Rice
Manager, Administrative Services
Community Action Council

Jan LaBonde
Client Service Manager
Benefit Insurance Marketing

Nancy Spivey
Chief Operating Officer and SVP
Workforce Talent Solutions
Northern Kentucky Chamber of Commerce

Lynn Bertsch
Director, Employer Engagement
UK iwin

Health Literacy in Kentucky:
Observations from the Health Literacy Colloquium Series

Jennifer Dupuis, H. Dan O'Hair & Michael T. Childress

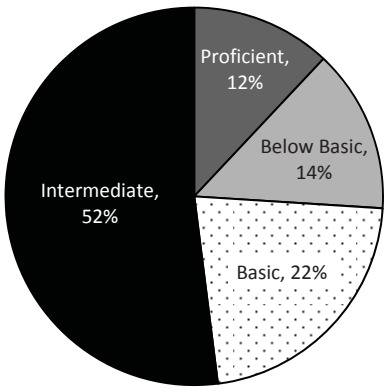
Health literacy is recognized as an important contributing factor not only to the health and well-being of people in general, but also to healthcare costs and our nation's economy. Yet, a 2003 study found that only 12 percent of adults had proficient health literacy, meaning, for example, they can find the definition for a medical term in a complex document or match a legal document to a specific medical situation. To gain a statewide view of health literacy issues in Kentucky, research scientists at the University of Kentucky's College of Communications and Information Studies conducted a series of ten colloquia to learn about unique programs and activities throughout Kentucky. This chapter presents some of the findings.

Health literacy is defined as "the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions." This definition is usually attributed to a 2004 report by the Institutes of Medicine,[1] though it was first used by the National Library of Medicine and the *Healthy People 2010* report in 1999.[2] In the past decade, since the concept was introduced, health literacy has been recognized as an important contributing factor not only to the health and well-being of people in general, but also to individual healthcare costs, business expenses, and the overall economy.

The cost of low health literacy to the national economy is an estimated $106 billion to $238 billion annually.[3] A person with low health literacy is less likely to understand prescription and self-care instructions, resulting in higher incidences of medication and treatment errors that can lead to more costly healthcare needs; less likely to seek regular care that can prevent chronic and emergency illnesses; and more likely to be hospitalized.

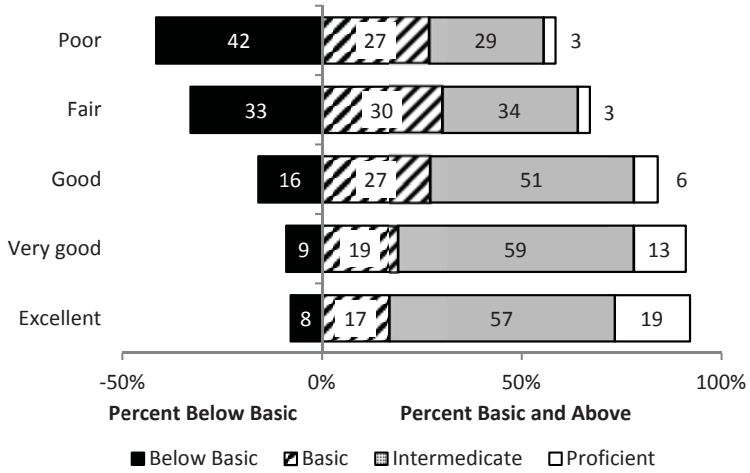
At two-and-a-half times the OECD average, the U.S. spends more on health care than any other industrialized country, leading some to conclude that expanding health care costs are hurting U.S. global competitiveness.[4] An estimated sixty percent of U.S. firms offer health benefits to their workers, with average annual premiums for employer-sponsored health insurance costing $5,429 for single coverage and $15,073 for family coverage.[5] Compared to 2010, premiums for single coverage in 2011 were 8 percent higher while family coverage was 9 percent higher.[6] Containing healthcare expenses will be difficult unless the health literacy of Americans improves significantly.

FIGURE 1
Health Literacy of U.S. Adults (NAAL, 2003)



The National Assessment of Adult Literacy (NAAL) measured health literacy in Americans for the first time in 2003.[7] As shown in Figure 1, the study found that only 12 percent of adults had *proficient* health literacy, meaning, for example, they can find the definition for a medical term in a complex document or match a legal document to a specific medical situation. 53 percent had *intermediate* health literacy (ability to correctly interpret a prescription drug label or read a chart to determine the appropriate age for childhood vaccines), 22 percent had *basic* (understand a clearly-written health pamphlet), and 14 percent had *below basic* health literacy (may not be able to understand a medical appointment form).

FIGURE 2
Percentage of Adults in Each Health Literacy Level, by Self-Assessment of Overall Health, 2003



Note: Detail may not sum to totals because of rounding. Adults are defined as people 16 years of age and older living in households or prisons. Adults who could not be interviewed because of language spoken or cognitive or mental disabilities (3 percent in 2003) are excluded from this figure.
Source: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2003 National Assessment of Adult Literacy.

NAAL compared these results to the self-reported overall health of adults, and found a correlation between overall health and health literacy; those with *excellent* or *very good* overall health were less likely to have *below basic* health literacy, while those with *poor* or *fair* overall health had higher incidences of *below basic* health literacy levels (see Figure 2).[8]

According to the 2011 America's Health Rankings report, Kentucky is ranked 43rd in overall health, particularly due to high rates of chronic disease.[9] More than 75 percent of health care costs are due to chronic conditions such as heart disease, cancer, stroke, diabetes, and arthritis.[10] Many patients have multiple chronic conditions and their care costs up to seven times as much as those with one chronic condition.[11] Much of the chronic disease is caused by four *preventable* health risk behaviors—lack of exercise, poor nutrition, smoking, and heavy alcohol consumption.[12] When compared to the U.S. as well as states that are widely considered to be Kentucky's competitors for economic development prospects, Kentuckians are more likely to smoke, be obese, and not engage in regular physical activity—but are slightly less likely to be heavy drinkers (see Table 1).[13] Over 62 percent of Kentuckians demonstrate at least one of these four behaviors that put them at risk of developing a chronic disease, compared to 57 percent for the competitive states and 54 percent for the United States (see Figure 3).[14] Moreover, nearly one-quarter of Kentucky adults exhibit multiple chronic disease causing behaviors (see Figure 4).

Because our overall health is comparatively low, we can speculate that the health literacy of Kentuckians tends more to the *below basic* and *basic* levels, compared to the rest of the country. Improving health literacy among Kentuckians would likely improve the health and well-being of our citizens. Unfortunately, while programs for health literacy have been proposed, tested, refined and re-imaged with relative frequency, strong metrics for establishing health literacy as a *bona fide* healthcare strategy have been elusive.

TABLE 1
Four Risk Behaviors that Contribute to Chronic Disease, U.S., Competitive States, and Kentucky, 2008-2010

Adults, 18 and Older	US (%)	CS (%)	KY (%)
Current Smoker	17.9*	20.1*	25.2
Obese	27.3*	29.1*	31.5
Lack of Physical Activity	24.6*	26.3*	29.8
Heavy Alcohol Consumption	5.1*	4.7	4.3

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, 2008-2010
Note: The competitive states are AL, AR, FL, GA, IL, IN, LA, MI, MO, MS, NC, OH, SC, TN, VA, & WV.
**These percentages are statistically different from the Kentucky percentages (alpha=.05).*

The University of Kentucky Colloquium Series on Health Literacy

To gain a statewide view of health literacy issues in Kentucky, research scientists at the University of Kentucky's College of Communications and Information Studies conducted a series of ten colloquia over one academic year (2010 – 2011). Each colloquium featured four local experts in health, outreach, policy making, or research, plus a moderator. We strove for variety in discipline and geographic area, in order to foster creative discussion and learn about unique programs and activities throughout Kentucky. In some cases, panelists were selected based on discussions during the colloquia or through recommendations of panelists (a form of snowball sampling).

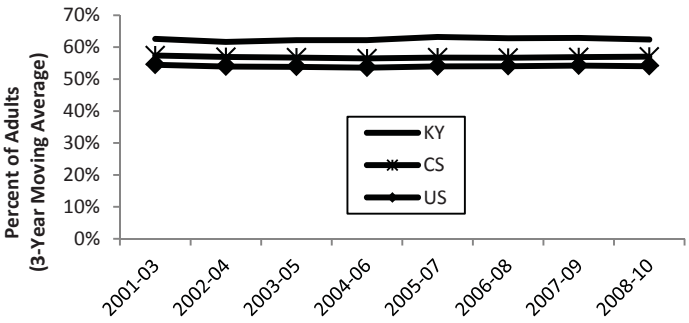
The forty panelists that comprised the ten colloquia were classified into five broad categories: healthcare, advocacy/grassroots, media, government, and University of Kentucky experts (see Figure 5). Healthcare panelists included executives from hospital and health centers such as Cardinal Hill Rehabilitation Center; advocacy/grassroots professionals represented non-profit state organizations (for example, the United Way of the Bluegrass and Kentucky Voices for Health); Kentucky journalists comprised the media category; a state senator and state representative, in addition to local councilmembers and commissioners represented the government; and University of Kentucky experts included faculty and clinical professionals from several Colleges, including Communications, Dentistry, Medicine, and Business (refer to Table 2).

Analysis of Colloquium Data

Each hour-long colloquium was recorded in video format, transcribed, and made available on our College's website.[15] In order to reduce the large data set to a manageable level that allowed more sophisticated analysis, a proven qualitative analysis technique known as constant comparative analysis, which is based on grounded theory,[16] was employed. Consistent with Glaser and Strauss' formulation of the constant comparative method process, four steps were taken in this analysis. First, key ideas were marked with a series of codes extracted from the text. Second, extracted codes were grouped into similar concepts. Third, concept categories (and labels) were formed from these concepts. Fourth, continuous iterative coding was employed to reduce categories and refine elements within them. Eight concept categories resulted:

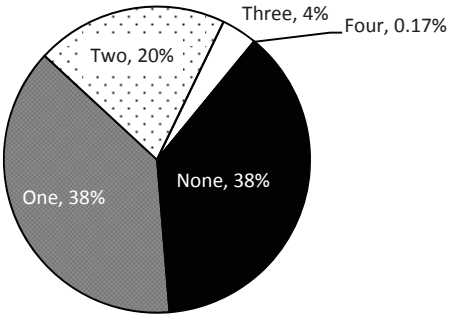
1. About the Colloquium
2. About Health Literacy
3. Resources – Specific
4. Resources – General
5. Competencies/Skills
6. Barriers/Obstacles
7. About the Healthcare System
8. About Healthcare

FIGURE 3
At Risk for Chronic Disease,*
US, KY, and Competitive States (CS), 2001-2010



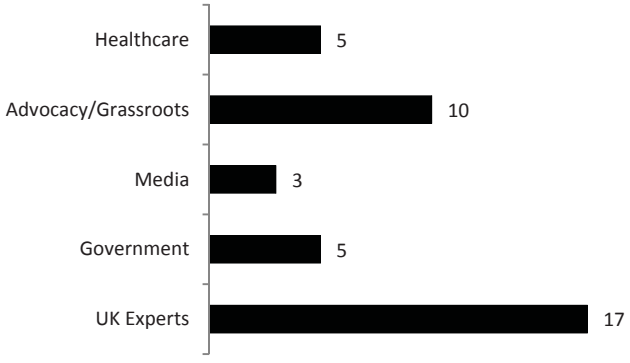
**Demonstrates at least one of the at-risk behaviors for developing chronic disease: smoking, obesity, physical inactivity, or heavy alcohol consumption.*
Source: Authors' analysis of Behavioral Risk Factor Surveillance System data

FIGURE 4
Percent of Kentucky Adults by Number of Chronic Disease Risk Behaviors, 2008-2010



Source: Authors' analysis of Behavioral Risk Factor Surveillance System data

FIGURE 5
Health Literacy Colloquium Panelists, 2010-2011



About the Colloquium: The first category captured comments that expanded or reinforced the role that the College's colloquium series can or should play in the improvement of health literacy in Kentucky. Our original intent was primarily to identify health literacy resources and programs that are already in place in Kentucky that can be replicated or used as a benchmark for programs in underserved areas of the state; this is reinforced when Dean Dan O'Hair (University of Kentucky College of Communications and Information Studies) stated in the sixth colloquium that the goal is to develop an understanding of assets in the state that can be brought to bear in the improvement of health literacy. According to his perspective universities should be adept at leveraging best practices and adapting the best research that can be found, while at the same time conducting new research. Adapting research to a specific community's needs through asset mapping is an applied research strategy that can have lasting results.

In the second colloquium, University of Kentucky Provost Kumble Subbaswammy affirmed that these discussions also coincide with the objectives of the university: "a lot of the research that goes on, approximately 60 to 70 percent of the research that takes place on campus, has to do with health outcomes, disease, and disease prevention. So, that plays a very critical role in the University's research mission." And Lexington-Fayette Urban County Government Council Member At-Large Steve Kay, in the ninth colloquium, talked about how the University's research should contribute to the community and indicated that the colloquium series is a step in the right direction; Kay said "this is not just about health, but one of my longstanding interests is improving town-gown collaboration and communication, and I think the College of Communications is really doing a lot in that arena."

About Health Literacy: This category encompasses perspectives and ideas on the concept of health literacy – how it is defined, how to measure

TABLE 2
Colloquium Panelists 2010-2011

Panelist Name	Title	Organization
David Adkisson	President	Kentucky Chamber of Commerce
Kristen G. Brown	Clinical Administrator	University Health Service, University of Kentucky
Jane Bryant	Medical Librarian	University of Kentucky
Tom Burch	State Representative	Kentucky General Assembly
Michael Childress	Policy Research Analyst	University of Kentucky
Elisia L. Cohen	Assistant Professor	College of Communications and Information Studies, University of Kentucky
Leslie J. Crofford	Director	Clinical Research Development and Operations Center, University of Kentucky
Julie Denton	State Senator	Kentucky General Assembly
William "Bill" Farmer	President	United Way of the Bluegrass
William Hacker	Commissioner	Kentucky Department for Public Health
Dwain Harris	Director	Southern Kentucky Area Health Education Center
Torrie T. Harris	Assistant Professor	College of Public Health
Beth Hunter	Director of Research	Cardinal Hill Rehabilitation Hospital
Charles Jackson	Project Manager	The Humana Foundation
Tara Kaprowy	Chief Blogger	Kentucky Health News
Steve Kay	Councilman	Lexington Fayette Urban County Government
Jane Kirschling	Dean	College of Nursing, University of Kentucky
Stephanie Lamar	Network Director	Green River Regional Health Council
Jamie Lucke	Editorial Writer	Lexington Herald Leader
Debra Miller	Director of Health Policy	Council of State Governments
Jodi Mitchell	Executive Director	Kentucky Voices for Health
M. Raynor Mullins	Public Health Dentist and Emeritus Faculty	College of Dentistry, University of Kentucky
Deborah Murray	Associate Director	Health Education through Extension Leadership (HEEL)
Seth M. Noar	Associate Professor	University of North Carolina, Chapel Hill
James Norton	Associate Dean	College of Medicine, University of Kentucky
H. Dan O'Hair	Dean	College of Communications and Information Studies, University of Kentucky
Andrea L. Pfeifle	Director	UK Center for the Advancement of Interprofessional HealthCare (CAIPH)
Phil Schervish	Grants Coordinator	Norton Cancer Institute
Sheila Schuster	Executive Director	Advocacy Action Network
Robert M. Shapiro	Clinical Reference Librarian	University of Kentucky
Robert Slaton	Former Executive VP, University Health Care (UHC)	School of Medicine, University of Louisville
Pamela Stein	Research Scientist	College of Dentistry, University of Kentucky
Kumble R. Subbaswamy	Provost	University of Kentucky
David T. Susman	Psychology Services Coordinator and Director	The Recovery Mall, Eastern State Hospital
Lee Todd	President	University of Kentucky
James W. Tracy	Vice President for Research	University of Kentucky
Timothy S. Tracy	Dean	College of Pharmacy, University of Kentucky
Bernie Vonderheide	Chairman and Founder	Kentuckians for Nursing Home Reform
Emery A. Wilson	Dean	College of Medicine, University of Kentucky
Jan Winter	Journalist and Founder	The Kentucky Children's Health and Fitness Fund

it, and the cost of health literacy – and its role in the provider-patient relationship, the importance of plain language, and general literacy and illiteracy issues. In the second colloquium, Mike Childress, a policy research analyst at the University of Kentucky, succinctly explained why health literacy behavior is complex and affects everyone: "We all know that smoking's bad for you; there are people with PhDs who smoke—probably PhDs in health sciences who smoke. They know, yet they still do it. I know that eating ice cream and birthday cake is bad for me, and I still do it."

In that same discussion, Dr. Pamela Stein, a research scientist in the College of Dentistry at the University of Kentucky, noted that "it's difficult to tell at what reading level your patient is at, and most of the things that I am reading on health literacy is that we should be—everybody, universally, a universal precaution if you will—[designing] all reading materials at fifth grade level or below." Many panelists described the importance of creating health messages that are understandable by and motivating to all segments of our population.

Resources – Specific: Along with the following category (Resources – General), the information gathered here provided the content of an asset map of resources that can be used to improve health literacy or can serve as models for exemplary health literacy activities. Specific resources identified included people, organizations, partnerships, statistics and reports, and programs; see below for exemplars of organization, report, and program in Kentucky.

Resources – General: Assets such as community leaders, the grassroots concept, incentives, education, technology, messages, and research comprise this broad category. For Kentucky, the concept of grassroots initiatives emerged throughout the series as an essential way to reach rural populations. In the third colloquium, Stephanie Lamar, the network director for the Green River Regional Health Council in the Green River Area Development District (see below: exemplar organization), explained that "regarding the motivation, as people receive [health literacy] education, when you're down there with them on a grassroots level, and you're communicating with them, they're getting motivated, and they're getting excited, and it's all, again, about the grassroots initiative."

David Susman, the psychology services coordinator at The Recovery Mall at Eastern State Hospital, discussed how to create powerful, motivating messages in the eighth colloquium: "I think you have to balance providing accurate facts but also touching people's feelings. Because we know that human stories do touch people's feelings and we know that many times that's going to motivate change even more effectively than just the facts." Additionally, panelists discussed in depth how to use technology to deliver health literacy messages, and whether the digital divide in Kentucky limits the power of technology in this effort. Local newspapers were called upon to fill the technology gap, but obstacles exist preventing journalists from fulfilling that need. In the eighth colloquium, Tara Kaprowy, the chief blogger at Kentucky Health news, explained "We didn't want the newspaper to be telling our readers what to do. So we had to be very careful not to be judgmental, or not to come across as being judgmental. . . . I think that there are three big challenges with health literacy when you're writing about health. One, to get the stories written in the first place, to find the time; two, to write it in a way that people can understand; and three, to write it in a way most importantly that people will want to keep reading."

Competencies/Skills: Personal competencies and skills – what an individual already possesses that can help develop better health literacy – were the subject for this category. Education, motivation, literacy, accessibility to messages and services, and openness to behavior modification are competencies that were mentioned throughout the series. In the sixth colloquium, Leslie Crofford, the director of the University of Kentucky Clinical Research Development and Operations Center, reinforced that personal competencies are vital when she stated that "the most important determinants of health are education, and health behaviors, and those two things really don't have all that much to do with doctors."

Barriers/Obstacles: On the flip side of competencies and skills, barriers and obstacles are individual or community issues that can prevent health literacy and healthy behaviors. For example, a community may suffer from a lack of funding, lack of educational resources, and a general culture of pride that can hinder health education. An individual may lack access to healthcare providers,

have a fear of doctors, or have been exposed to competing dialog which is confusing or misleading.

Socioeconomic factors and education were often cited as significant barriers to health literacy in Kentucky, as described by William Hacker, the Commissioner of the Kentucky Department for Public Health, in the second colloquium: "if we don't deal with the socioeconomic factors, if we don't deal with education in the state, we are going to be at the bottom of the barrel, and we're going to be the sickest state. So in terms of a public health point of view, if I could just improve educational outcomes at elementary school, high school, and college or community college or four-year universities, I know that I'm going to have a healthier group."

About Healthcare System: The healthcare system is complex, and often an area where health literacy breaks down. This category captured information about insurance, politics, healthcare reform, healthcare costs, and regulations and policy that affect healthcare. Debra Miller, the Director of Health Policy for the Council of State Governments, opened her comments in the first colloquium by stating "how illiterate many, many, many of us are about health care and health insurance; [for example] what's the difference between your deductible and your out-of-pocket maximum and do you understand that pre-existing conditions exist."

In the tenth colloquium, Dean Dan O'Hair indicated that even the basic driving forces of the healthcare system are up for debate, "given the extensive discussion that is going on right now about healthcare reform and many people trying to dichotomize the debate between should we spend our money on prevention or should we be addressing current health needs." In this environment of confusion, the general healthcare consumer suffers as policymakers attempt to balance corporate and political pressures with the importance of community health. More than a few panelists from the colloquium series expressed a similar state of conundrum. Investing in health literacy may not pay obvious dividends for some time and convincing legislators and policymakers to accept some level of delayed gratification for long-term benefits is often a tough sell.

About Healthcare: The final category was used to identify comments that pertained to a specific type of healthcare. The subcategories were oral health, mental health, child health, family health, elder health, outcomes, and health of Kentuckians. These categories were applied in conjunction with other comments, and are useful for tracking discussions about particular areas of healthcare.

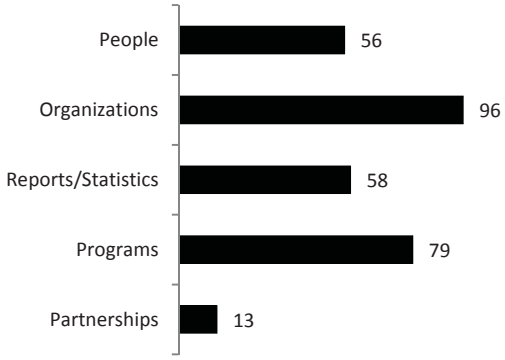
Health Literacy Resources in Kentucky

Our analysis identified a number of existing, specific resources (Category 3, Resources – Specific) that contribute to health literacy improvement, including people, organizations, reports and statistics, programs, and partnerships (see Figure 6). Several of these resources are active exemplars of health literacy efforts in Kentucky, and can be considered models for future efforts throughout the Commonwealth.

Exemplar Organization—The Green River Area Development District: Stephanie Lamar is the network director for the Green River Regional Health Council in the Green River Area Development District,[17] which serves five rural counties (Hancock, Ohio, McLean, Union, and Webster) and two urban counties (Henderson and Davis). Lamar, in the third colloquium, stated that "our mission is—our vision is—we want to improve the health and quality of life for the citizens that live within our region. And we know we have to do that through education, motivation, and evaluation. And we truly are a grassroots initiative."

The Health Council informs its communities about health issues and solutions through local facilitators, who write weekly columns in local newspapers about relevant health concerns. They conduct lunch and learn sessions within the communities; one attendee reported later that the information she learned in the lunch session helped

FIGURE 6
Resources Identified in the Colloquium Series, 2010-2011



her know when she was having a heart attack and quickly receive care. Billboard campaigns are also reaching individuals in the area communities. Lamar claims "when you go into the rural communities . . . I think the key is finding the right people to get on your bus," and that has contributed to her Council's success.

***Exemplar Report*—**The New Health Reform Law: What it Means for Kentuckians (Kentucky Voices for Health): This 12-page brief outlines the Patient Protection and Affordable Care Act of 2010 that was passed in March 2010, and includes a timeline of changes to healthcare coverage and information in plain language to help Kentuckians understand how they will be affected.[18] Jodi Mitchell, the executive director of Kentucky Voices for Health, states that her organization is "not taking a position on whether [the new health reform law is] good or bad. We're simply trying to get the information out because it is law currently, and we want folks to know how Kentuckians can benefit from it."

The report is available in paper format and online, and it helps Kentuckians navigate the new healthcare system and "dispel any concerns and clarify what individuals might be hearing."

***Exemplar Program*—**Health Education Through Extension Leadership (School of Environmental Sciences, College of Agriculture, University of Kentucky): HEEL, Health Education Through Extension Leadership,[19] was established in 2002 with a grant from the United States Department of Agriculture. According to Deborah Miller, the associate director, "the philosophy of the program is that we utilize the extension system, where we have professional people in every county in the state of Kentucky, to collaborate with our health partners in the academic health centers here at UK. . . . as well as with the Kentucky Department of Public Health."

The success of the program is measurable: "In 2002, when our program was founded, 36,027 people – Kentuckians – reported making lifestyle changes as a result of being involved in extension programs. Most of those were nutrition. By 2010, that number had increased to 103,000, so we know we're reaching Kentuckians."

Conclusion

As health care costs continue to increase, so does interest in programs, policies, and strategies to boost health literacy, improve health, and contain costs. In addition to the exemplars described above, wellness programs described in the previous chapter can utilize various strategies to boost health literacy. Common characteristics of wellness programs include weight loss programs, smoking cessation programs, personal health coaching, classes in nutrition or healthy living, web-based resources for healthy living, or a wellness newsletter.[20] To incentivize adoption of wellness programs, states are responding with legislation ranging from insurance premium discounts to tax credits.[21] Research indicates that wellness programs are cost-effective at a broad level, with medical costs falling about $3.27 and absenteeism cost falling around $2.73 for every dollar spent.[22]

The colloquium series was spawned as a means to identify human and programmatic assets that could improve health literacy levels that bear directly on the Commonwealth's economic vitality and growth. Asset mapping is a proven technique for exposing gaps in services and for highlighting best practices that can be leveraged by collateral programs or professionals. In one sense, the colloquium series served as a portal for linking likeminded individuals through an invisible college or emerging network for health literacy. The long-term implications of this network will not be known for some time to come.

The content generated in the ten colloquia, from the forty expert panelists, contains innovative thoughts on the current issues, resources, and complexity of health literacy and the healthcare system in Kentucky. The information has been categorized into relevant categories and subcategories, enabling researchers to focus on themes and ideas of interest. Analysis on the range of themes and topics is leading to new research initiatives, partnerships, and networks that are actively engaged in improving health literacy for all of our communities.

After the series of ten colloquia, the College of Communications and Information Studies at University of Kentucky and the panelists reflected on the uniqueness and usefulness of the colloquium series, and determined that the network development, asset mapping, and current events discussions remain relevant and identify useful trends. Consequently, the College has continued the series into the 2011-2012 academic year, with two

colloquia held in the Fall semester and two planned for the Spring semester. All of the colloquium discussions can be viewed on the College's website (http://cis.uky.edu/hl/colloquium), and transcripts for each of the colloquia are available there as well. Visitors to the website are encouraged to make comments on the content and make their own contribution to Kentucky's health literacy.

---

[1]Institute of Medicine Committee on Health Literacy. *Health Literacy: A Prescription to End Confusion*. 2004

[2]Health Literacy: A Challenge for American patients and their healthcare providers. Ratzan and Parker, 2000.

[3]Vernon, J. A., Trujillo, A., Rosenbaum, S., & DeBuono, B. (2007). *Low health literacy: Implications for national policy*.

[4]Toni Johnson, "Healthcare Costs and U.S. Competitiveness," Council on Foreign Relations, March 23, 2010, online at <www.cfr.org>.

[5]The average cost to the firm is $10,944 for family coverage and $4,508 for single coverage. *Employer Health Benefits, 2011 Summary of Findings*, Kaiser Family Foundation/Health Research & Educational Trust, September 2011, online at <http://ehbs.kff.org/pdf/8226.pdf>.

[6]Ibid.

[7]Kutner, M., Greenberg, E., Jin, Y., and Paulsen, C. (2006). The Health Literacy of America's Adults: Results From the 2003 National Assessment of Adult Literacy (NCES 2006–483). U.S. Department of Education. Washington, DC: National Center for Education Statistics.

[8]Kutner, M., Greenberg, E., Jin, Y., and Paulsen, C. (2006). The Health Literacy of America's Adults: Results From the 2003 National Assessment of Adult Literacy (NCES 2006–483). U.S. Department of Education. Washington, DC: National Center for Education Statistics.

[9]United Health Foundation, America's Health Rankings, www.americashealthrankings.org

[10]Chronic Disease, Centers for Disease Control and Prevention (CDC), online at <http://www.cdc.gov/chronicdisease/resources/publications/AAG/chronic.htm>.

[11]Mark W. Stanton, *The High Concentration of U.S. Health Care Expenditures*, Agency for Healthcare Research and Quality (AHRQ), Issue 19 (June 2006), online <http://www.ahrq.gov/research/ria19/expendria.htm>.

[12]CDC, online at <http://www.cdc.gov/Features/LiveLonger/?source=govdelivery>. Also see Ford ES, Zhao G, Tsai J, Li C. "Low-risk lifestyle behaviors and all-cause mortality: Findings from the National Health and Nutrition Examination Survey III Mortality Study," *American Journal of Public Health*, published online ahead of print August 18, 2011.

[13]The competitive states are AL, AR, FL, GA, IL, IN, LA, MI, MO, MS, NC, OH, SC, TN, VA, & WV.

[14]Kentucky's estimate is statistically difference from the competitive states and the U.S. ($p<.05$).

[15]https://cis.uky.edu/hl/colloquium

[16]Glaser, B. (1978). Theoretical sensitivity. Mill Valley: Sociology Press; Glaser, B., & Strauss, A. (2006). The discovery of grounded theory: Strategies for qualitative research. Chicago: Aldine. (Original work published 1967); Strauss, A. & Corbin, J. (1998). Basics of qualitative research: Techniques and procedures for developing grounded theory (2nd ed.). Thousand Oaks: Sage.

[17]http://www.gradd.com/

[18]http://kyvoicesforhealth.com/reform.html

[19]http://www.ca.uky.edu/hes/?p=6

[20]*Employer Health Benefits, 2011 Annual Survey*, Kaiser Family Foundation/Health Research & Educational Trust, September 2011, online at <http://ehbs.kff.org>, p. 189.

[21]State Wellness Legislation, 2006-2010, National Conference of State Legislatures, July 2010, online at <http://www.ncsl.org/?TabId=13826>.

[22]Katherine Baicker, David Cutler, and Zirui Song, "Workplace Wellness Programs Can Generate Savings," *Health Affairs* 29, No. 2 (2010).

Notes

Kentucky Annual Economic Report 2012
Center for Business and Economic Research
335BA Gatton Building
University of Kentucky
Lexington, KY 40506-0034

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

Non-Profit Organization
U.S. Postage PAID
Permit No. 51
Lexington, KY

UNIVERSITY OF KENTUCKY

Gatton
COLLEGE OF BUSINESS AND ECONOMICS

CBER

ADDRESS SERVICE REQUESTED

DATED MATERIAL
PLEASE RUSH