



CENTER FOR BUSINESS AND ECONOMIC RESEARCH

The Effects of Education across the Kentucky Economy

The Center for Business and Economic Research (CBER) (Gatton College, University of Kentucky) was commissioned by Kentucky's Council for Postsecondary Education to examine the implications of education across the Kentucky economy. This study used data on Kentuckians from the American Community Survey (ACS), the Behavioral Risk Factor Surveillance System (BRFSS), the Uniform Crime Reports (UCR), the Bureau of Labor Statistics (BLS), and the Bureau of Economic Analysis (BEA). The focus on Kentucky is unique, as most studies of this kind have used only national data. The results have allowed us to examine how education is related to important outcomes related to the Kentucky economy. These studies have also allowed for the unique opportunity to examine and compare the impact of education within different regions of the Commonwealth.

Seven outcomes were examined in the study: income and earnings, employment, state income tax revenues, Medicaid, health, crime, and participation in the Supplemental Security Income (SSI) and Supplemental Nutrition Assistance Program (SNAP) programs. Overall, the results of each study show that the present educational attainment levels in Kentucky cost the state in myriad ways. According to the 2013 ACS estimates, approximately 21.5% of Kentuckians have a Bachelor's Degree or higher, while the U.S. average sits at 28.8%; similarly, 7% of Kentuckians have earned an Associate's degree, while the U.S. average is 8%. If Kentucky were to obtain the same average education levels as the U.S., per capita earnings would rise by over 3.5% and over 4,600 Kentuckians would move off unemployment rolls.

The benefits of higher income and decreased unemployment have cascading effects throughout the economy. Again, if Kentucky education levels were raised to meet the current U.S. levels, the state income tax revenues would rise by as much as \$500 million, helping to ease state budget crises. In addition, increasing education throughout the state would save over \$200 million in Medicaid expenditures, further easing state budgets and allowing legislators to use those resources for the benefit of the citizens of the Commonwealth.

It's not just state budgets that benefit from increased education; it also significantly improves health outcomes, reduces crime rates, and decreases reliance on public assistance programs. In terms of health, these estimates suggest that we could reduce the costs of chronic disease (specifically heart disease and diabetes) by nearly \$200 million per year. These are costs that accrue to Kentucky citizens and businesses both in health services and in lost work days. Similarly, achieving a higher education level would save the state approximately \$3 million in costs associated with crime. It would also move over 5,000 Kentucky families off food stamps and over 20,000 adults off SSI.

Many have argued that education only benefits citizens in the Urban Triangle (Lexington, Louisville, and Northern Kentucky). This study examined the implications of education at the regional level within Kentucky. Kentucky was divided into four regions: Eastern Kentucky, Western Kentucky, South Central Kentucky, and the Urban Triangle. While the gain from education does vary across the regions, the differences are typically small. A Bachelor's degree in the Urban Triangle adds 52% to an individual's earnings, while in Eastern Kentucky it adds 47%. However, in Eastern Kentucky, an Associate's degree adds 28% to earnings, while this same degree in the Urban Triangle only adds 27%.

The results across regions for employment are also striking. The unemployment rate for college graduates is 4.8% lower than for high school graduates. In the Urban Triangle it is 5% lower, while in Eastern Kentucky it is 5.5% lower! Perhaps more importantly, education has profound effects on labor force participation. Labor force participation for high school graduates ranges from a low of 54.4% in Eastern Kentucky to 73.7% in the Urban Triangle. But the labor force participation for college graduates is 77% in Eastern Kentucky and 83% in the Urban Triangle. College graduates are more likely to have jobs.

A more complete picture of each topic can be found by looking at the briefs in their entirety. They are available on CBER's web site on the publications tab or from UKnowledge.



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ISSUE BRIEF

on topics affecting Kentucky's economy

October 2015

Education Pays Everywhere!

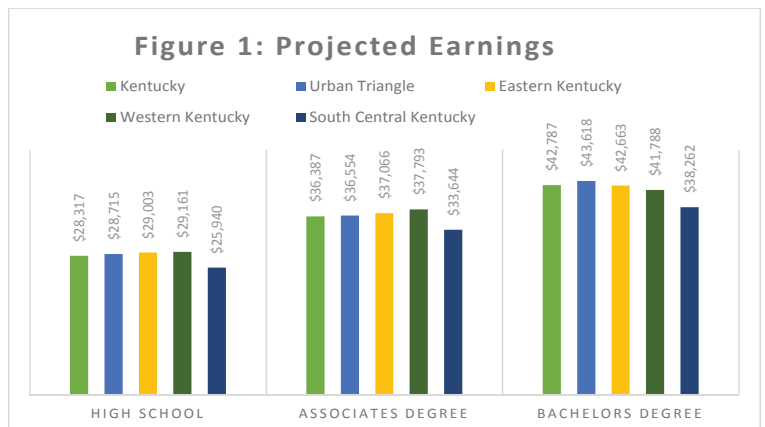
By Christopher R. Bollinger (crboll@uky.edu)*

Economists and other researchers have long demonstrated the relationship between education and earnings. In this brief, we focus on the relationship between educational attainment and earnings in the state of Kentucky. Our results, in many ways, are unsurprising, as the old ad campaign said, "Education Pays." What may be surprising is that we demonstrate that education pays not only in the big cities of Lexington and Louisville, but also in the more rural parts of the state, such as eastern Kentucky and western Kentucky.

The American Community Survey (ACS) for the years 2009-2013 is the source of our data. We use statistical methods designed to isolate the impact of education on earnings from the many other known factors such as age and gender which affect earnings as well. Overall, we find that residents of Kentucky who have an Associate's degree earn approximately 29% more than Kentuckians with a high school diploma. The average high school graduate in the state earns \$28,317 a year. That 29% premium for an Associate's degree represents \$8,070 per year in their paycheck or a total annual income of \$36,387. Kentuckians who hold a Bachelor's degree earn 51% more than their friends with only a high school diploma. This translates into \$14,470 additional income every year, or total earnings of \$42,787.

Many Kentuckians worry that these premiums are only achievable if they leave home and move to the metropolitan areas of the state. Our data allow us to examine this question by focusing on smaller regions. We focus on four different regions: the Urban Triangle, Western Kentucky, Eastern Kentucky, and South Central Kentucky.**

In Figure 1, we present the overall state results, as well as the results for people living in each of these four regions (all projections are presented in Table 1 at the end of the document). Over half of the state's population lives and works in the Urban Triangle. For individuals residing in this area, an Associate's degree pays 27% more than a high school diploma and a Bachelor's pays 52% more than a high school diploma. What may be surprising to learn is that individuals



who live outside the urban areas (combining Eastern, Western and South Central), gain 29% higher wages with an Associate's degree compared to those with only a high school education. Similarly, a Bachelor's degree leads to an average 46% higher earnings than their high school educated counterparts.

*This research was funded by the Council on Postsecondary Education (CPE) to study the relationship between education and outcomes such as income, employment levels, health, public assistance use, and crime.

**The Urban Triangle includes the Louisville, Lexington, and greater Cincinnati metropolitan areas and surrounding counties. Eastern Kentucky includes Bath, Bell, Boyd, Bracken, Breathitt, Carter, Clay, Fleming, Floyd, Greenup, Harlan, Jackson, Johnson, Knott, Knox, Laurel, Lawrence, Lee, Leslie, Letcher, Lewis, Magoffin, Martin, Mason, Menifee, Montgomery, Morgan, Owsley, Perry, Pike, Robertson, Rockcastle, Rowan, Whitley, and Wolfe counties. Western Kentucky includes Ballard, Caldwell, Calloway, Carlisle, Christian, Crittenden, Daviess, Fulton, Graves, Hancock, Henderson, Hickman, Hopkins, Livingston, Lyon, Marshall, McCracken, McLean, Muhlenberg, Ohio, Todd, Trigg, Union, and Webster counties. South Central Kentucky includes Adair, Allen, Barren, Breckinridge, Butler, Casey, Clinton, Cumberland, Edmonson, Grayson, Green, Hart, Larue, Logan, Marion, McCreary, Metcalfe, Monroe, Nelson, Pulaski, Russell, Simpson, Taylor, Warren, Washington, and Wayne counties.

Kentuckians earn 29% more with an Associate's degree and 51% more with a Bachelor's degree.

A BA in Eastern or Western Kentucky pays approximately \$12,000 more per year.

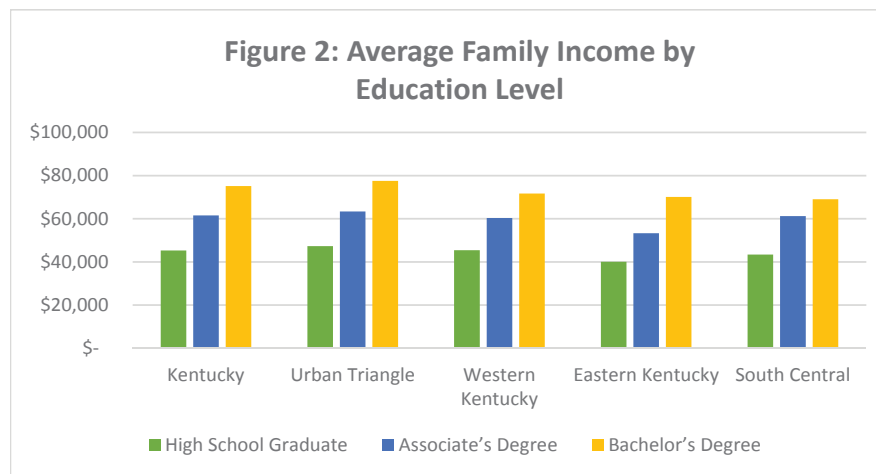


There is some variation across the four regions, with salary estimates for college graduates being the highest in Eastern Kentucky and the lowest in Western Kentucky. But even in Western, where a Bachelor’s degree returns 43% higher earnings, this translates into \$12,000 higher earnings every year or \$41,788 in annual income.

If Kentucky were to increase the number of individuals with an Associate’s or Bachelor’s degree by 1%, this translates into a 0.5% increase in per capita earnings or a shift from \$33,723 to \$33,949 per year. If Kentucky education levels were equivalent to the U.S. levels, per capita earnings would be 3.5% higher. This translates into a \$1,100 per year increase in per capita income, on average. This shift would move Kentucky from 47th to 43rd in per capita earnings compared to other states.

Family earnings increase by 56% for college graduates versus high school diploma holders.

In Figure 1, we focus on individual earnings and only for those between the ages of 21 and 64. In order to see the larger picture, Figure 2 examines how family income is affected by the education level of the head of the household. The



results are striking. A family where the head of the household has an Associate’s degree has 29% higher total income than a family where the householder is a high school graduate. Even more striking, earning a Bachelor’s degree leads to a 56% higher family income than the family headed by a high school graduate. As we saw in the comparison of labor market earnings, this comparison is quite similar across all the regions. Most striking is the difference that

an education makes to family in Eastern Kentucky. As we explore in “Want a Job? Get a College Degree,” this is largely due to participation in the labor market.

While individuals may have experiences that differ from these averages, the overwhelming evidence is that education leads to higher incomes, both through earnings and other avenues. Individuals and families with higher education fare much better through our state, whether it be the Urban Triangle, the beautiful hills of Eastern Kentucky, or the rich plains of Western Kentucky.

Table 1: Average Individual Earnings Projection by Level of Education

	High School Graduate	Associates Degree		Bachelors Degree	
	Annual Earnings	Average Earnings Projection	% Increase Compared to High School	Average Earnings Projection	% Increase Compared to High School
Kentucky	\$28,317	\$36,387	29%	\$42,787	51%
Urban Triangle	\$28,715	\$36,554	27%	\$43,618	52%
Eastern Kentucky	\$29,003	\$37,066	28%	\$42,663	47%
Western Kentucky	\$29,161	\$37,793	30%	\$41,788	43%
South Central Kentucky	\$25,940	\$33,644	30%	\$38,262	48%



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Crime and Punishment and Education

By Christopher R. Bollinger (*crboll@uky.edu*)*

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Overall, higher education is associated with lower crime rates in the general population.

Crime impacts the lives of Kentuckians in myriad ways. It has direct costs to victims and indirect costs through property values and business activity. Citizens and policymakers alike desire to reduce and limit crime. In this brief, we investigate the link between crime rates in Kentucky's counties and the aggregate level of education. Perhaps surprisingly, higher education, and specifically the percent of the population with a Bachelor's degree, is associated with lower crime. We find that increasing educational attainment in Kentucky to the U.S. levels could reduce the costs of crime by over \$3 million annually.

We use data from the Uniform Crime Reporting Program Data Series (UCR) as well as data from the Bureau of Economic Analysis to estimate the relationship between higher education and crime. Our results use statistical techniques which allow us to isolate how changes within a county in the education level will impact the crime rate. Our models focus on the total crime rate**, violent crime rate***, and property crime rate**** for counties in the state of Kentucky. The average rate of violent crime for the state of Kentucky across this time was 0.15%, or 15 violent crimes per 10,000 people. The average property crime rate was 0.29%, or 29 property crimes per 10,000 people.

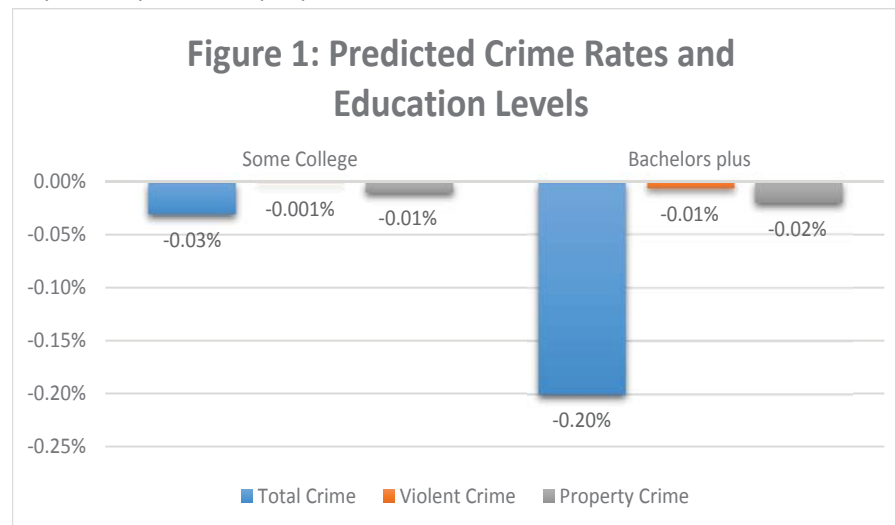


Figure 1 presents the model estimates of how predicted crime rates would change as 1% of the people in a county were to move from having a high school diploma to obtain either some college (typically an Associate's degree) or a Bachelor's degree (or higher). By moving 1% of the population into a Bachelor's degree, we would reduce vio-

If higher education rates increased by 1%, all crime would drop. If more individuals earned a Bachelor's degree, total crime could be reduced by as much as 20 crimes per 10,000 people.

lent crime by about 1 crime per 10,000 people.

*This research was funded by the Council on Postsecondary Education (CPE) to study the relationship between education and outcomes such as income, employment levels, health, public assistance use, and crime.

**Total crime includes violent crimes and property crimes below, plus: other assaults, forgery/counterfeiting, fraud, embezzlement, having stolen property (buying, receiving, or possessing), vandalism, weapons violations, prostitution, sex offenses, drug abuse and violations (several categories), gambling, alcohol related issues like drunk and disorderly or DUIs, loitering, and runaways.

***"Violent crime is composed of four offenses: murder and nonnegligent manslaughter, rape, robbery, and aggravated assault. Violent crimes are defined in the UCR Program as those offenses which involve force or threat of force." (FBI Uniform Crime Reports, 2013)

****"Property crime includes the offenses of burglary, larceny-theft, motor vehicle theft, and arson. The object of the theft-type offenses is the taking of money or property, but there is no force or threat of force against the victims." (FBI Uniform Crime Reports, 2013)



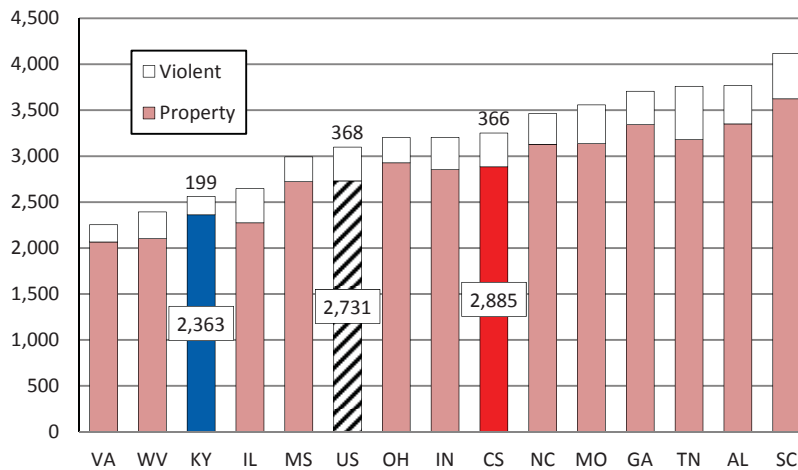
Similarly property crime would fall by about 2 crimes per 10,000 people. Total crime makes the most dramatic shift between high school and college, falling approximately 20 crimes per 10,000.

Economists have long provided estimates of the societal costs of crime. Using those estimates, violent crime costs Kentucky \$2.7 billion in a typical year, while property crime costs \$1.3 billion. Our estimates suggest that simply moving 1% of the population from high school to Bachelor's degrees would reduce violent crime costs by \$160,000 each year and property crime costs by \$540,000 each year. Were we to achieve U.S. levels of education, we would reduce violent crime costs by nearly \$1 million and property crime costs by over \$2.5 million.

While Kentucky is generally a safe place to live, our crime rate is lower than the U.S. average and most of the competitor states, as depicted in the graph below from the CBER Annual Report. By increasing education, we can further reduce crime throughout the Commonwealth and its price tag to communities.

Increasing higher education would also translate into dollars saved by the state in terms of costs associated with crime. For the state of Kentucky, if U.S. education levels were achieved costs associated with crime could be reduced by almost \$3.5 million.

**Crime Rate,
 Kentucky, Competitor States, and the U.S., 2013**
 (rate per 100,000 persons)



Source: US Federal Bureau of Investigation



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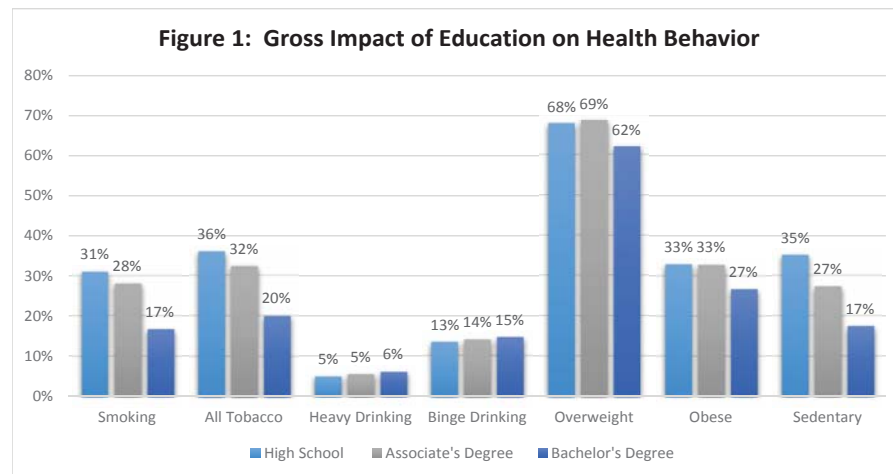
Education for Your Health!

By Christopher R. Bollinger (crboll@uky.edu)*

The health of the people of Kentucky is of high concern for policymakers and citizens alike. Individuals want to live healthy, productive lives, while policymakers recognize that chronic illnesses cost the state in myriad ways. In this brief, we examine the link between educational attainment and health outcomes. We focus on two groups of health outcomes. The first are behavioral and include choices: tobacco use, alcohol use, obesity, and exercise. The second group are outcomes highly associated with these behaviors: heart attack, angina, stroke, and diabetes. The Center for Disease Control (CDC) estimates that these four diseases may cost Kentuckians over \$5 billion annually in lost days at work and medical bills. Our simulations suggest that if Kentucky were to achieve education levels comparable to the U.S., we could reduce those costs by nearly \$200 million per year.

With the exception of alcohol consumption, higher education leads to improved health behaviors. We also find that higher education is associated with lower rates of all four diseases. We use data from the Behavioral Risk Factor Surveillance System (BRFSS) for the years 2009 through 2012 to examine these questions. These data represent a comprehensive sample of Kentuckians and provide information on prevalence of these conditions. Our models control for other factors such as race, gender, age, and employment. We examine two education impacts: the gross impact and the impact net of income. It is well known that high income is often associated with better health. We measure the gross impact of education on health which may work through income as well as other channels, and the net effect of education, controlling for income levels.

Figure 1 presents the impact of education for seven behavioral factors: smoking, all tobacco use, heavy drinking, binge drinking, overweight, obese, and sedentary.



binge drinking, overweight, obesity, and lack of exercise (sedentary lifestyle). Each of these factors has been well documented to be associated with chronic health conditions such as diabetes and heart disease. With the exception of the two alcohol consumption measures, a Bachelor's degree is strongly associated with lower rates of these negative behaviors. Indeed,

those with a Bachelor's degree have about half the incidence of smoking and tobacco use compared to high school graduates. They are also more likely to participate in regular exercise activities. Rates of obesity and overweight among college graduates are 20% and 10% lower (respectively) than their high school graduates. The only behaviors that have a positive association with higher education are related to alcohol consumption.

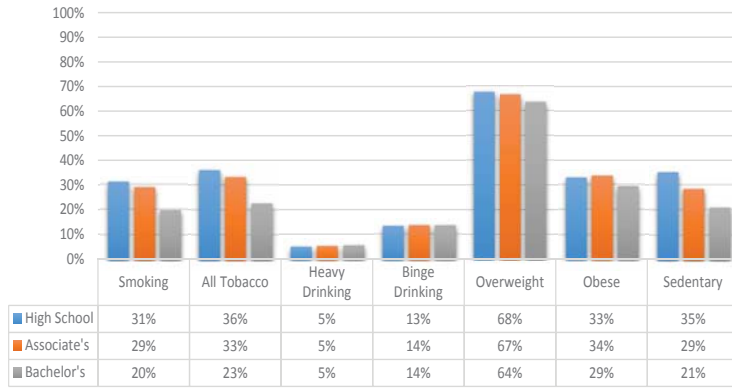
*This research was funded by the Council on Postsecondary Education (CPE) to study the relationship between education and outcomes such as income, employment levels, health, public assistance use, and crime.

Individuals with a Bachelor's degree are 50% less likely to smoke or use tobacco products, which decreases their likelihood of developing chronic diseases such as diabetes and heart disease.



Even when we control for income, college graduates report healthier outcomes, with the exception of alcohol consumption.

Figure 2: Net Education Effect on Health Behaviors

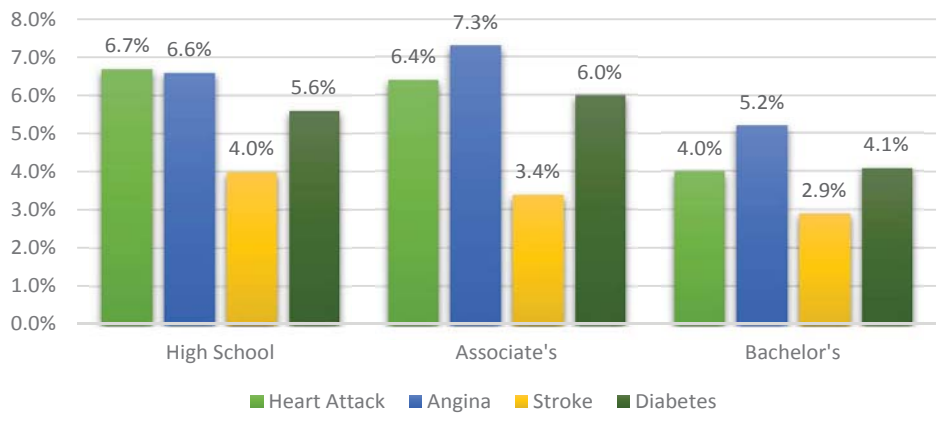


In Figure 2, we present the education effect on the seven behaviors. However, in this model, we control for income. What is surprising here is that, with the exception of the alcohol consumption measures, very little has changed in the relationship between behaviors associated with chronic disease and level of education. Far from being simply an income effect, education appears to lead individuals to adopt a healthier lifestyle. The exception to this is alcohol consumption. When we control for income, the differences in alcohol consumption between high school and college graduates, become much smaller. The higher alcohol consumption among college graduates in Figure 2 appears largely to work through the income channel.

The higher alcohol consumption among college graduates in Figure 2 appears largely to work through the income channel.

We turn next to actual incidence of diseases. In Figure 3, we compare the differences in diagnosis rates for four important chronic diseases: heart attack, angina, stroke, and diabetes. For each of these four diseases, the rates are lower among those with college degrees. Individuals with a college degree reduce their rates of heart attack by 40%, angina by 20%, stroke by 28%, and diabetes by 27% compared to those with a high school diploma.

Figure 3: Education Effect on Chronic Disease Risk



Increasing the number of college graduates by 1% (both Associate's and Bachelor's degree holders), the predicted incidence of heart attack and stroke decreases by 0.3%.

Using our models we predict the possible reduction in overall rates of these diseases through changes in higher education. If Kentucky could increase the rates of Associate's and Bachelor's degrees each by only 1%, we would reduce rates of heart attack and stroke by 0.3%, and diabetes by 0.1%. This small change in educational attainment could result in a cost savings of over \$6 million annually. By achieving education attainment rates comparable to the rest of the U.S., Kentuckians could save nearly \$200 million annually in health care related costs.

Increasing the overall education level of the state could save the state of Kentucky almost \$200 million in health care costs.

The results are clear: Kentuckians with a higher level of education lead healthier lives. Increasing education could save the state millions of dollars annually in healthcare costs and potentially increase worker productivity by reducing illness-related absences.



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Impact of Education on Medicaid Eligibility

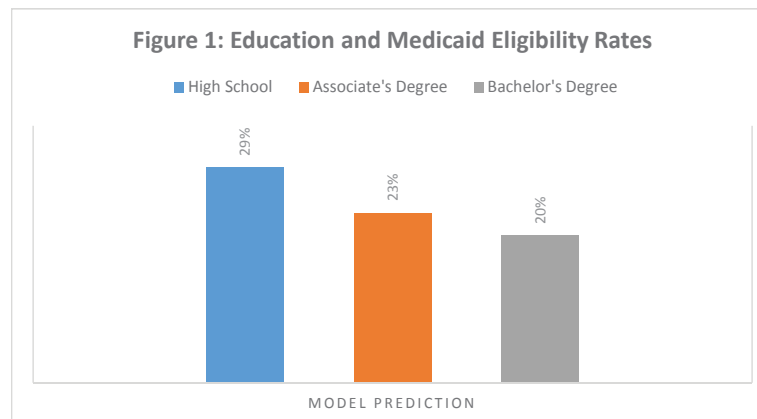
By Christopher R. Bollinger (crboll@uky.edu)*

Our results suggest that the state of Kentucky could reduce Medicaid costs by \$27 million if we were to increase our education levels modestly.

The individual mandate of the Affordable Care Act (ACA) coupled with the Medicaid expansion in Kentucky makes reducing Medicaid eligibility rates of crucial importance. This brief examines the link between education and eligibility for Medicaid for the citizens of Kentucky. In general, the relationship is nearly mechanical in that higher education leads to higher incomes. Since income is the key determining factor of Medicaid eligibility, and because of the individual mandate eligibility is mostly equivalent to participation, our estimates show that higher education reduces the likelihood that an adult will be on Medicaid or have children and family members on Medicaid. Our results suggest that the state of Kentucky could reduce Medicaid costs by \$27 million if we were to increase our education levels modestly and as much as \$200 million if we can achieve education levels comparable to the U.S.

We use the American Community Survey (ACS) for the years 2009 through 2013 (the latest data available). Rather than measure actual Medicaid participation, however, we use eligibility under the new Medicaid expansion rules for Kentucky. Adults who live in households with incomes less than 138% of the poverty level are eligible for Medicaid coverage**. For children and pregnant women, the eligibility threshold is 200% of the poverty level. We focus only on those individuals who are under the age of 65, since Medicare applies to those over 65.

Adults are eligible for (and because of the individual mandate, presumably will participate in) Medicaid if their family income is under 138% of the poverty line. We begin by examining how the rate of eligi-



bility in the Kentucky population is associated with education. Using statistical techniques, we isolate the effect of education on eligibility from other factors such as race, gender, age, and marital status. Figure 1 presents this relationship. Overall, 29.3% of adults with a high school diploma are eligible to participate in Medicaid. We predict that obtaining a college degree would reduce that rate by 9.3 percentage points to 20%. Similarly by obtaining an Associate's

degree, the eligibility rate would fall by 6.2 percentage points to 23.1%.

Obtaining a college degree reduces the rate of Medicaid eligible adults to 20% from 29%.

*This research was funded by the Council on Postsecondary Education (CPE) to study the relationship between education and outcomes such as income, employment levels, health, public assistance use, and crime.

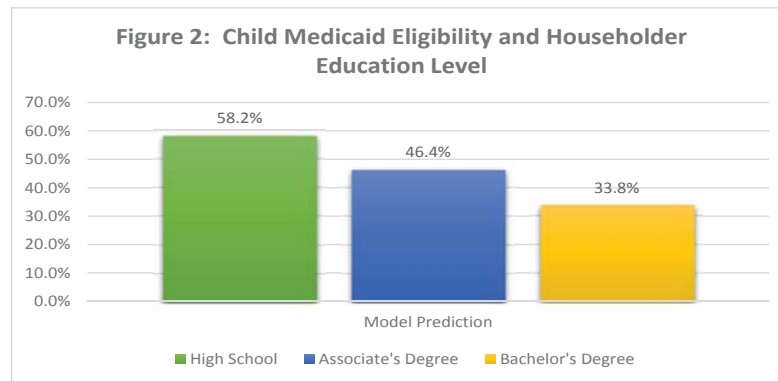
**In 2013, for a household of four people, the poverty level was \$23,834, according to the U.S. Census Bureau.



As the education level of head of household adults increases, the rate of eligibility for Medicaid of children in these households decreases.

These predictions hold constant other aspects of individuals in Kentucky with a high school diploma, such as their gender, their family structure, and labor market conditions such as unemployment of where they live. In general, changes in education often lead to changes in some of these characteristics (for example family structure), and thus our results may be an understatement of what would happen were those individuals to obtain a college degree.

In Figure 2, we examine how child eligibility is impacted by the education level of the household in which the child lives. This focuses the discussion on education of adults. As with our adult model,



we isolate the impact of education from other factors such as the family size and the local labor market. Eligibility rates are, in general, higher for children since the income eligibility threshold is higher (at 200% of the poverty line). Our model predictions are quite similar though: higher education of the adults will lower the eligibility rate of their children. Overall, 58.2% of children living in households where the householder has a high school diploma

are eligible for participation in Medicaid. Our model predicts that if those heads of household were to obtain a college degree, the rate of participation would drop nearly in half by 24.4 percentage points to 17.1%. Similarly, if we move heads of household from high school graduates to Associate's degrees, the child Medicaid eligibility rate would fall by 11.8 percentage points to 46.4%.

Translating this into costs is difficult due to the changing cost structure from the expansion and the individual mandate. The Kaiser Foundation suggests that adult participants in the Medicaid program cost approximately \$5,000 per year, while child participants cost approximately \$2,900 per year. It is likely that these figures are an overstatement as we move from voluntary participation to the individual mandate. However, if we use these estimates and increase Associate's and Bachelor's degree levels by 1%, we speculate this would reduce total Medicaid expenditures in the state by \$27 million. If Kentucky were to achieve education rates comparable to the U.S., the savings could be as high as \$200 million.

If Kentucky's education rates matched the U.S. average, the state could save up to \$200 million in annual Medicaid expenses.

The relationship between household income and education, coupled with the new ACA individual mandate and the Medicaid expansion, means that improving educational attainment in Kentucky is crucially important to containing future Medicaid costs.



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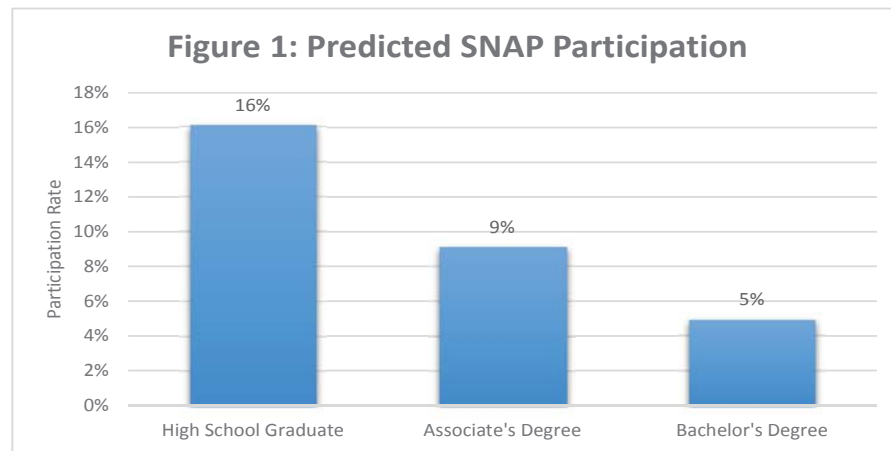
Moving People Off Public Assistance Programs Through Education

By Christopher R. Bollinger (crboll@uky.edu)*

Increasing the education levels of Kentuckians can reduce expenditures on the SSI and SNAP programs by over \$100 million each year.

Two of the largest federal transfer programs are the Supplemental Nutrition Assistance Program (SNAP) and Supplemental Security Income (SSI). Federal expenditures on SNAP exceeded \$74 billion in 2014, and SSI exceeded \$3 billion. While these programs provide families in distress with important support, ideally we desire that Kentucky families would not require this kind of assistance. In 2014, over 800,000 Kentuckians received SNAP assistance each month while over 190,000 received SSI. This brief examines the relationship between participation in these programs and educational attainment for Kentuckians. We find that education is highly related to participation and that those with higher education are much less likely to participate. By increasing educational attainment in Kentucky to the U.S. level, we can move people off of these means tested programs saving over \$100 million annually.

We use the American Community Survey (ACS) for the years 2009-2013 to examine this question. The ACS is well suited to addressing this question as it provides detailed demographic data, including education, as well as data on participation in these programs. The data also allow us to focus on Kentucky. We use statistical models to isolate the impact of education from other known characteristics associated with participation in these programs. In our data, about 17% of families in Kentucky qualified for SNAP during the period we study.



In Figure 1, we present the predicted participation rates for families headed by different levels of education. We find that while families headed by high school graduates have a base participation rate of approximately 16%**, the participation rate of those families where the head of the household has an Associate's degree

Only 5% of college graduates are predicted to participate in the SNAP program, compared to 16% of high school graduates.

decreases by 7% to an overall rate of 9%. Only 5% of college graduates are predicted to participate in the SNAP program, an 11% reduction compared to high school graduates.

We estimate that by simply adding 1% to Associate's degrees and Bachelor's degrees, we could reduce Kentucky's participation rate by 0.3%, moving over 5,000 families off food stamps. The typical family in Kentucky receives a benefit of \$244 per month. The resulting savings would be \$14 million annually. If Kentucky could achieve education rates equivalent to the U.S. average participation would drop by 2%, moving over 33,000 households off food stamps, and saving over \$99 million annually.

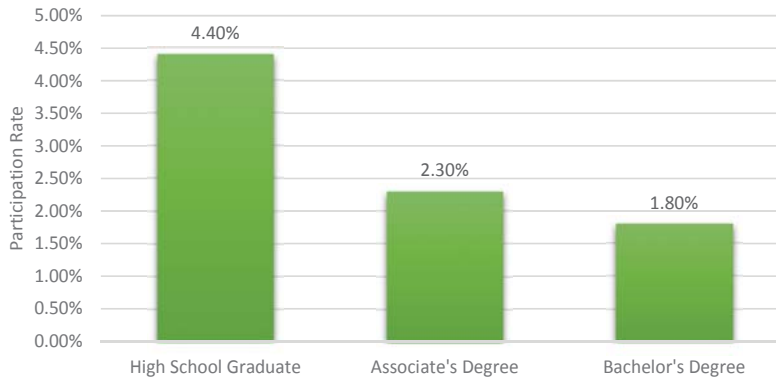
*This research was funded by the Council on Postsecondary Education (CPE) to study the relationship between education and outcomes such as income, employment levels, health, public assistance use, and crime.

**The reason the overall average is higher than these three groups is that families headed by a high school dropout participate at a staggering 35% rate. We focus on high school and above here.



The Supplemental Security Income (SSI) program provides income for individuals who are disabled and poor. In our analysis, we focus on adults who are under 65, although the program does provide benefits for children and seniors. One might be skeptical that education would matter here, but the data reveal that it does. Overall, about 4.7% of adults under 65 in Kentucky receive SSI benefits. Figure 2 provides our model results for the differences in participation between high school graduates and those with an Associate's or Bachelor's degree. Approximately 4.4% of individuals with a high school diploma receive SSI benefits. Our model shows that individuals with an Associate's or Bachelor's degree have a 2.1 or 2.6 percentage point lower participation rate: dropping participation more than half. Our model predicts that only 2.3% of Associate's degree holders and only 1.8% of Bachelor's degree holders would receive SSI.

Figure 2: Predicted SSI Participation Rates



For adults under the age of 65, having a college degree drops predicted SSI participation rates by half.

Approximately 4.4% of individuals with a high school diploma receive SSI benefits. Our model shows that individuals with an Associate's or Bachelor's degree have a 2.1 or 2.6 percentage point lower participation rate: dropping participation more than half. Our model predicts that only 2.3% of Associate's degree holders and only 1.8% of Bachelor's degree holders would receive SSI.

Given that this program is designed to benefit those with disabilities, it may seem odd that participation falls so dramatically with education. There are a number of mechanisms by which this relationship manifests itself. Perhaps the most important, is that the typical jobs for which those with high school diplomas qualify are physically demanding. It is difficult for workers with physical disabilities to perform those jobs. This is significantly less true of the white collar jobs typically obtained by those with a college degree. Education allows individuals with disabilities the opportunity to have a rewarding career and provides opportunities which can mitigate other risks in life.

Increasing the number of college graduates by 1% in each degree type (Associate's and Bachelor's degrees) would reduce SSI related costs by over \$10 million.

Our estimates suggest that were Kentucky to increase educational attainment of Associate's and Bachelor's degrees by 1%, we could reduce participation in SSI by 0.1%. This would reduce SSI roles by approximately 4,000 individuals and payments by over \$2 million. Similarly, were Kentucky to achieve the same educational attainment as the U.S. average, SSI participation would fall by 0.5%. This would reduce SSI roles by 20,000 individuals, reducing costs by over \$10 million.

Education provides opportunities for people to support themselves. Many studies have shown that individuals are happier and more satisfied when they can provide their own means of support and support their families. Moving individuals and families off of these kinds of means tested transfer programs should be a priority for the state of Kentucky, and an effective way to do that is through education.



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How to Raise State Revenue without Raising Taxes

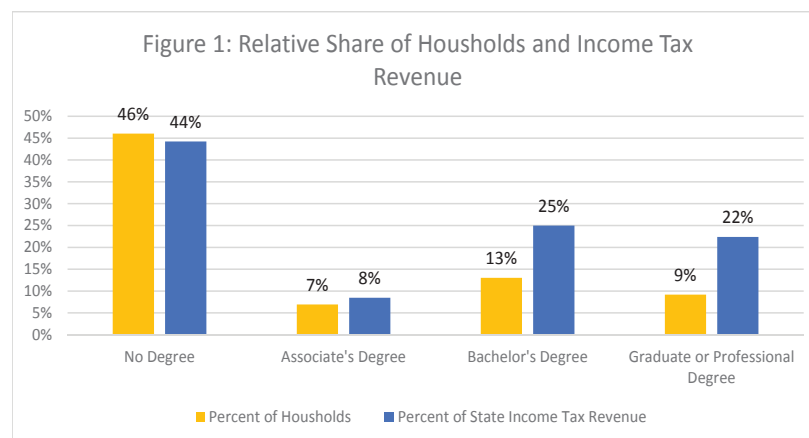
By Christopher R. Bollinger (crboll@uky.edu)*

Tax revenues would increase by up to \$500 million per year if Kentucky education levels were increased to meet national averages.

A positive relationship exists between educational attainment and earnings, which has been well established in the literature through multiple studies. This, in turn, influences the revenues generated for the state of Kentucky through the personal income tax. We predict even the modest change of increasing Associate's and Bachelor's degree holders by 1% would increase revenue by \$37 million. Kentucky loses between \$300 million and \$500 million in state tax revenues every year because our educational attainment is lower than the national average.

We use data from the American Community Survey (ACS) and the TAXSIM program, provided by the National Bureau of Economic Research (NBER), to estimate the amount that households in Kentucky pay in state income tax. We focus only on state income tax. Our estimates are for tax year 2011, the last year for which data and simulation modules are available. While our estimates are based on a simulation, but are quite comparable to the actual revenue of 2011.

Figure 1 presents a summary of our overall estimates for the state. We present the share of household and the share of state income tax revenues paid by those households.



Families headed by someone without any type of college degree contribute about 44% of total personal income tax revenues while making up 46% of total households. In contrast, families headed by someone with an Associate's degree contribute about 8.5% of the personal income tax revenues, while making up only 6.9% of all households.

Most importantly, families headed by a person with a Bachelor's degree make up only 13% of households, but contribute 25% of the total state income tax revenue. The 9% of families headed by someone with graduate or professional degrees contribute 22% of total state income tax revenue.

Using these data, we've estimated the difference in taxes paid across the levels of educational attainment. We control for family structure and other demographic characteristics known to be associated with earnings. Thus, our results and our simulation here isolate the impact of education. A simple simulation is to ask what would happen if 1% of the households moved from being headed by high school graduate to being headed by a person with an Associate's degree. Using our projections, we estimate that total state income tax revenues would rise by 0.2%.

*This research was funded by the Council on Postsecondary Education (CPE) to study the relationship between education and outcomes such as income, employment levels, health, public assistance use, and crime.

Families headed by an individual with a Bachelor's degree comprise only 13% of the Kentucky population but contribute 25% of the total state income tax revenues.



Increasing the number of income earners with a college degree could potentially increase state tax revenues by \$37 million (1%) each year.

In 2013-14 tax year, that would amount to an additional \$6.9 million in tax revenues. Similarly, moving that group to have a Bachelor’s degree would increase state income tax revenues by 0.8%, amounting to over \$30 million in additional revenues. Doing both would increase the revenues by over \$37 million.

We use our simulation to compare Kentucky educational attainment to the rest of the country. We ask the following question: how much additional revenue would be generated if the education distribution in Kentucky was similar to the education distribution in the U.S. as a whole? The simulation suggests that this change would generate between 9.9% and 14.3% more in state income tax revenues. This shift translates into revenue ranging between \$370 million and \$534 million.

One might be concerned, however, that these individuals who obtain higher education would end up worse off after taxes. This assumption does not reflect reality. A complete analysis of how education impact income and earnings can be found in our “Education Pays” Brief.

Table 1: Average Family Income Earnings Projection by Level of Education

	High School Graduate	Associate's Degree		Bachelor's Degree	
	Annual Earnings	Average Earnings Projection	% Increase Compared to High School	Average Earnings Projection	% Increase Compared to High School
Kentucky	\$28,317	\$36,387	29%	\$42,787	51%
Urban Triangle	\$28,715	\$36,554	27%	\$43,618	52%
Eastern Kentucky	\$29,003	\$37,066	28%	\$42,663	47%
Western Kentucky	\$29,161	\$37,793	30%	\$41,788	43%
South Central Kentucky	\$25,940	\$33,644	30%	\$38,262	48%

Shifting from having a high school diploma to an Associate’s degree amounts to an additional \$8,000 per year in income or a 29% increase.

Total household income increases quite substantially when the head of the household moves from holding only a high school diploma to holding either type of postsecondary degree examined in the model. For example, gaining an Associate’s degree increases average household income by \$8,070. Our predictions suggest that these individuals would only have to pay an additional \$346 in state income taxes, leading to a net gain of \$7,724 per year in income. Similarly, a household moving from a high school diploma household to a Bachelor’s degree householder, would pay somewhere between \$1,560. The net gain, after taxes would be over \$12,900 when Federal income taxes are included, the Associate’s degree holder still nets an additional \$6,770 per year, while the Bachelor’s degree holder nets \$10,500.

Increasing education in the state of Kentucky will not only improve the financial well-being of our citizens, but it will help our state government to balance the budget as well.



CENTER FOR BUSINESS AND ECONOMIC RESEARCH

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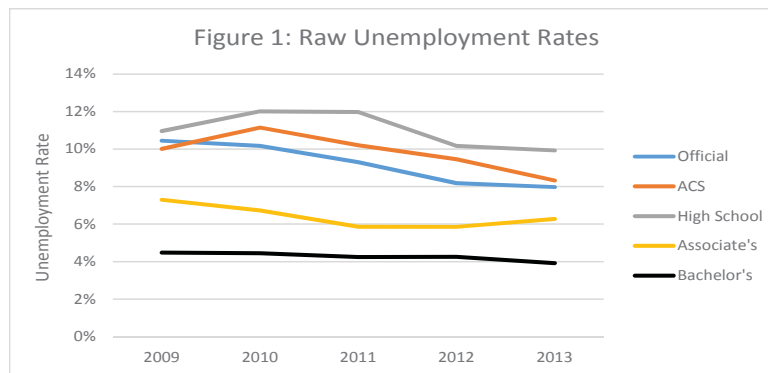
Want a Job? Get a College Degree

By Christopher R. Bollinger (crboll@uky.edu)*

While it is well known that a positive relationship exists between educational attainment and earnings for those who are in the labor market, an important part of how education impacts the well-being of families in Kentucky is the access to employment that it provides. In this brief, we examine the relationship between education and two measures of employment status: unemployment and labor force participation. What we find is quite striking: not only do those with higher education experience less unemployment, they are far more likely to be participating in the labor market. Education leads to better access to employment.

These data are derived from the American Community Survey (ACS) for the years 2009-2013. This annual survey is designed to allow researchers to examine economic and demographic characteristics of the United States population at the national, state, and local level. We use statistical methods designed to isolate the impact of education on our employment measures from the many other known factors such as age and gender which affect earnings as well.

We begin with a brief look at unemployment rates through this period for the state of Kentucky using the compiled data. The official rates, reported by the Bureau of Labor Statistics (BLS), are computed at a monthly level. These data are limited to an annual rate but are similar to those officially reported. Figure 1 shows the simple average annual unemployment rate from the BLS and from our data. The blue line represents the official unemployment rate released by the Bureau of Labor Statistics (averaged across the months), while the orange line represents our estimates based upon the ACS data set. As can be seen in the figure below, they are quite comparable, both in level and in overall trend.



The most important comparison to make via this graphic is to examine the unemployment rates of the various education levels used in the analysis. The grey line represents workers with a high school diploma. The yellow line and the black line represent workers who have either an Associate's or a Bachelor's degree (respectively). In many ways Figure 1 tells the full story: those with a college degree face a much lower unemployment rate than those with only a high school diploma.

Those with an Associate's or Bachelor's degree face a much lower unemployment rate than those with only a high school degree.

In Table 1 (next page), we present our predicted unemployment rates for the entire state of Kentucky and also the four sub-regions (the Urban Triangle, Eastern Kentucky, Western Kentucky and South Central Kentucky**).

*This research was funded by the Council on Postsecondary Education (CPE) to study the relationship between education and outcomes such as income, employment levels, health, public assistance use, and crime.

**The Urban Triangle includes the Louisville, Lexington, and Cincinnati metropolitan areas and surrounding counties. Eastern Kentucky includes Bath, Bell, Boyd, Bracken, Breathitt, Carter, Clay, Fleming, Floyd, Greenup, Harlan, Jackson, Johnson, Knott, Knox, Laurel, Lawrence, Lee, Leslie, Letcher, Lewis, Magoffin, Martin, Mason, Menifee, Montgomery, Morgan, Owsley, Perry, Pike, Robertson, Rockcastle, Rowan, Whitley, and Wolfe counties. Western Kentucky includes Ballard, Caldwell, Calloway, Carlisle, Christian, Crittenden, Daviess, Fulton, Graves, Hancock, Henderson, Hickman, Hopkins, Livingston, Lyon, Marshall, McCracken, McLean, Muhlenberg, Ohio, Todd, Trigg, Union, and Webster counties. South Central Kentucky includes Adair, Allen, Barren, Breckinridge, Butler, Casey, Clinton, Cumberland, Edmonson, Grayson, Green, Hart, Larue, Logan, Marion, McCreary, Metcalfe, Monroe, Nelson, Pulaski, Russell, Simpson, Taylor, Warren, Washington, and Wayne counties.



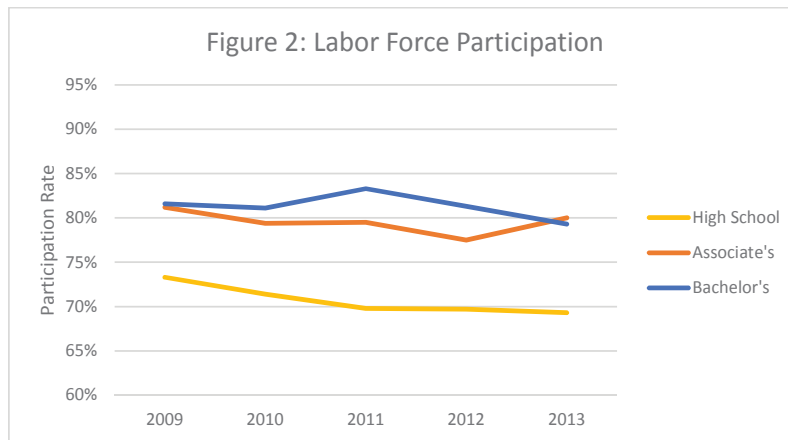
Table 1: Differences in Unemployment Rates by Level of Education

	High School	Associate's (predicted)	Bachelor's (predicted)	Difference between High School and Associate's	Difference between High School and College
Kentucky	9.9%	6.9%	5.1%	-3.00%	-4.80%
Urban Triangle	10.1%	6.8%	5.1%	-3.30%	-5.00%
Western	11.0%	8.5%	7.3%	-2.50%	-3.70%
Eastern	13.0%	11.3%	7.5%	-1.70%	-5.50%
South Central	6.8%	2.8%	2.7%	-4.00%	-4.10%

Even in areas with higher overall unemployment, college graduates are predicted to face decreased chances of unemployment, when compared to people with less education.

We use the 2013 unemployment rate as a baseline. Most important, in every region, the citizens with some postsecondary education faced a substantially lower unemployment rate than those with a high school diploma. Even in Eastern Kentucky, where the unemployment rate was still as high as 13% in 2013, college graduates were facing an unemployment rate of only 7.5%. This rate was lower than the national unemployment rate in 2013 at 8.3%. Our estimates suggest that the total number of unemployed in the state would fall by over 4,600 individuals if Kentucky had the same level of overall educational attainment as the U.S. (1% increase in the number of individuals with an Associate's degree and a 5% increase in Bachelor's degree recipients).

Many have speculated that the college-educated can't find jobs and simply drop out of the labor market in utter despair, which has been coined the "discouraged worker effect." This phenomenon is very real, but the remaining question around this topic is how this effect impacts each educational group. To explore this, we examine labor force participation rates. A person is considered participating in the labor force if they have a job or are classified as unemployed. We focus on individuals between the ages of 20 and 65. Figure 2 presents the baseline labor force participation rates for high school graduates and our model predictions, which isolate the impact of education from other factors.



As can be seen, throughout the entire period, labor force participation for high school graduates fell. While there was some decline for those with a post-secondary education, the decline is less marked and, initially, the rate even rose for college graduates. The evidence is quite clear that those with a post-secondary education are more likely to participate in the labor market, and are less likely to be subject to the discouraged worker effect.

Those with degrees are more likely to be in the labor market and more likely to keep their job through hard times than their high school educated counterparts.

In Table 2, we present our model prediction for labor force participation rates

for the state and for the four regions by education level for 2013. As one might expect, the Urban Triangle has the highest participation rate, in general, at 77.7%, while Eastern Kentucky has the lowest at 52.8%. What is striking is how little the labor force participation rate varies across regions for college graduates. Overall, Bachelor's degree holders participate at a rate of 79% and those with Associate's degrees participate at a rate of 77.2%. Even in Eastern Kentucky, 77.4% of Bachelor's degree holders and 68% of those with Associate's degrees participate in the labor force.

Table 2: Labor Force Participation Rates (2013)

	All	High School	Associate's	College
Kentucky	71.1%	68.4%	77.2%	79.0%
Eastern	52.8%	54.4%	68.0%	77.4%
South Central	67.8%	68.5%	78.4%	77.6%
Urban Triangle	77.7%	73.9%	81.1%	82.9%
Western	66.7%	66.1%	74.8%	80.0%

The conclusion is clear: college education provides access to employment. Those with degrees are more likely to be in the labor market and more likely to keep their job through hard times than high

school graduates.