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The Individual, Regional and State Economic Impacts of Kentucky Community and Technical Colleges

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Executive Summary

This report presents the results of our nine-month effort to measure the economic value of the Kentucky Community and Technical College System (KCTCS), both directly to its students around the state, and indirectly to all residents of Kentucky. We find wide public support for KCTCS, and a willingness to pay for an expansion of its programs. We also find a large variation in the individual returns to community and technical college education, in terms of expected work-life earnings by gender and by region of the state.

The study has essentially three components:

1. An extensive statistical analysis of Census data on Kentucky residents, using measures of educational attainment, age, gender, occupations, and other socio-demographic variables to estimate the increase in work-life earnings of those receiving an associate's degree.

2. A comprehensive statistical analysis using pre- and post-KCTCS earnings for students enrolled during the 2002-03 academic year to estimate the short-run returns from receiving a certificate, diploma or associate's degree.

3. A survey of a representative sample of 3,000 Kentucky households, identifying how much they value KCTCS programs and facilities relative to other public and private goods. This investigation provides estimates of the total value of KCTCS to citizens of the state. This value includes the individual returns measured in the other two components as well as its more subtle and latent contributions to regional economic development and quality of life.

This report provides detailed findings from our research, as well as a discussion of the methods and data used and the academic literature on which it is based. Among the most important and interesting findings of our research are:

- The long-run individual returns to an associate's degree for Kentucky residents show that it is associated with a $245,000 increase in lifetime earnings over that for a high school degree for the typical Kentuckian. This increase in lifetime earnings is approximately a 42 percent increase in lifetime earnings. For men, an associate's degree is associated with a 31 percent increase in earnings; for women, it is associated with a 66 percent increase in earnings.

- We find a fairly large variation by region and gender in the long-run individual returns. For both men and women, the largest returns are in the Ashland-Maysville region, where receiving an associate's degree is associated with a 52 percent increase in lifetime earnings for men and a 150 percent increase in lifetime earnings for women. For men, the smallest returns occur in the Green River region, where receiving an associate's degree is associated with a 17 percent increase in lifetime earnings. For women, the smallest returns occur in the Cumberland region, where receiving an associate's degree is associated with a 52 percent increase in lifetime earnings.

- One of the primary reasons why women experience a larger return from an associate's degree than men is that many women who earn an associate's degree work in health and other professional science and legal occupations, which pay substantially higher earnings than those occupations where women with only a high school diploma work. For men, the difference in occupational earnings is not as great.

- Our short-run estimates of the returns to diplomas and certificates show that both men and women experience substantial increases in earnings immediately after receiving a diploma, with women experiencing a larger percentage increase than men, and that women also experience a substantial increase in earnings immediately after receiving a certificate. For women, receiving an associate's degree or a diploma is associated with a 29 percent short-run increase in earnings, while receiving a certificate is associated with a 10 percent short-run increase in earnings. For men, receiving an associate's degree is associated with a 12 percent short-run increase in earnings, while receiving a diploma is associated with a 9 percent short-run increase in earnings. Men experience no statistically significant short-run increase in earnings from a certificate. Further research with additional data is needed to better understand this finding for certificates. Again, much of the large percentage increase in earnings for women is the result of women receiving degrees, diplomas or certificates in health-related fields.

- Our estimate of the total benefits received by Kentuckians from KCTCS shows that Kentuckians are willing to pay $106 million to increase KCTCS by 10 percent. Since the cost of expanding the system by 10 percent is around $60 million, this shows that Kentucky citizens believe that the benefits of expanding KCTCS are much greater than the cost.

- Although the total benefits people receive from expanding KCTCS do vary by region in the state, we find that there are large benefits in every region in the state. We also find that the amount people are willing to pay to expand the system increases with age, education and income.

From our two investigations of individual returns to education we believe that most of the value citizens place on KCTCS programs flows from their perception of increased personal financial gains, with the remainder due to their valuation of community social benefits – benefits that they would also be willing to pay for. Indeed, the results of our analysis of Census data suggest that all the benefits are individual and therefore, more programs should be financed simply through more tuition revenue. However, for reasons we discuss later, we suspect that this estimate of individual work-life returns, based only on an analysis of associate's degrees, is too large.

If instead, we use our estimates of the short-run individual returns based on student data from KCTCS to estimate the increase in individual returns from a 10 percent expansion in the system, we find that the expansion would produce estimated individual returns of $70 million. This means that our estimate of the public returns from a 10 percent expansion in KCTCS is around 30 percent. However, we believe that this estimate of the individual returns is too low because it is based on earnings differentials immediately after students leave school and previous research has shown that returns to schooling increase over time.

Treating these two estimates as upper and lower bounds suggests the true increase in individual returns from a 10 percent expansion in KCTCS is between 70 and 100 percent of the total returns. If we assume that the true public return is roughly in the middle of our two estimates, the implied public benefits (improved regional economic development opportunities, drop in crime, increase in individual health, better public decision-making) that would occur with a 10 percent expansion of KCTCS is worth approximately $20 million to the citizens of Kentucky.

I. Introduction

When deciding on the optimal allocation of resources across government programs and projects, policy makers and legislators often try to base these decisions on the expected benefit of the program for residents of the state. For many government programs and projects whose output is provided at a substantially reduced cost to the public, and whose output may provide large benefits (or costs) to members of society even if they do not directly consume the product, measuring the economic benefit of many programs is quite challenging. This problem is particularly acute for institutes of higher learning, such as community and technical colleges.

One method frequently used to measure the benefits of a program is an economic impact analysis, which tries to measure the benefits by first measuring the direct spending of a program and then, through the use of multipliers, calculates the impact the direct spending has on an area's economy. However, this method is not appropriate for assessing the impact of public higher education for several reasons. First, the dollars are not generally 'new' to the regional economy. Rather, funds to finance the colleges are primarily raised through taxes and tuition from local and state residents. Second, the economic impacts for institutes of higher learning, whose primary output is more educated citizens, is much more profound and complex than simply tracking current dollar flows. While much of the benefit of more education accrues to the student receiving the education in the form of higher earnings in the future—what is typically referred to as the individual returns to schooling—a significant portion of the benefit accrues to other members of society. More educated workers raise the wages of other workers in an area; more educated workers are less likely to commit crimes; more educated workers are healthier; and more educated workers are more likely to be informed participants in the political process. Thus, the primary benefits from higher education, both for the individual and the public, are completely missed in a conventional economic impact analysis.

Finally, economic impact studies often focus on an irrelevant policy experiment. Impact analysis tries to measure the impact on the economy of shutting down or starting an entirely new program or project. This is appropriate when considering whether to build a new road or a lodge at a state park, but it is not appropriate for considering the allocation of resources to a community and technical college system since policy makers are not considering closing the entire system. Instead policy makers are considering whether to expand or contract the size of the system, so we need to measure the benefits from expanding or contracting the system taking into account that increasing the amount of resources devoted to the community and technical college system reduces the amount of resources devoted to other programs.

Nevertheless, it is possible to measure the benefits from expanding higher education programs such as the Kentucky Community and Technical College System (KCTCS) and to do it in a rigorous way. There has been substantial research on how to best measure the individual returns to higher education, that is, the expected increase in work-life earnings associated with attending college. We use that research methodology here to investigate these gains to Kentuckians. In addition, scholars have developed a method, called contingent valuation, to measure the benefits to society of other government programs such as building a new road or park, cleaning up the

environment or developing a new drug. We can apply this method to measure the overall benefit of expanding KCTCS.

The object of this report is to present a measure of the overall benefits of expanding KCTCS to Kentucky residents. We can divide the overall benefits into two parts: the individual benefits that accrue directly to people who attend a KCTCS school and the public benefits that accrue to all citizens in Kentucky regardless of whether they interact with KCTCS.

We start by measuring the individual returns of an associate's degree over a high school diploma for the residents of Kentucky. We measure this benefit for the state as a whole as well as by regions within the state. While there has been extensive research on the individual returns to higher education in general, and to two-year colleges in particular, this research focuses almost exclusively on the nation as a whole. In order to measure the benefits of expanding KCTCS to Kentucky residents, we estimate the individual returns for only Kentucky using data from the 2000 U.S. Decennial Census.

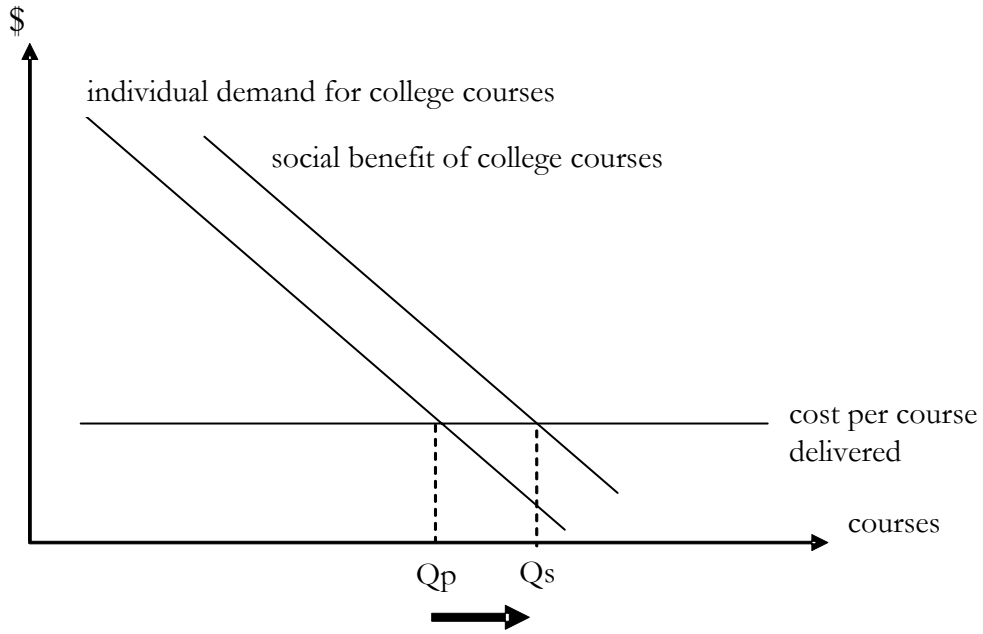
One problem with using data from the Decennial Census to measure the individual returns from attending a KCTCS school is that the Census does not measure whether someone has received a diploma or certificate from a community or technical college. Since these are important programs for the KCTCS, we also estimate the individual returns to a degree, diploma, or certificate using student-level data obtained directly from KCTCS. These findings provide valuable information on the short-run returns. Future research with a longer post-schooling time period is needed to study the longer-term effects. Future work should also include additional KCTCS students to allow for more precise estimation of the returns for individual fields of study and for separate regions of the state.

Finally, to estimate our total benefits measure, we employ a large survey of Kentucky residents and the contingent valuation methodology to measure the overall benefits from expanding KCTCS by 10 percent. We then subtract the individual benefits from expanding KCTCS from the total benefits to obtain our estimate of the public benefits of expanding KCTCS. Together these measures provide a more accurate and rigorous measure of the benefits received by Kentucky residents from expanding KCTCS.

In the report, we continually make the distinction between individual returns, public returns and total returns (or social returns) to education. While these are technical terms used by economists, the concepts can easily be grasped by anyone who has ever thought about the demand for a good or service. For everyday purchases, consumers pick the level of consumption that gives them the most satisfaction given the price of the good. For example, if one purchases a $10 ticket to see "Pirates of the Caribbean" at the local theatre, we know that the consumer received at least $10 of satisfaction from the movie experience. This is the individual returns received by customers of the movie theatre. Since all the satisfaction is limited to the paying customers, the individual returns and the total returns to all members of society are the same thing.

However, in the case of most educational services, there are good reasons to believe that the total returns are greater than the individual returns. Individuals are willing to pay tuition and taxes for the opportunity to take college courses that will raise their productivity, wages, and quality of

life. But the benefits do not end with the students. A more educated worker raises the productivity of others at his or her workplace. The more educated worker is more likely to have a healthy lifestyle, to avoid criminal behavior, and to contribute to the civic life of the community. These are what economists call positive externalities of education – we call them public returns. Externalities are market failures, in the sense that a free market solution will lead to an under-provision of the good or service. There are social benefits beyond the individual benefits, and hence society's welfare is improved if we find ways to provide more of the service than would be generated by individual demand only.



These concepts can be easily illustrated with a simple supply and demand diagram shown above. Assume for simplicity that more KCTCS programs can be offered at a constant cost per additional student, so the supply curve is a horizontal line, labeled as 'cost per course delivered.' The individual demand curve shows how much students are willing to pay for more or less education. Students and their families make calculations as to how much they will gain from the education. The lower the price of education, the more individuals will find it in their self-interest to take courses. With competition among educational institutions, and without intervention by government, the market would deliver *Qp* number of college courses.

The social benefits curve shows the additional benefits of education, those that accrue to other members of society. These beneficiaries do not pay tuition, but receive benefits nonetheless. Since the social benefits of serving more students are greater than the costs of serving more students, total welfare in society is improved by raising educational output to *Qs*. The additional costs cannot be covered by students, since they are not willing to pay more. Rather, it is typically covered by general taxation. Indeed, this is the intellectual argument for the widespread subsidy of public schools, from K-12 through universities.

One objective of our research is to determine whether the point *Qs* has been obtained in Kentucky for the associate's degrees, diplomas, and certificates. If Kentuckians reveal that they would pay more in terms of taxes and tuition to support an increase in KCTCS programs than it costs to produce those programs, then we are to the left of *Qs* and are under-providing these programs. If Kentuckians reveal the opposite, then we would be at the right of *Qs* and are over-providing KCTCS programs.

The rest of this report is as follows. In the next section, we provide an overview of the literature on estimating the returns to higher education and on the development of the contingent valuation methodology. While it is not always typical to provide this type of overview in a report such as this, because we are using techniques that may not be familiar to many readers, we feel it is important to provide this background material. In the third section we present our measures of the individual returns received by students attending a school that is part of KCTCS. These returns are for students receiving an associate's degree as well as for students receiving a diploma or certificate. In the fourth section, we present our measure of the total returns of the KCTCS accruing to Kentucky residents. In the final section, we present our estimates of the public returns and draw some conclusions based on our analysis.

II. Review of the Literature on Returns to Schooling and Contingent Valuation

The benefits to schooling have been an oft-studied topic in social science. There are two types of benefits to additional schooling. The first type, called individual returns, is the benefit received by the individual who pursues the schooling. For example, earnings and education are positively related: more educated individuals, on average, are more highly paid. The second set of benefits, known as public returns, is the additional benefit received by society as a whole. An example of a public return to schooling is that education levels are negatively related to crime rates: areas with more educated residents tend to have lower levels of crime.

This section discusses previous research on both types of benefits. The discussion of the literature on individual returns focuses on the increase in earnings as earnings are by far the most common measure of individual returns. After discussing the social returns literature, we discuss the literature from an alternate method of calculating social returns to schooling called contingent valuation. This method is often used to calculate benefits for goods that are hard to assess in dollar values, such as health outcomes or environmental quality.

II.A Individual Returns

Researchers have long studied the relationship between schooling and earnings. Census data show that workers with higher education levels have higher earnings. On average, workers with associate's degrees make more than workers with high school diplomas. However, it is not clear whether these higher earnings are entirely caused by higher levels of education, or if there are other factors involved. For example, college graduates generally have higher test scores than high school graduates. It may be that college graduates have higher earnings because they have more analytic ability, as reflected in higher test scores, rather than because they have more education. In response, researchers have come up with a variety of techniques to control for factors other than education that also affect earnings. Card (1999) summarizes the vast literature on the individual or private returns to schooling with discussions of several of these techniques. Straightforward, single-equation estimates of the individual returns to schooling find that an additional year of schooling raises yearly earnings between five and ten percent. More complex analyses that use multiple equations and/or special populations (such as identical twins) tend to find returns at or above ten percent.

The individual rate of return generally assumes that an additional year of schooling has a similar effect on earnings, whether that additional year is the 10th year of schooling or the 15th year of schooling.[1] Other researchers have looked specifically at the types of schooling received, focusing in particular on high school graduation and college degrees. Kane and Rouse (1995) find that an additional year of community college corresponds with an increase of four to seven percent in annual earnings, whereas an additional year at a four-year institution produces a six to nine percent increase in annual earnings. They also find that receiving a college degree raises earnings even when compared to having completed an equivalent amount of schooling (such as

[1] Card (1999) notes a couple of exceptions to this statement, such as the lower return to the 11th year of schooling.

four years) without completing a degree. Marcotte et al. (2005) obtain similar results from a more recent cohort of students. Both studies use national data.

Jacobson, LaLonde, and Sullivan (2005a, 2005b) look only at the individual returns for community college. They look at a specific population of workers who have been 'displaced' because their employers have closed down or moved out of the state of Washington. They find that an additional year of community college increases long-run earnings by approximately nine percent for men and 13 percent for women, with slightly lower returns for older workers (age 35 or older). Most of the increase in annual earnings came from additional hours of work rather than from higher hourly wages. They also show that workers derived more benefits from technical courses and math/science courses and fewer benefits from less technical courses.

Another technique for studying individual returns is to look at the highest degree received rather than the number of years of schooling. Kane and Rouse (1995) report that an associate's degree is associated with an earnings increase of 24 percent for men and 31 percent for women. For comparison, the returns for a bachelor's degree are 42 percent for men and 51 percent for women. The comparison group in all cases is a high school graduate.

The individual returns to schooling are the benefits of additional schooling for the individual who receives the schooling. Because these benefits are not received by society as a whole, they do not justify state spending on higher education. The individuals themselves receive the benefits and therefore, they should pay these costs. A public benefit to education is needed to justify state spending on higher education.

II.B Social Returns

The concept of social returns is that society as a whole is better off with a more educated population than a less educated one. There are several areas where these benefits could occur. For example, Lochner and Moretti (2004) posit that more education leads to lower crime rates. Moretti (2004) and Shapiro (2006) find a positive relationship between metropolitan area education levels and employment growth. Dee (2003) and Milligan, Moretti, and Oreopoulos (2004) find a positive connection between education and political interest and involvement. There is also a positive relationship between health and education – more educated people are healthier (Cutler and Muney, 2006). Education potentially provides social benefits in crime reduction, civics, employment, and health, among other areas.

The social return literature contains no estimates for the societal benefits generated by community colleges. Moretti (2004) estimates one component of the social returns to schooling: the effect of college graduates in a metropolitan area on wages of residents with no high school, high school graduates, some college and college. Moretti finds that college graduates have a larger effect on wages of the less educated.

Measuring all of the societal returns to education is difficult. We cannot simply add the results from separate studies to generate an overall societal return. These studies cover different time periods and different measures of area. In addition, there are spillover effects across outcomes, so that simply adding all these benefits together will likely double-count some of the benefits.

For example, suppose that increasing education lowers crime rates and raises employment growth, but lowering crime rates also raises employment growth. If the study measuring employment growth does not explicitly control for crime rates, then the effect of the crime rate on employment may be attributed to education.

Another concern with the literature on social returns is the distinction between association and causation. Lange and Topel (2006) argue that the literature on social returns fails to show that increases in education levels *cause* improvements in outcomes such as economic growth, citizenship, and crime. Instead, they believe that other factors, which researchers are unable to measure, are responsible for the strong association between education levels and economic outcomes. The techniques used in this literature require strong assumptions before a causal relationship can be established, and Lange and Topel (2006) are not convinced of the validity of the assumptions. They conclude that there is no strong evidence that the social returns to education are much different than the individual returns.

Given these concerns about traditional ways of estimating the social returns, we consider an alternate method, contingent valuation, for estimating these benefits for community colleges.

II.C Contingent Valuation

To obtain estimates of the value individuals place on goods and services, we typically look to the market. However, social outcomes related to education such as lower crime rates, employment growth, improved citizenship, and better health, are goods not typically traded in the market. Still, obtaining a monetary measure of the benefits related to the social outcomes is an important part of sound education policy.

The lack of a market to generate measures of value for such social outcomes is not a coincidence. Markets are often absent in the case of outcomes with public benefits. Public benefits are benefits that are enjoyed by someone in addition to the individual who incurred the cost to enjoy them. A beautiful flower garden in the yard of a home is an example of an outcome with a public benefit. The homeowner incurred the cost (time, money, effort) to beautify the yard, yet benefits occur to him *and* to everyone who passes by and enjoys the beauty of the garden. In the same sense, education is an outcome with possible public benefits. While the student incurs the costs associated with obtaining schooling, the student *and* society benefit through the social channels already discussed. In the presence of externalities, markets do not fully capture the value of benefits associated with transactions. Another valuation mechanism is needed (Hanemann 1994).

Contingent valuation is a survey-based methodology used for placing monetary values on goods with public benefits or goods which are difficult to value in the marketplace (Carson 2000). The method is often called a stated-preference method because it asks respondents to state what they would be willing to pay to obtain the good or service described in the survey. It avoids the absence of markets by creating a hypothetical market within the survey in which respondents have the opportunity to purchase the good in question (Mitchell and Carson 1989).

The estimate of value obtained from a contingent valuation survey typically represents the total value or benefit to the respondent of obtaining the good or service. The estimate of total value includes the individual benefits the respondent receives, in addition to the value the respondent places on any public benefits (Carson 2000). The resulting measure of benefit is the consumer surplus (Carson 2001), which is the preferred measure of values and social benefits.

The first mention of the possible use of the contingent valuation method occurred in Ciriacy-Wantrup (1947) who studied the benefits of preventing soil erosion. The article observed that some of the favorable effects of soil erosion prevention were public goods and thus very difficult to value in a typical market. The article suggested that one way to obtain information on the benefits of soil erosion prevention, in the absence of a market, would be to ask people directly how much they would be willing to pay for the good. While Ciriacy-Wantrup suggested the idea of benefit estimation by direct questioning, he never implemented it himself (Portney 1994).

The first academic application of the contingent valuation method appeared in Davis (1963). Davis was interested in the value that hunters and other wilderness users placed on a specific recreational area. To estimate the value, he implemented the first contingent valuation survey, attempting to elicit values from individuals directly. In an attempt to validate his findings, Davis compared them with value estimates from the so called "travel cost" approach. In the travel cost approach, the cost of traveling to visit a recreational site (e.g., cost of gasoline, lodging, food) is plotted against the quantity of visits to the site. In essence the method attempts to trace out a demand curve from which benefits estimates can be obtained. Davis found that the contingent valuation benefit estimates compared well to benefit estimates from the travel cost model (Portney 1994). Davis's study provided an initial source of credibility for the contingent valuation method and piqued an interest among those working in the area of benefits estimation.

Following the work of Davis, researchers in a wide variety of fields have made use of the contingent valuation method to estimate benefits for goods and services that may be hard to value in the market or for which a market does not exist. Some notable studies include those on air quality in the Four Corners (Utah, Colorado, Arizona and New Mexico) area (Randall, Ives and Eastman 1974), the value of job safety (Gerking et al. 1988), the reduced risk of respiratory disease (Krupnick and Cropper 1992), the provision of curbside recycling services (Aadland and Caplan 2006), and the value of arts in a state (Thompson et al. 2002). For a more complete list of studies employing the contingent valuation method, see Carson et al. (1995), which provides a bibliography of over 1600 studies, including those from many nations around the world.

Since the inception of the contingent valuation method, there have been concerns over its use. Chief among those concerns is the possibility that respondents will not take the hypothetical nature of the survey seriously (Carson 2001). Because no money changes hands, it is feared that the hypothetical responses are not reflective of what people would do if they actually had to pay money based on their decisions. Researchers have responded to this concern by conducting many studies in which they compare hypothetical purchase decisions to real purchase decisions. The hypothetical and real scenarios vary only in the fact that some respondents are asked if they *would* pay, while others are asked if they *will* pay. The results indicate that significant "hypothetical bias" exists (Blumenschein et al. 1997; Cummings and Taylor 1999; List and Gallet 2001; Harrison 2006). Hypothetical bias occurs when contingent valuation respondents

state they are willing to pay more for a good than they would be willing to pay in an actual purchase scenario and can arise when willingness to pay questions have no real monetary consequence (Whitehead and Cherry 2007). Due to the need to obtain accurate benefit estimates for many goods that can only be valued through contingent valuation, current research has focused mainly on the mitigation of hypothetical bias. While the method of mitigation varies, the results of direct comparisons between real and mitigated hypothetical responses typically show little differences in willingness to pay (Blumenschein et al. 1998, 2007; Champ and Bishop 2001; Champ et al. 1997; Cummings and Taylor 1999; Poe et al. 2002).

Another area of current research on contingent valuation has been on the choice of the format used to elicit information about respondents' willingness to pay (Carson 2000). One of the most common formats, the discrete-choice format, is a simple yes/no response to a question asking respondents if they would be willing to pay a given amount of money to obtain the good in question. An alternative is the open-ended format in which the respondent is asked to state, in monetary terms, their maximum willingness to pay for the good in question.

Other formats also exist such as the double-bounded dichotomous-choice format and the payment-card format. The double-bounded format begins as does the discrete-choice format, with a simple yes-no question asking respondents if they are willing to pay a given price for the good described in the survey. If respondents answer yes, the double-bounded dichotomous-choice method continues by asking a second yes-no question, this time at a higher price. Respondents answering no are asked a second yes-no question at a lower price. The benefit of this method is that it extracts more information from each respondent and can lead to more efficient estimation. The cost is that the second question can influence respondents in ways that are difficult to understand. Rather than answer a yes-no question, the payment-card format presents respondents with a list of values and asks respondents to circle the value closest to their willingness to pay.

The discrete-choice format has several advantages relative to the other formats. First, respondents have experience in making discrete choices (Arrow et al. 1993). Many purchases made in standard markets are on a take-it-or-leave-it basis in which individuals decide whether or not to purchase a good at the listed price. Second, it is simple. Since the respondent need only answer a simple yes-or-no question to indicate their value for the good, the discrete-choice format may lead to lower nonresponse rates (Freeman 2003). Third, the discrete-choice format is arguably incentive compatible (Cummings et al. 1997; Haab et al. 1999), meaning that respondents have an incentive to answer in a truthful manner. Other formats elicit information about respondent preferences at more than one price and hence offer greater estimation efficiency but at a possible cost of bias.

After more than forty years of contingent valuation research and several decades of intense inquiry into the reliability of the method in environmental and health economics, considerable progress has been made in the elicitation of the value respondents place on goods not traded in an open market. Particularly promising are the methods for mitigating hypothetical bias based on the certainty with which respondents say they will act as they state they will and methods based on statements in the survey asking respondents to avoid hypothetical bias. A well-designed contingent valuation study of the social returns to education should be able to produce

reliable estimates of the total value of education that includes not only the value of education to the more educated individual, but the value to others of lower crime rates, employment growth, improved citizenship, and better health. These returns to education are not typically reflected in observable market transactions but are essential to include in estimates of the social benefits.

II.D Summary

As this brief review has demonstrated, the total or social returns to education can be divided into two parts: the returns that accrue directly to the individual, the individual returns, and the returns that accrue to society as a whole, the public returns. As we have seen, there has been extensive work on measuring the individual returns, although almost no work that is specific to Kentucky. Among researchers there is a fairly general consensus on the actual individual returns to schooling and the appropriate methodology to use to estimate the individual returns. In contrast, there have been very few estimates of the social returns to schooling and the estimates that have been produced remain controversial. However, contingent valuation is a methodology that has been used to estimate the benefits to society of goods that are not typically traded in the open market. Previous research shows that the contingent valuation methodology can be used to estimate the social benefits from goods that are not directly priced in the market and, therefore, is clearly a technique that can be used to estimate the social returns to education.

III. Individual Returns to Schooling

This section focuses on the individual returns to attending KCTCS. In other words, we evaluate the increase in earnings that a person receives after he or she attends a KCTCS school. The analysis begins with a study of the long-run effects of KCTCS on earnings, where we compare work-life earnings for a person with an associate's degree to the work-life earnings of a person with a high school degree. In the second part of the analysis, we analyze internal KCTCS data on students as well as data on their wages before and after attending KCTCS to look at the short-run changes in earnings for diplomas and certificates in addition to associate's degrees.

III.A. Long-run Estimates Based on Census Data

In this section, we examine the added value of attending school beyond high school, from just a single year to the attainment of an associate's degree, for people currently living in Kentucky as well as separately for each of ten regions in Kentucky.

Higher education can have a significant long-run effect on a student's earning potential. Workers with more education on average tend to have higher earnings than those with less education. But it costs time and money to attend a college, university or vocational school.

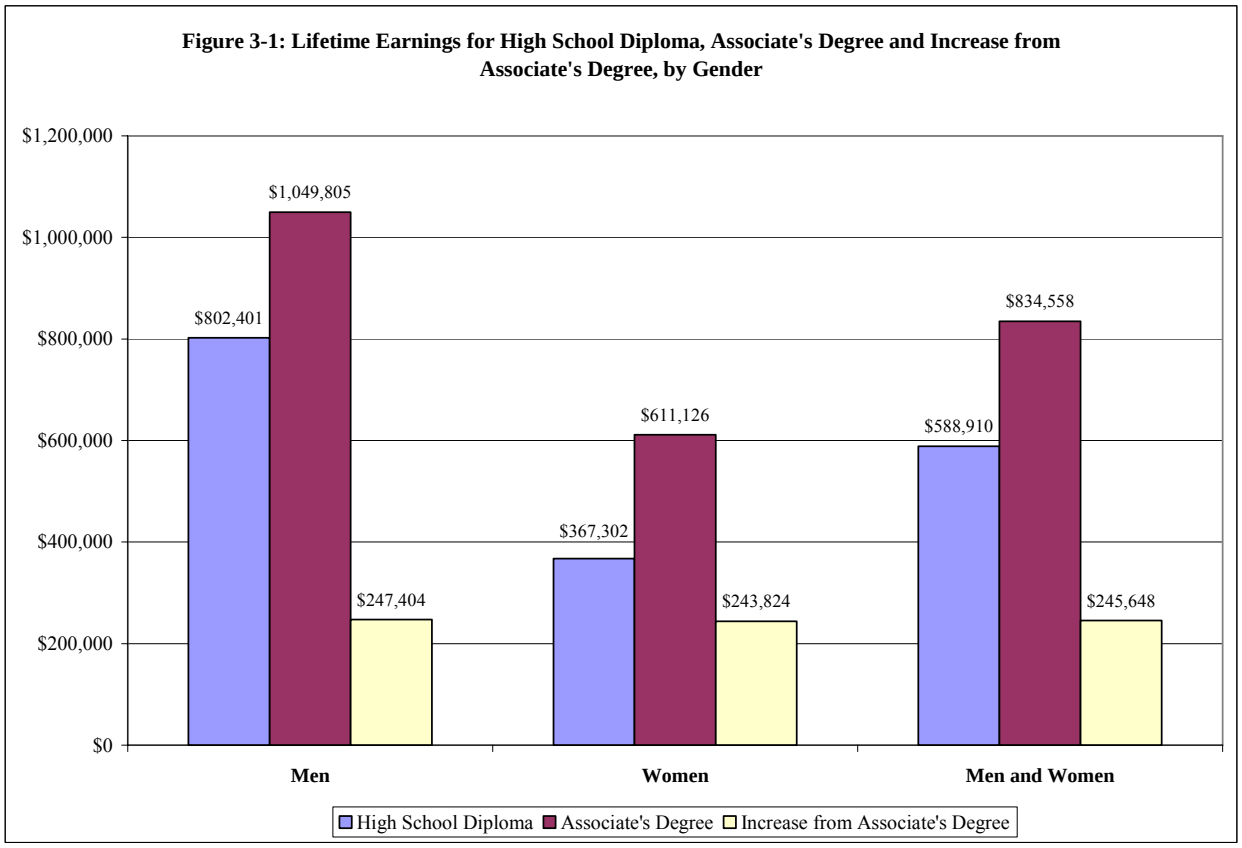
Students generally decide to extend their education beyond high school if they believe the long-run returns to education are greater than the short-run costs of the schooling. Since the costs to the students occur over a fairly short two-to-eight year time period (for most people) while the returns accrue over a lifetime, expenditures on higher education can be analyzed as an investment in human capital. These are what economists refer to as the 'individual or private returns' to education, as distinct from the value received by co-workers and other members of the community where the more-educated person works and lives.

We use detailed 2000 Census data to analyze the increase in work-life earnings of individuals associated with increased education levels, with a particular focus on the gains from attending a college without earning a degree and from obtaining an associate's degree. Specifically, we calculate lifetime earnings levels for each education level. All dollar figures are present value (in 2006 dollars) – what a person's post-education earnings stream would be worth to him or her were it available as a lump sum today, taking into account the cost of the education and foregone earnings. More details on the method and data are available in Appendix A, along with an investigation of how the economic returns to education vary by gender, age, occupation and marital status.

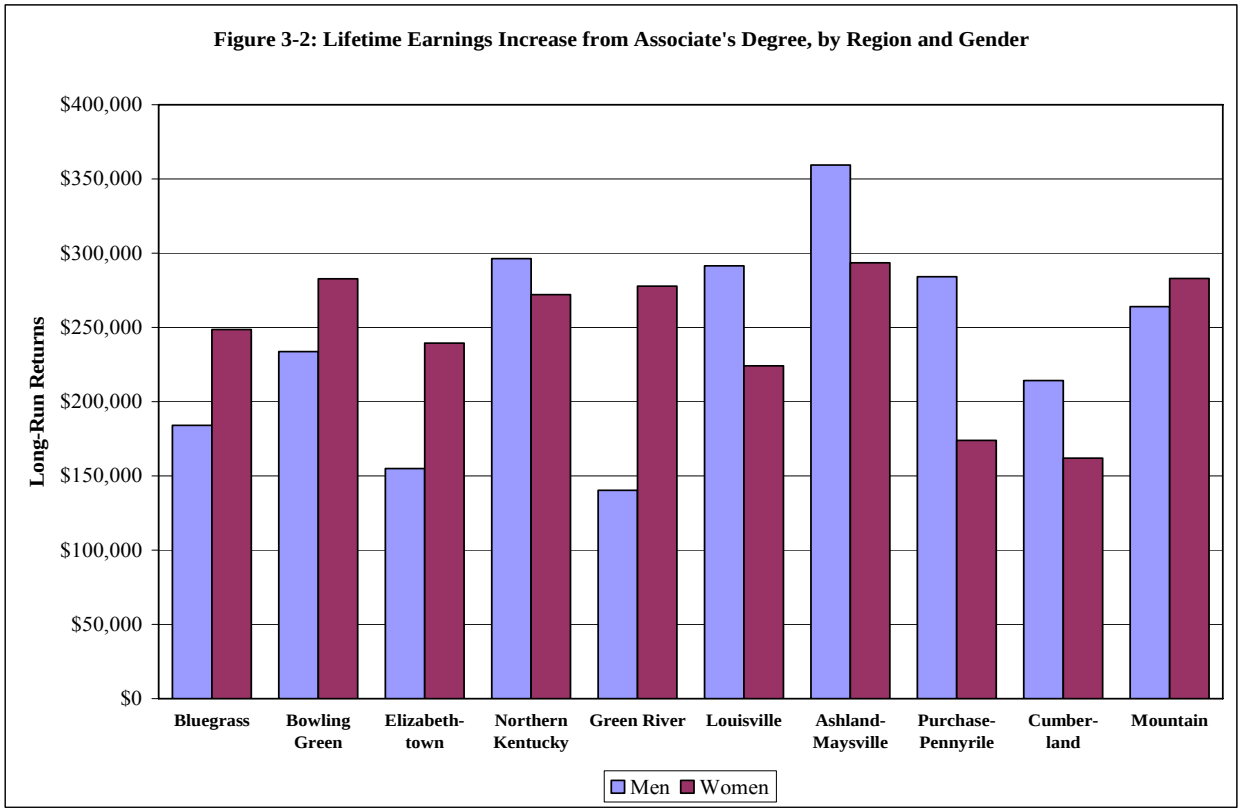
III.A.1 Findings

Our analysis begins by looking at the statewide returns to an associate's degree compared to a high school degree. Figure 3-1 shows the additional returns for all Kentuckians, as well as separate figures for men and women. The figure shows that the lifetime return to an associate's degree is approximately $246,000, a 42 percent increase in lifetime earnings. Men have slightly higher returns ($247,404) than women ($243,824). For men, the gain in earnings represents a 31

percent increase above the lifetime earnings for high school graduates. The percentage increase for women, 66 percent, is more than twice as large as the percentage increase for men, as female high school graduates have much lower lifetime earnings than male high school graduates. This finding, that women experience a larger percentage increase in earnings than men, is consistent with previous results in the literature looking at returns to an associate's degree (Kane and Rouse 1995).



Next, we consider the difference in work-life earnings separately by gender and region. We have divided the state into ten regions which are shown in Figure A-1 in Appendix A. Completing at least some higher education increases the present value of one's work-life earnings over what it would have been had one ended one's education with high school graduation, as shown in Figure 3-2. This holds for every classification of worker. The net present value of the work-life earnings of an associate's degree holder is estimated to be between $132,000 (men in the Green River region) and $351,000 (men in the Ashland-Maysville region) greater than for a high school graduate. This corresponds to between a 17 and 52 percent increase in lifetime earnings above high school for men, depending upon region.



There is substantial variation in the returns by region for men, due presumably to the great differences in industrial structure and employment possibilities around Kentucky. Men in the Green River area, which includes Owensboro, Henderson, and Madisonville, have the lowest estimated work-life returns from an associate's degree relative to a high school degree ($972,000 compared to $832,000 for high school only). By contrast, men with an associate's degree in the Ashland-Maysville region earn $1,048,000 over their work life, compared to only $689,000 for men with a high school degree.

The geographic dispersion in returns for women is not as wide as for men, with the lowest increased returns from an associate's degree in the Cumberland area ($154,000) and the highest returns in the Ashland-Maysville region ($285,000). This corresponds to between a 52 and 150 percent increase in lifetime earnings above high school for women, depending upon region.

Among the geographic regions, the present values of lifetime earnings, regardless of education level, are generally highest for the Northern Kentucky, Louisville, and Bluegrass regions, and lowest for the Mountain, Cumberland, and Ashland-Maysville regions. The present values of the latter group are generally about 70 percent of those of the former group.

Figure 3-3 shows that work-life earnings profiles for men have greater initial predicted earnings and peak at higher values than for women. For many experience levels, there is virtually no difference in male earnings whether one has had less than one year of college, more than a year but no degree, or earned an associate's degree. A large percentage of men remain in blue-collar occupations after receiving an associate's degree and see little economic return.

Figure 3-3: Work-life Earnings Profile, by Gender

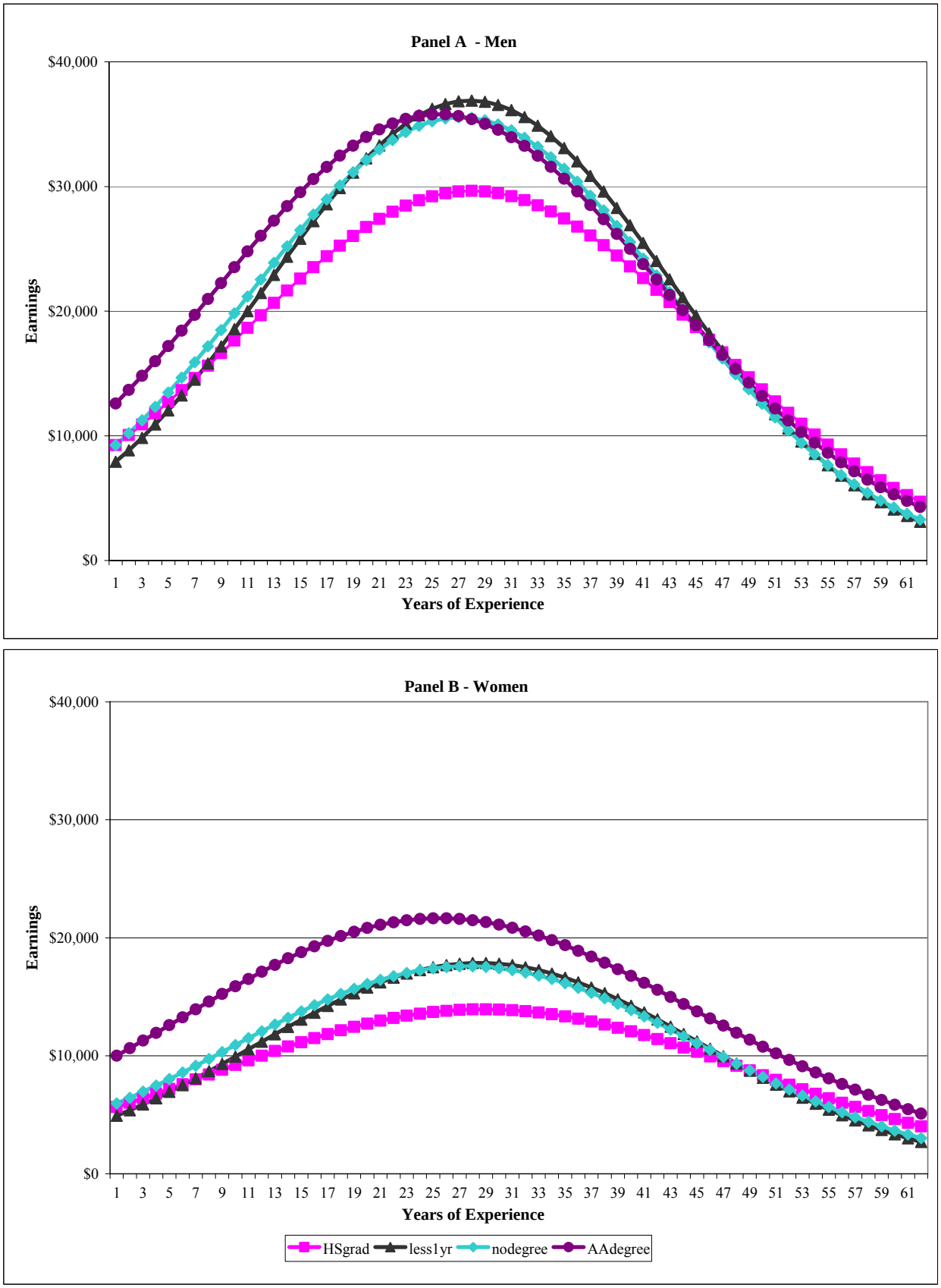


Table 3-1: Occupational Distribution of Kentucky Workers, by Region

Occupation Group	Bluegrass	Bowling Green	Elizabeth-town	Northern Kentucky	Green River	Louisville	Ashland-Maysville	Purchase-Pennyrile	Cumber-land	Mountain
Panel A - Male Workers										
High school graduates										
Management, business, finance	7.2%	7.7%	7.8%	6.5%	6.1%	6.5%	5.6%	7.0%	7.1%	3.5%
Professional science, legal, healthcare, technical	2.2%	1.8%	1.3%	2.0%	1.7%	1.6%	2.6%	1.4%	1.9%	2.0%
Social services, education, arts, media, military	1.4%	0.7%	5.0%	0.8%	0.6%	1.2%	0.8%	7.1%	1.2%	1.2%
Personal services	12.2%	8.5%	7.5%	10.1%	9.4%	12.7%	8.8%	9.0%	8.9%	11.8%
Sales and office functions	14.7%	12.8%	9.4%	16.0%	9.9%	16.2%	12.5%	11.4%	15.4%	13.0%
Agriculture, construction, extractions, maintenance	25.4%	25.0%	29.2%	25.7%	31.2%	23.9%	32.6%	29.1%	24.6%	38.8%
Production, transportation, material handling	36.9%	43.4%	39.8%	38.8%	41.1%	37.9%	37.1%	35.1%	40.7%	29.8%
Less than 1 year of college										
Management, business, finance	11.1%	14.2%	10.1%	12.8%	6.8%	10.8%	6.7%	7.0%	12.5%	8.5%
Professional science, legal, healthcare, technical	6.4%	4.9%	2.6%	5.7%	4.3%	6.8%	5.6%	3.9%	2.5%	5.0%
Social services, education, arts, media, military	3.6%	2.0%	12.3%	3.5%	3.1%	2.0%	2.2%	12.6%	4.0%	3.9%
Personal services	10.2%	9.8%	10.4%	11.3%	13.1%	12.4%	13.4%	10.7%	13.0%	11.2%
Sales and office functions	23.6%	18.1%	13.4%	25.1%	13.4%	19.9%	18.2%	15.7%	19.0%	16.7%
Agriculture, construction, extractions, maintenance	19.6%	20.1%	23.9%	19.6%	25.4%	19.5%	24.5%	21.3%	20.0%	30.2%
Production, transportation, material handling	25.6%	30.9%	27.2%	22.0%	33.9%	28.6%	29.4%	28.7%	29.0%	24.4%
More than 1 year of college, but no degree										
Management, business, finance	13.9%	11.1%	10.3%	14.5%	12.6%	14.0%	11.6%	11.7%	16.6%	11.1%
Professional science, legal, healthcare, technical	8.3%	4.3%	7.3%	6.2%	4.9%	6.9%	6.7%	6.0%	4.5%	7.3%
Social services, education, arts, media, military	4.5%	5.2%	12.6%	4.2%	3.9%	4.1%	5.1%	11.2%	5.5%	6.0%
Personal services	16.3%	11.6%	11.4%	11.7%	11.8%	11.3%	15.5%	14.1%	11.1%	13.2%
Sales and office functions	23.9%	23.7%	16.2%	25.8%	15.7%	25.8%	18.8%	18.8%	20.1%	20.5%
Agriculture, construction, extractions, maintenance	13.7%	15.2%	16.9%	17.0%	23.5%	15.3%	18.8%	19.7%	19.8%	23.0%
Production, transportation, material handling	19.4%	28.9%	25.3%	20.6%	27.6%	22.5%	23.5%	18.4%	22.4%	18.8%
Associate's degree										
Management, business, finance	15.4%	14.7%	6.9%	15.3%	9.0%	14.2%	14.4%	14.4%	10.7%	16.7%
Professional science, legal, healthcare, technical	16.4%	13.8%	7.5%	19.7%	13.2%	17.2%	18.0%	12.4%	11.9%	14.7%
Social services, education, arts, media, military	6.9%	3.7%	16.2%	3.1%	6.0%	3.7%	5.8%	10.9%	6.0%	7.3%
Personal services	10.1%	8.3%	11.0%	7.9%	5.4%	10.3%	15.1%	8.9%	8.3%	4.7%
Sales and office functions	20.2%	18.3%	16.8%	23.6%	18.6%	20.1%	15.1%	15.8%	20.2%	18.7%
Agriculture, construction, extractions, maintenance	16.2%	15.6%	21.4%	17.9%	24.6%	15.2%	17.3%	18.8%	19.0%	26.0%
Production, transportation, material handling	14.9%	25.7%	20.2%	12.7%	23.4%	19.4%	14.4%	18.8%	23.8%	12.0%

Table 3-1: Occupational Distribution of Kentucky Workers, by Region (continued)

Occupation Group	Bluegrass	Bowling Green	Elizabeth-town	Northern Kentucky	Green River	Louisville	Ashland-Maysville	Purchase-Pennyrile	Cumber-land	Mountain
Panel B - Female Workers										
High school graduates										
Management, business, finance	6.8%	5.6%	5.2%	9.1%	5.3%	8.1%	6.5%	6.6%	4.2%	6.1%
Professional science, legal, healthcare, technical	3.3%	2.7%	2.6%	3.7%	3.5%	3.1%	3.2%	3.7%	4.5%	4.0%
Social services, education, arts, media, military	4.6%	4.9%	4.0%	3.9%	3.5%	4.3%	4.9%	4.1%	5.2%	5.5%
Personal services	21.7%	20.5%	24.0%	19.2%	26.7%	21.5%	24.9%	26.3%	22.3%	28.3%
Sales and office functions	40.7%	35.0%	36.7%	48.9%	39.8%	47.0%	38.5%	38.0%	37.7%	45.0%
Agriculture, construction, extractions, maintenance	1.9%	1.1%	2.1%	1.1%	1.1%	1.3%	2.0%	1.6%	1.6%	0.9%
Production, transportation, material handling	21.0%	30.0%	25.4%	14.1%	20.2%	14.7%	19.9%	19.7%	24.5%	10.2%
Less than 1 year of college										
Management, business, finance	10.2%	8.7%	8.9%	12.7%	7.6%	10.4%	9.4%	7.8%	10.0%	13.1%
Professional science, legal, healthcare, technical	5.7%	7.9%	6.9%	7.6%	8.7%	4.9%	7.2%	4.6%	6.4%	8.3%
Social services, education, arts, media, military	5.4%	6.0%	9.3%	5.3%	6.1%	6.7%	7.2%	3.9%	7.6%	6.2%
Personal services	22.1%	18.3%	20.8%	14.4%	19.8%	17.7%	19.2%	22.5%	20.4%	20.7%
Sales and office functions	47.7%	46.0%	41.3%	52.9%	42.7%	51.2%	45.0%	46.9%	41.6%	46.6%
Agriculture, construction, extractions, maintenance	1.5%	0.0%	1.5%	1.7%	0.6%	0.8%	0.6%	2.0%	1.6%	0.0%
Production, transportation, material handling	7.3%	13.1%	11.2%	5.3%	14.5%	8.3%	11.3%	12.4%	12.4%	5.2%
More than 1 year of college, but no degree										
Management, business, finance	9.8%	7.4%	7.9%	13.0%	10.0%	12.1%	8.9%	8.0%	7.9%	7.7%
Professional science, legal, healthcare, technical	9.4%	8.8%	12.2%	9.6%	11.8%	8.6%	9.1%	7.8%	10.1%	10.9%
Social services, education, arts, media, military	6.6%	8.2%	5.7%	6.2%	7.7%	6.6%	7.7%	8.2%	7.9%	9.4%
Personal services	20.1%	19.3%	17.4%	16.5%	17.1%	15.7%	16.5%	18.4%	18.8%	17.9%
Sales and office functions	44.7%	47.3%	45.7%	48.8%	43.8%	49.8%	45.9%	48.9%	44.0%	48.6%
Agriculture, construction, extractions, maintenance	1.4%	0.8%	0.7%	0.5%	1.1%	0.7%	1.4%	1.6%	0.5%	0.8%
Production, transportation, material handling	8.1%	8.2%	10.4%	5.5%	8.6%	6.4%	10.6%	7.1%	10.9%	4.7%
Associate's degree										
Management, business, finance	13.5%	10.8%	13.0%	14.0%	8.5%	13.6%	7.0%	8.1%	10.0%	5.5%
Professional science, legal, healthcare, technical	34.9%	37.1%	33.3%	39.0%	39.8%	32.8%	44.4%	28.3%	36.5%	40.9%
Social services, education, arts, media, military	4.8%	2.7%	4.3%	4.5%	7.8%	6.4%	8.8%	6.6%	5.7%	9.3%
Personal services	9.7%	8.1%	10.4%	12.0%	7.5%	10.9%	8.5%	13.6%	10.4%	10.3%
Sales and office functions	33.2%	35.5%	32.0%	27.4%	31.0%	31.4%	27.8%	35.7%	29.9%	29.9%
Agriculture, construction, extractions, maintenance	0.2%	0.5%	0.9%	0.0%	0.3%	1.5%	0.7%	0.8%	1.9%	0.3%
Production, transportation, material handling	3.8%	5.4%	6.1%	3.1%	5.0%	3.5%	2.8%	7.0%	5.7%	3.8%

However, for women, there is a definite step up in earnings at the associate's degree level compared to high school only, as well as an earnings increase for taking some college classes but not getting a degree. A marked gender difference in the impact of education on the distribution of occupations among our sample seems to account for this difference. As shown in Table 3-1, the distribution of jobs among the seven occupational classes is much more concentrated in one or two sectors for women than for men. It is especially pronounced at the associate's degree level where for men no job class has more than 26 percent of the workers in any of the geographic regions, but for women both the Science, Legal and Health and the Sales and Office occupational groups each have at least 27 percent and up to 44 percent of the workers in all the geographic regions. For women, one sees in the data a marked shift in occupations as women earn an associate's degree, moving from the Sales and Office, and Personal Service occupational groups to the Professional Science, Legal, and Healthcare occupational class.

III.B. Short-run Estimates based on KCTCS Data

A primary reason that students attend post-secondary schooling is to increase their earnings. As mentioned previously, the change in earnings associated with additional education is known as the individual returns, since the change is only for the individual attending school. In this section, we use data from KCTCS to measure the short-run individual returns. We also estimate separate returns for several different outcomes — earning a certificate, earning a diploma or earning an associate's degree. Each of these represents different possible outcomes for students and, since each involves different amounts of investment in time, likely has potentially different returns. For a certificate, while the number of credits required differs by the certificate, the typical number of credits earned by someone with a certificate in the KCTCS data is 25 credits. Diplomas tend to target broader areas than certificates, and diplomas usually require more credits (often one year or more of full-time studies): the average number of credits earned by someone with a diploma in the KCTCS data is 57 credits. Finally, associate's degrees require the most number of credits, 60 to 76 depending on the field of study. The Census data used in the previous section only contain information on associate's degrees, so we cannot use these data to estimate the returns for these other programs. This is why we are using KCTCS data to estimate the individual returns to these other programs.

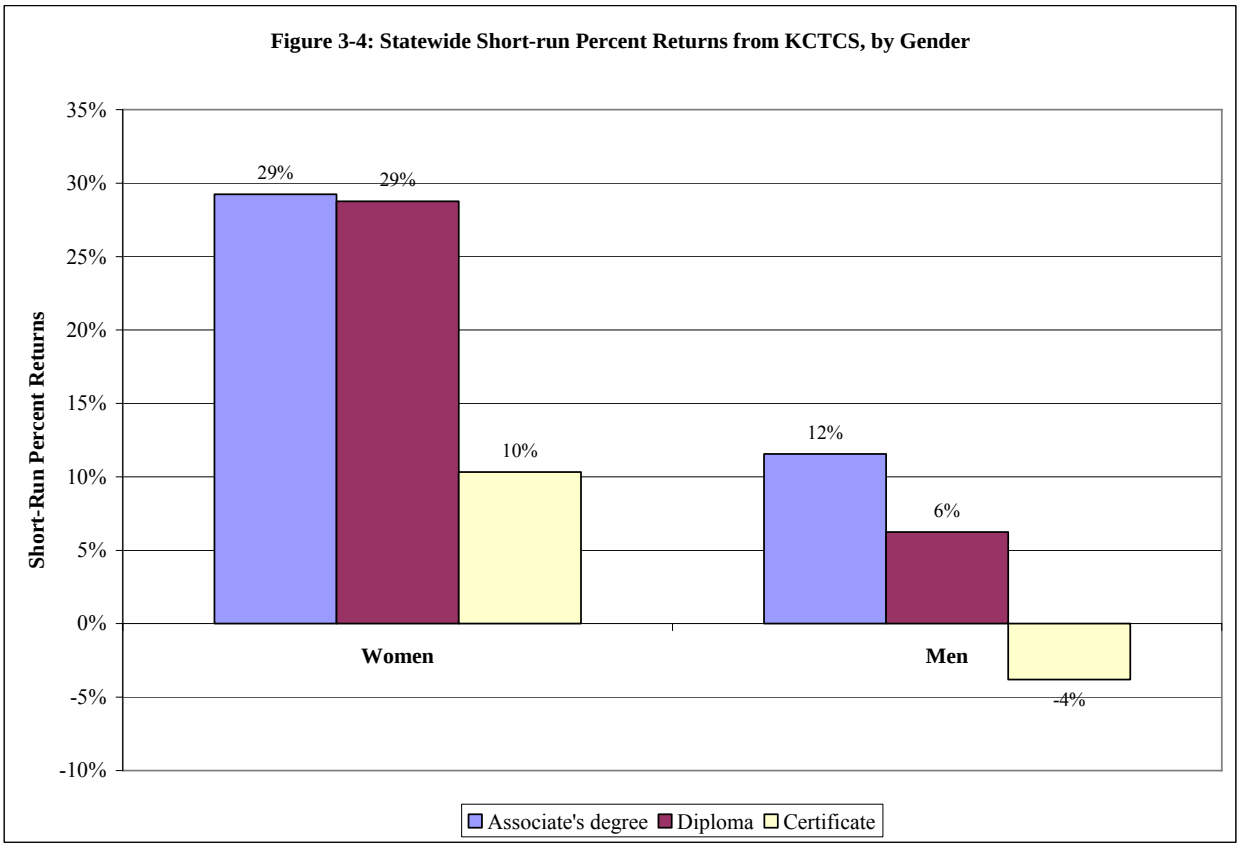
The KCTCS student-level data we use to estimate the short-run individual returns to these various outcomes contain information on student characteristics such as age, race and sex; information on all courses taken by the student; information on all credits, certificates, diplomas or associate's degrees earned; as well as data on student earnings in the labor market from the first quarter of 2000 through the fourth quarter of 2006. Our focus is on the cohort of students who started at KCTCS from summer 2002 to spring 2003. Students from earlier cohorts have little if any pre-KCTCS earnings data, and students from later cohorts have little if any post-KCTCS earnings data. Because we have such a relatively few number of years of earnings after these students have left KCTCS, we are only able to estimate the short-run returns for these students. Follow-up research should be conducted to estimate the long-run returns for these students. In addition, future research can also use additional cohorts of students to provide a larger sample to study returns for different fields of study and for different parts of the state.

III.B.1 KCTCS Results

Figure 3-4 illustrates the individual returns associated with three types of KCTCS outcomes discussed above: associate's degrees, diplomas, and certificates. The return is reported as the percentage change in earnings for each six-month period after receiving the award. Returns are calculated separately for men and for women.

The figure illustrates that women have higher returns than men. Women receiving associate's degrees have increased earnings of 29 percent for each six-month period after receiving the degree. Women have nearly identical short-run returns for diplomas, also 29 percent. The similarity is somewhat surprising given that diplomas typically require 12 to 15 months of full-time coursework, compared with two years of coursework for an associate's degree. At the same time, the returns are only calculated over a short period of 1.5 to 2.5 years. Certificates have the lowest returns of the three, at 10 percent, but they also require the least amount of coursework.

Figure 3-4: Statewide Short-run Percent Returns from KCTCS, by Gender



Men's short-run returns to community college are much lower than women's. In fact, the returns for men are less than half the returns for women, in terms of both absolute and percentage earnings. For example, men's earnings increase by 12 percent after receiving an associate's degree, compared to an increase of 29 percent for women. The higher returns for women may in part be explained by the fact that women had much lower earnings than men prior to attending

KCTCS. For the sample of students used for this report, the average earnings in 2000 were around $29,000 for men and $17,000 for women. This difference might be expected if men were concentrated in low-skill manufacturing jobs and women were not, as low-skill manufacturing jobs tend to pay more than other low-skill jobs. Men's returns from diplomas are 6 percent compared to 29 percent for women. One potential explanation, which is explored below, is that women receive most of their diplomas in higher-paying health-related areas, whereas men receive most of their diplomas in lower-paying vocational areas. Men receive essentially no return from certificates.

The results for certificates should be interpreted with caution. The majority of students who received certificates were not employed in the six-month period prior to attending community college. This result suggests that many of these students had trouble finding work and may have attended KCTCS as a result of participating in a workforce development program. These programs may be successful at increasing employment; however, we are unable to capture this effect in our analysis of earnings because we cannot identify workforce development participants in our data. In addition, Dyke et al. (2006) show that people who participate in workforce development programs have short-run decreases in earnings followed by long-run increases. We look only at short-run changes in earnings. The long-run earnings effect for certificates could be positive, as Dyke et al. (2006) find. Future work is needed to study the long-run effects for KCTCS.

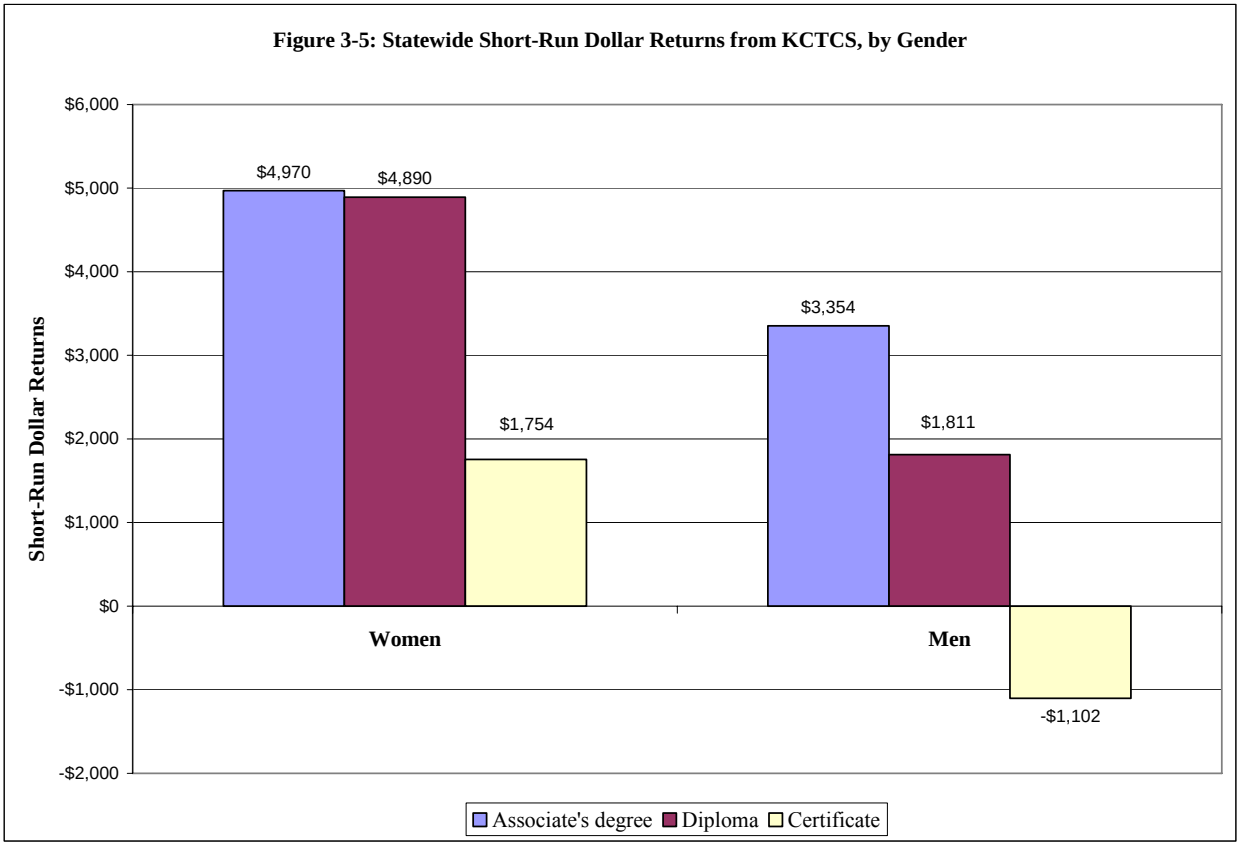
We can translate these short-run percent returns into estimates of the increase in lifetime earnings. However, given that these numbers are based on only two years worth of data, these numbers are used for illustrative purposes only. They are not directly comparable to the numbers presented in the previous section since we do not have information on the costs students incur to attend a community or technical college.

Our estimates of the actual dollar value of the return can be seen in Figure 3-5. Here we see that, in terms of dollar values, the return for men and women are closer—reflecting the fact that men receive higher earnings prior to entering KCTCS than women. For women the annual increase in earnings from an associate's degree is around $5,000 while for men the increase is $3,400. For women the annual increase in earnings associated with earning a diploma is $4,900, quite similar to the increase from an associate's degree, while for men the increase in earnings from a diploma is $1,800. Receiving a certificate leads to a $1,700 increase in annual earnings for women while for men receiving a certificate has essentially no impact on earnings.

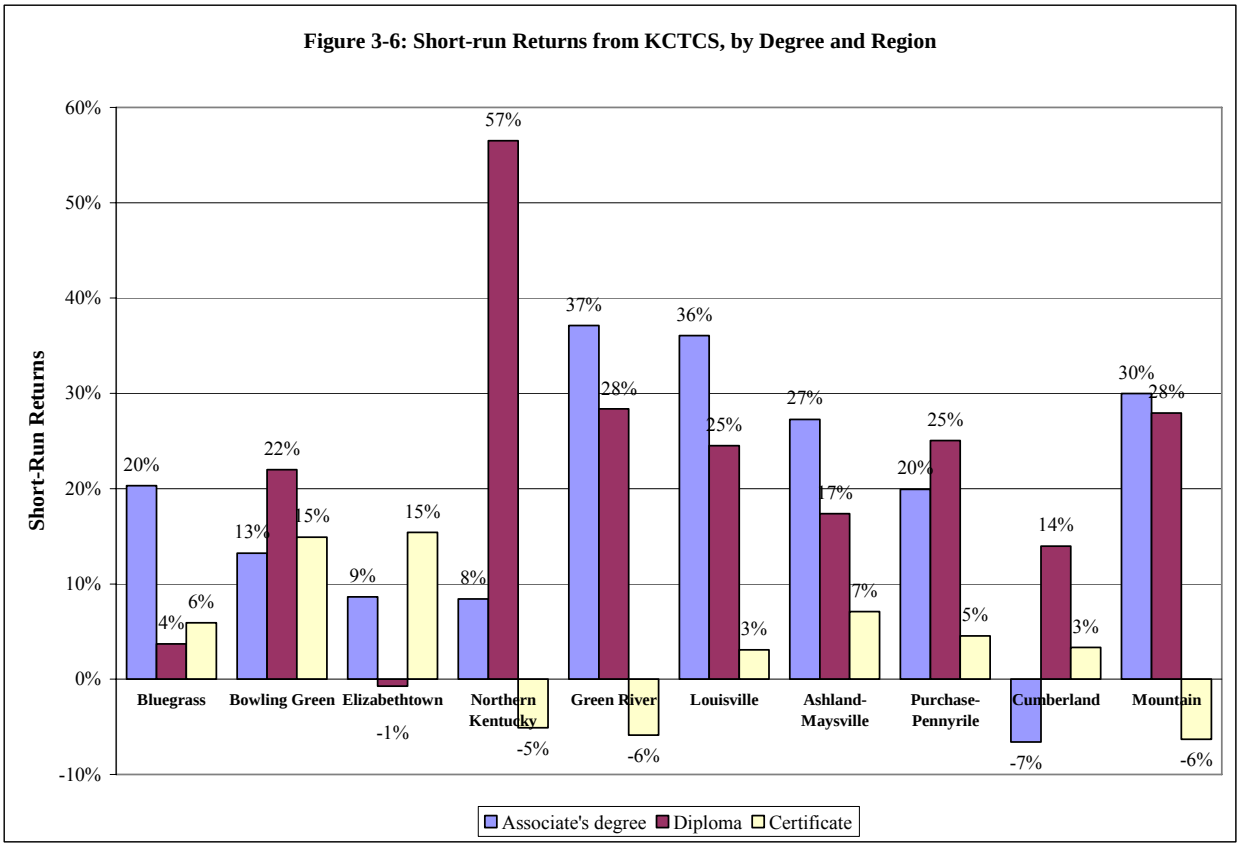
Although these numbers may appear small, over the course of a lifetime they represent a substantial increase in earnings. If we assume that the estimated short-run increase in earnings remains constant for the rest of their working lives, women receiving an associate's degree or diploma increase lifetime earnings by approximately $109,000, while those receiving a certificate increase earnings by $39,000. Men receiving an associate's degree have about a $74,000 increase in lifetime earnings, while those earning a diploma have about a $39,000 increase in lifetime earnings. (We describe how we compute these estimates in Appendix B.) If anything these numbers will significantly understate the true lifetime gains to a certificate, diploma or associate's degree, since the difference in earnings between those with some post-secondary education and those without any tends to grow over time. These estimates

demonstrate that the estimated increase in lifetime earnings is significant for all students except for men obtaining certificates.

Figure 3-5: Statewide Short-Run Dollar Returns from KCTCS, by Gender



The results in the last two figures are for the state of Kentucky as a whole, but it is possible that returns are higher in certain regions of the state than others. The 16 community college districts are combined into the same ten regions as in section III.A, as some districts are too small to study individually. Men and women are also combined in order to increase the number of individuals in each region with diplomas and certificates. Again Figure A-1 shows the ten regions in the state. Table B-2 lists the frequency of degrees, diplomas and associate's degrees for each region. Figure 3-6 presents the regional returns, where the return is the percent change in earnings for each six-month period after the degree/diploma/certificate is received.

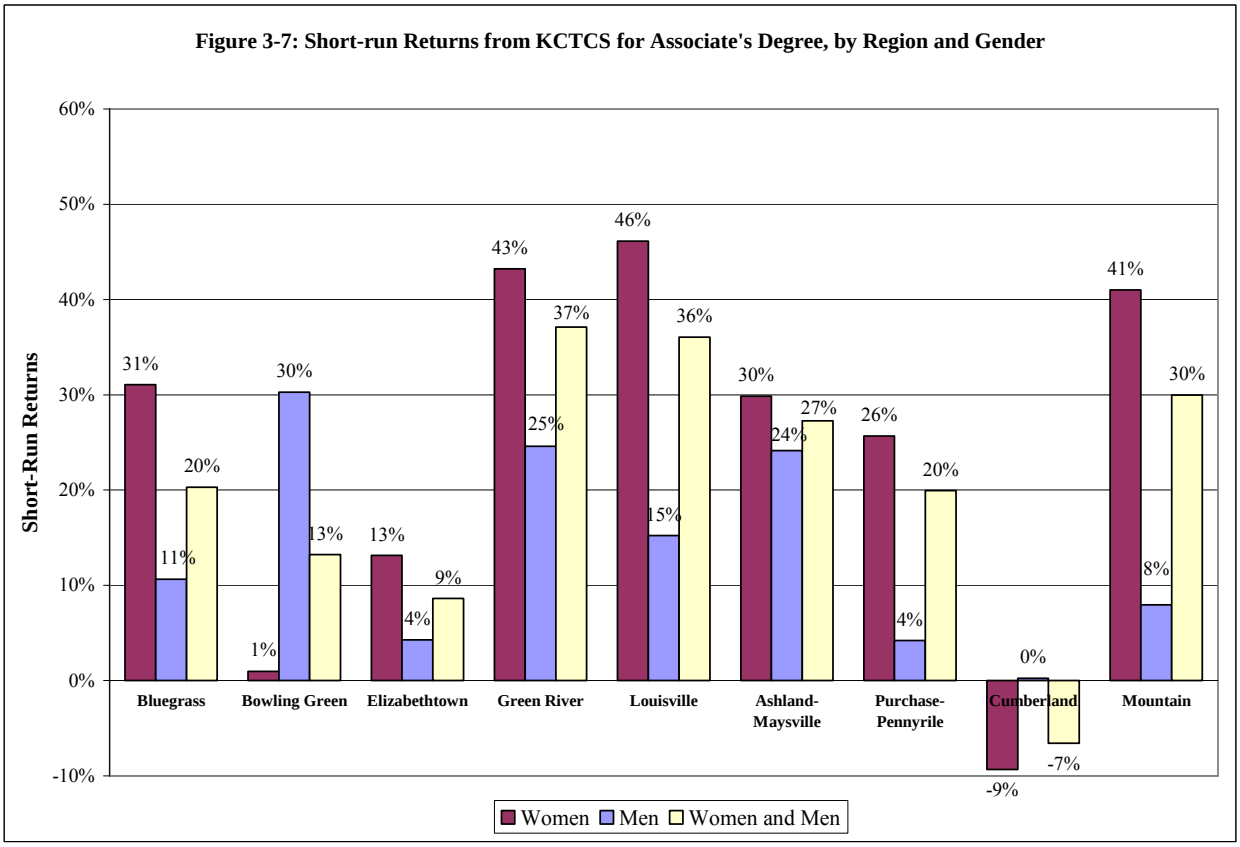


Most regions have large returns for associate's degrees. The two regions that award the most degrees, Green River and Louisville, also have the largest short-run returns, around 35 percent. The next largest returns are for the two eastern-most regions in Kentucky: the Mountain region (30 percent) and the Ashland-Maysville region (27 percent). The Bluegrass region and the Purchase-Pennyrile region have returns around the statewide average of 20 percent. The remaining regions have smaller returns. Although our estimate of the return for Cumberland is actually negative (implying a short-run decrease in earnings), this return is imprecisely estimated and is not statistically distinguishable from zero. Additional work with an additional cohort of students and a longer time period is needed to provide more precise estimates by region. Later, we will look more closely at gender differences by regions in the short-run returns to an associate's degree.

The figure also shows a wide range of returns for diplomas. The largest return is for Northern Kentucky, at more than 50 percent. Gateway Community and Technical College, which is located in this region, appears to specialize in diplomas and certificates rather than degrees. For the cohort of students who entered in 2002-2003, only 14 people in our sample received degrees from Northern Kentucky, compared to 79 diplomas and 92 certificates. Statewide, the number of associate's degrees (1,814) is more than double the number of diplomas (834). The next largest returns to a diploma, a little less than 30 percent, are for the Green River and Mountain regions. The Purchase-Pennyrile and Louisville regions both have returns of around 25 percent, above the statewide average of 21 percent. More post-schooling data are needed to calculate long-run returns to diplomas.

The short-run returns for certificates are near zero for most regions. The two exceptions are Bowling Green and Elizabethtown, where the returns are around 15 percent. The rest of the regions have short-run returns that are statistically indistinguishable from zero. Follow-up work with an additional cohort of students would provide more accurate estimates by region.

Figure 3-7: Short-run Returns from KCTCS for Associate's Degree, by Region and Gender



As mentioned above, the associate's degree is more common than diplomas or certificates which enables us to look separately at the returns to associate's degrees by region and gender. Figure 3-7 contains these returns for all regions except Northern Kentucky, which has too few degrees (14) to estimate by gender. The figure illustrates that women have higher returns than men in most regions. The only exception is the Bowling Green region, where the women have no return from an associate's degree and men have large returns of around 30 percent. In most regions, both women and men have positive short-run returns, but the returns are larger for women. For example, in Louisville, women have a 46 percent return while men have a 15 percent return. However, in the Purchase-Pennyrile and Mountain regions of the state, men have near-zero returns from an associate's degree, whereas women have sizable returns in both regions. Finally, note that Cumberland has no positive short-run returns to associate's degrees for men or women. In fact, the region has negligible returns for diplomas and certificates as well. Follow-up work with larger samples and longer time periods would provide valuable information on long-run returns by outcome type (degree, diploma, or certificate) and region.

Next, we consider how the short-run returns vary by field of study. As mentioned above, women and men have different returns to degrees, diplomas, and certificates. Are these differences in returns due to gender differences or due to differences in the field of study? This section addresses this question. Fields of study are divided into six categories: business, health, humanities, other academic (i.e. science and social science), services, and vocational. For example, the business category includes awards for aspiring administrative assistants as well as awards in more traditional business areas such as accounting. One of the most popular fields is health, due in large part to nursing-related programs. Associate's degrees, diplomas, and certificates are divided into each of these six categories, although there are no diplomas or certificates in humanities or other academic. Table 3-2 lists the short-run results, by field of study and gender. Again, these returns are for the short-run. Additional research is needed to calculate long-run returns by field of study

Table 3-2: Short-Run Returns, by Field of Study and Gender

	Field of Study					
	Business	**Health**	**Humanities**	**Other**	**Services**	**Vocational**
Panel A - Men						
Associate's degree	-6%	39% **	1%	10% **	16% *	6%
Diploma	-6%	29% **			-10%	3%
Certificate	21%	-11%			-30% **	-3%
Panel B - Women						
Associate's degree	9% *	59% **	-7%	24% **	-8%	7%
Diploma	-19% **	43% **			23% *	9%
Certificate	11% *	11% **			8%	8%

NOTE: Results denoted by a double star (**) are statistically significant at the five percent level. Results denoted by a single star (*) are statistically significant at the ten percent level.

The table shows a similar pattern for both women and men. The highest returns are for health-related outcomes of all types. The short-run returns for associate's degrees in health are very large: 59 percent for women and 39 percent for men. The short-run returns for health-related diplomas are not as large: 43 percent for women and 29 percent for men. Women also receive a moderate short-run return of 11 percent from health-related certificates. Men receive no discernable increase from health-related certificates.

Associate's degrees in science and social science have smaller, but positive, returns of around 24 percent for women and 10 percent for men. The returns for associate's degrees in humanities are essentially zero.

The returns for business, services, and vocational fields vary by type of award (degree, diploma, or certificate) and gender. Business-related degrees have small returns, not statistically different from zero. Certificates have positive returns for men and women, although the estimated return for men has a large standard error and should be interpreted with caution.

The returns for services fluctuate drastically. Men receive a gain of nearly 16 percent for service-related degrees, but show no gain from a service-related diploma. For women, the returns are reversed: they show no gain from degrees, but a 23 percent gain from diplomas. Women receive essentially no gain from service certificates, but men actually suffer a sizable 30 percent decrease in short-run earnings. These certificates cover a broad range of areas such as firefighting, child care, and cooking. Of those receiving service certificates, nearly half of women study child care compared to less than 10 percent of men. On the other hand, over 50 percent of men receiving service certificates receive them in cooking-related or firefighting fields (34 percent and 10 percent, respectively) compared to less than 10 percent of women receiving certificates receive them in these fields. The negative results for men should be interpreted with caution. These findings are for short-run earnings, and, as mentioned above, other researchers have found benefits of training/schooling in the long-run, but not in the short-run. Further research is needed to see if this pattern holds for KCTCS.

III.C Summary

This section studies the long-run and short-run changes in earnings for individuals attending community college. These returns are also known as the individual returns. In the long-run, men and women receive similar returns to an associate's degree: a life-time increase in earnings of approximately $250,000. In the short-run, women have much larger returns than men for associate's degrees, diplomas, and certificates. This difference appears to be a result of different fields of study. Most of the short-run returns are concentrated in health-related fields, and women are much more likely than men to receive degrees, diplomas, or certificates in health. The short-run returns from KCTCS vary by region, with students in Louisville, Ashland-Maysville and Mountain receiving the largest returns. Follow-up work with the KCTCS data should look at long-run returns to degrees, diplomas, and certificates.

IV. Total Returns to Schooling Using Contingent Valuation

This section describes the use of the contingent valuation method to estimate the total value to Kentuckians of KCTCS. The section begins with a short discussion of how estimates of value are obtained in the market, followed by a description of how the contingent valuation method can be used to obtain value estimates when markets are absent. The section then describes the survey used and provides a discussion of the results.

IV.1 Markets and the Contingent Valuation Method

The economic concept of value is based on the idea that individuals can increase their consumption of one good while decreasing their consumption of another good and remain just as well off. By substituting goods in this manner, individuals reveal their value for the goods and services consumed. If one of the goods traded has a monetary price, then the revealed values have a monetary interpretation. Money is simply a proxy for items in an individual's consumption bundle. For example, the money given up to purchase a gallon of milk represents the quantities of items that had to be given up in order to make the purchase. Many such trades are made in markets.

Markets facilitate the trade of goods and services and subsequently serve to reveal individuals' valuations for products sold. Markets, then, are a convenient setting for obtaining estimates of value. However, markets do not exist for all goods and services and do not work well for others, requiring us to seek other means to determine the value individuals place on some goods.

The contingent valuation method provides a way to value goods for which there is not a well-functioning market. The contingent valuation method does this by creating a scenario in a survey setting in which individuals are asked to state their *willingness to pay* for the good or service described. Willingness to pay is the maximum amount of money a person is willing to pay rather than go without an increase in a particular good and represents the total value to an individual of a good or service. In essence, the contingent valuation method sets up a well-functioning market where none previously existed. Transactions are then made and recorded as the measure of the individual's total value for the good or service described.

Valuing KCTCS is a natural application of the contingent valuation method. While certain market transactions take place for individuals wanting to attend KCTCS, those transactions alone cannot be considered to be the total value of KCTCS. That is because some of the benefits of education accrue to society as a whole and not just to individuals taking classes. Capturing the total value of the system requires an estimation of the combined benefits that accrue to the individual and society. The contingent valuation method estimates this value by sampling the population of Kentucky and offering individuals the chance to state their total value for KCTCS. This total value includes any benefit the survey respondent may receive personally if they attend KCTCS, but it also includes benefits the individual may receive such as lower crime rate or better public decision making.

IV.2 Survey

In order to estimate the value Kentuckians place on KCTCS, we sent an extensive survey to a random sample of approximately 3,000 households in Kentucky. The survey was administered in June and July 2007. The survey consisted of four main sections. The first section was designed to help respondents become familiar with KCTCS. It included a short introduction and several questions designed to assist respondents in thinking about their experience with and knowledge of KCTCS. In the second section, respondents were asked to allocate a fixed increment in state budget dollars to various state program areas to remind respondents that increased spending in one budget area is often accompanied by decreased spending in another area. We also asked questions designed to get the respondent thinking about the different benefits they might receive from KCTCS.

The third section contained the valuation scenario along with questions regarding response certainty. While all parts of the survey must work together to elicit an accurate valuation from respondents, the valuation section is the most critical. It is in this section that respondents were asked to state their value of KCTCS. To obtain valuations, the survey asked individuals if they would be willing pay a specified dollar amount for a 10 percent expansion in KCTCS. A 10 percent expansion was used because it is plausible to think about expanding the system by 10 percent and because measures of value are most accurately obtained for small changes from the status quo.

In the last section, respondents were asked several demographic questions. The demographic questions allow us to analyze willingness to pay by respondent characteristics such as gender, age, income, and education levels.

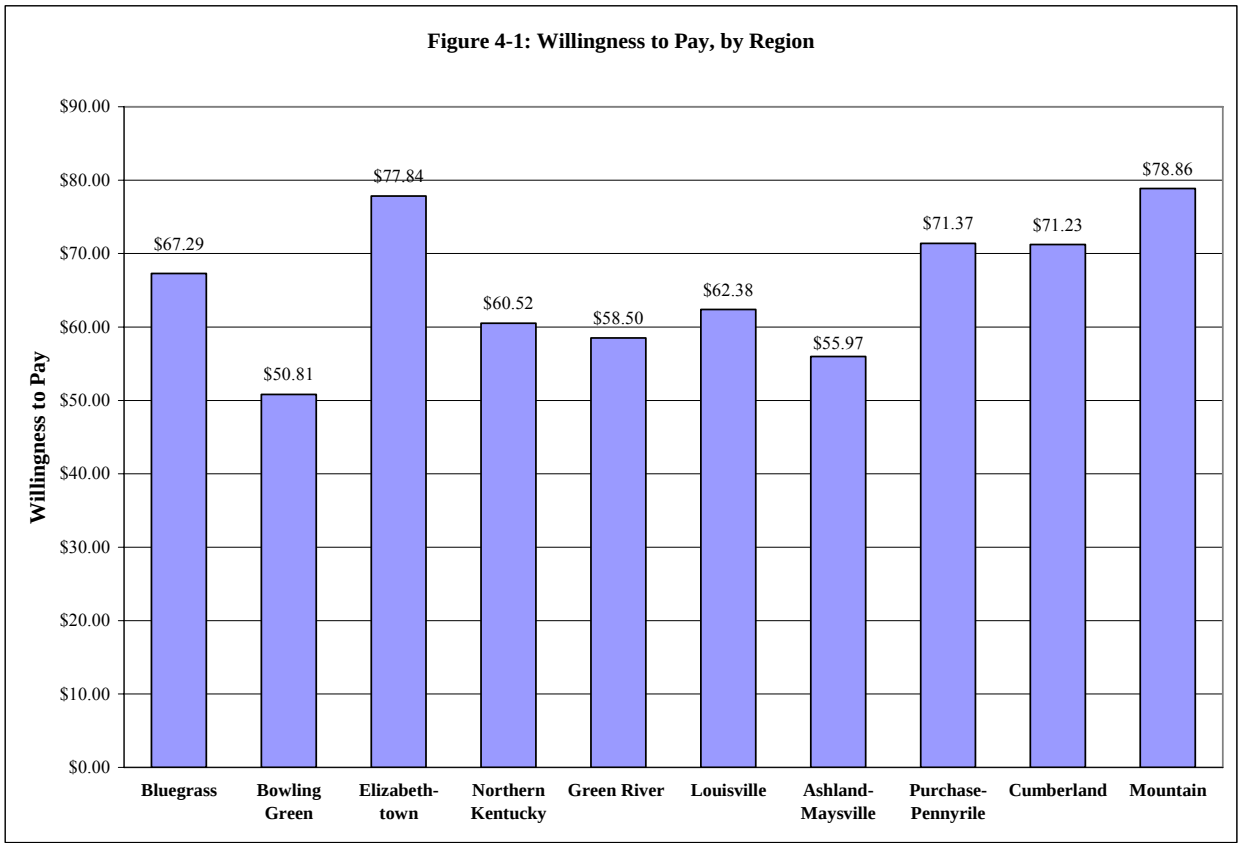
Appendix C contains a more complete discussion of how we developed the survey, how we administered the survey, and how we used the survey results to obtain our estimates of Kentuckians willingness to pay to increase the size of KCTCS. Appendix D contains a copy of the survey.

IV.3 Results

From the survey results we estimated the willingness to pay for KCTCS. The average household in Kentucky is willing to pay $64 for a 10 percent expansion of KCTCS. According to the U.S. Census Bureau's American Community Survey, there were 1.65 million households in Kentucky in 2005. If we multiply the number of households by the average willingness to pay per household, we find that the total value of a 10 percent expansion to KCTCS is $105.6 million. The $105.6 million includes both those benefits Kentuckians receive individually as well as benefits to society that come from reduced crime, healthier citizens and better public decision making.

In order to get an idea of the magnitude of this number, it is useful to compare the value of a 10 percent expansion to the costs of a 10 percent expansion. Information on costs was taken from the KCTCS budget. The revised 2006 fiscal year budget shows that total expenditures for operating KCTCS were $598 million. If we assumed that the cost of a 10 percent expansion

would be equal to 10 percent of current operating costs, then an estimate of the total cost of the expansion is approximately $60 million. Comparing the total value of a 10 percent expansion with the total costs of a 10 percent expansion indicates that Kentuckians value the expansion by an amount that is almost twice as large as what it would cost to expand the system. Since the benefits of a relatively small increase in the system are larger than the additional costs, an expansion to KCTCS would produce a positive net benefit for the state.[2]



In Figure 4-1, we present estimates of total willingness to pay separately for the ten regions of the state. These results show that in every region of the state people are willing to pay a substantial amount to expand KCTCS. The results also show that the Mountain region had the highest willingness to pay ($79), while the Bowling Green Region had the lowest ($51). The willingness to pay of the Mountain region may be a reflection of the concentration of schools in that region, combined with the lack of a nearby comprehensive university. With a greater number of community and technical colleges in the area, awareness of the presence and influence of KCTCS is likely to be higher than in other areas with fewer branches of KCTCS. Other areas with lower willingness to pay may be affected by a lower number of community and

[2] This increase in the system ignores any increase in buildings and other infrastructure costs since we are assuming that KCTCS could expand the number of students they serve without building any new buildings. According to KCTCS officials, the current value of KCTCS buildings is $390 million so a 10 percent increase in the number of buildings would be $39 million. If we add this to the increase in operating expenditures, it is still the case that the benefits to expanding the system by 10 percent exceed the costs of expanding the system.

technical colleges or greater opportunities to attend schools other than KCTCS. For example, within the Bowling Green region, there are four branches of KCTCS, two of those are in Bowling Green and two are in Glasgow. All are in close proximity to an alternative school for higher education, namely Western Kentucky University. These factors are likely to contribute to the lower willingness to pay in the Bowling Green region.

Total willingness to pay is also broken down by gender, education, income and age. We see in Figure 4-2 that men are willing to pay slightly more than women ($67 for men, $62 for women) to expand the system. This result should not be surprising since our estimates of the lifetime gain to obtaining an associate's degree based on Census data is slightly higher for men than women. Since men experience a larger gain in lifetime earnings, they should be willing to pay more to expand the system.

Figure 4-2: Willingness to Pay, by Gender

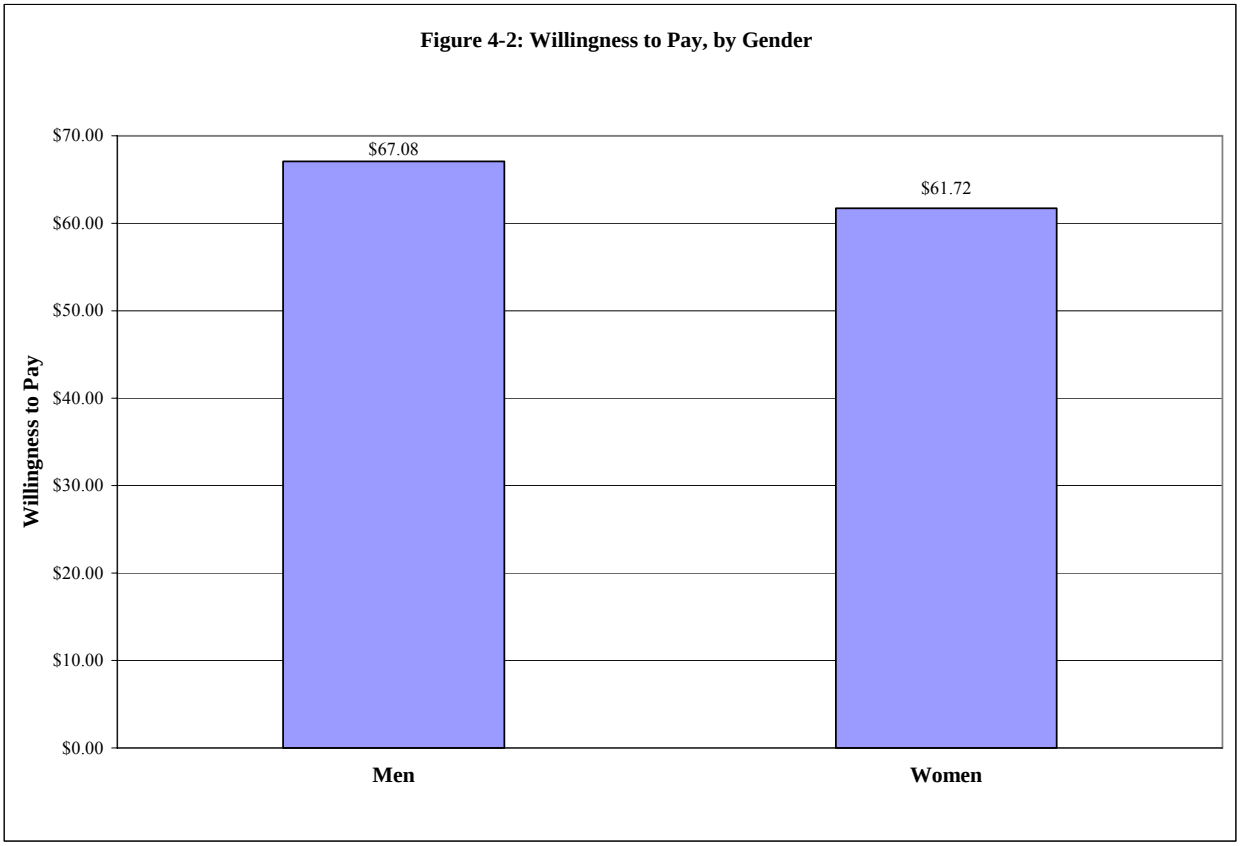


Figure 4-3 shows that willingness to pay increases with additional education, with those individuals having an associate's degree willing to pay the most ($83) to increase the size of the system. With more experience, individuals with higher education understand the potential benefits of increased levels of education and are willing to pay more for the expansion. Those individuals having an associate's degree are more likely to be those individuals who have had contact with KCTCS. The experience with KCTCS and the increase in earnings are likely reasons why associate's degree holders are willing to pay the most within the educational grouping.

Figure 4-3: Willingness to Pay, by Education

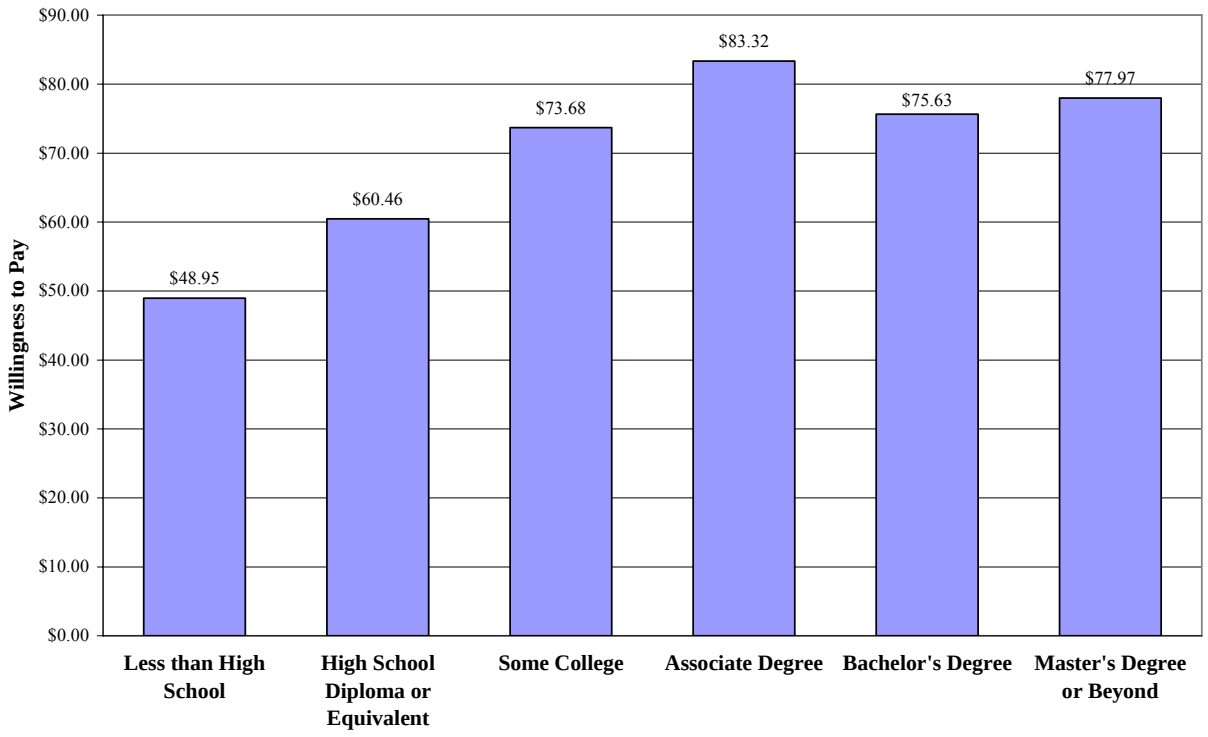
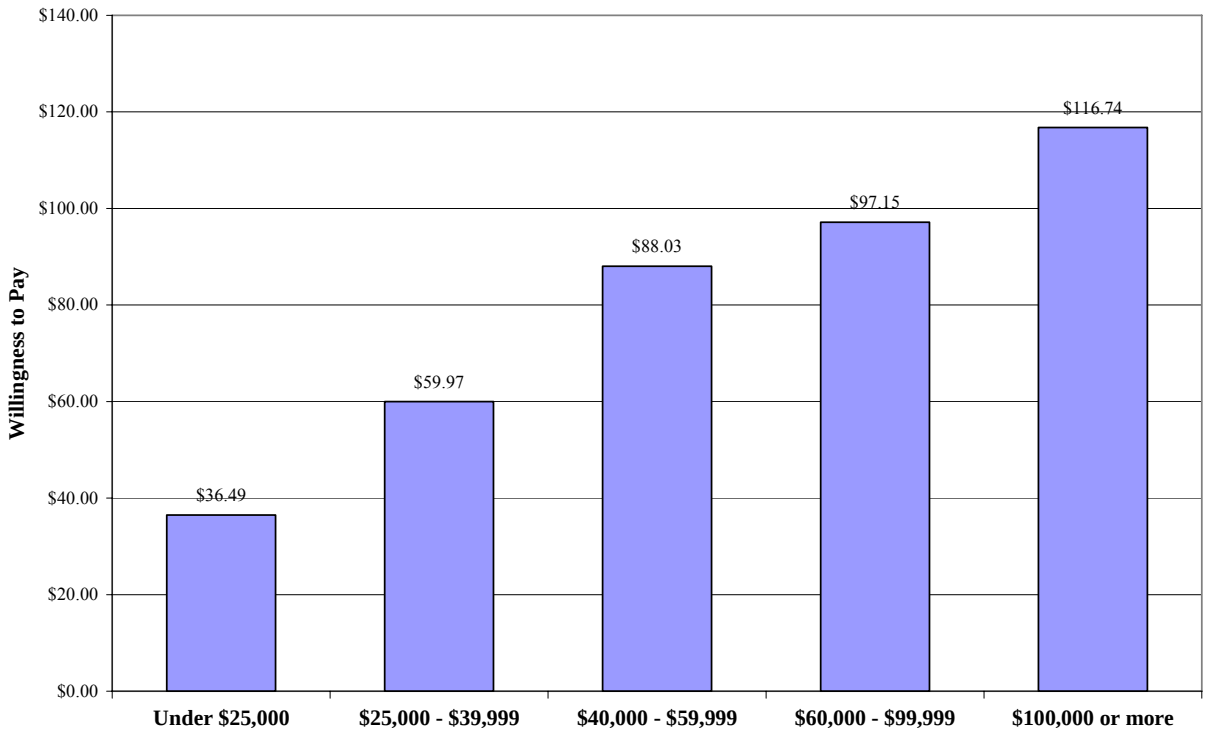
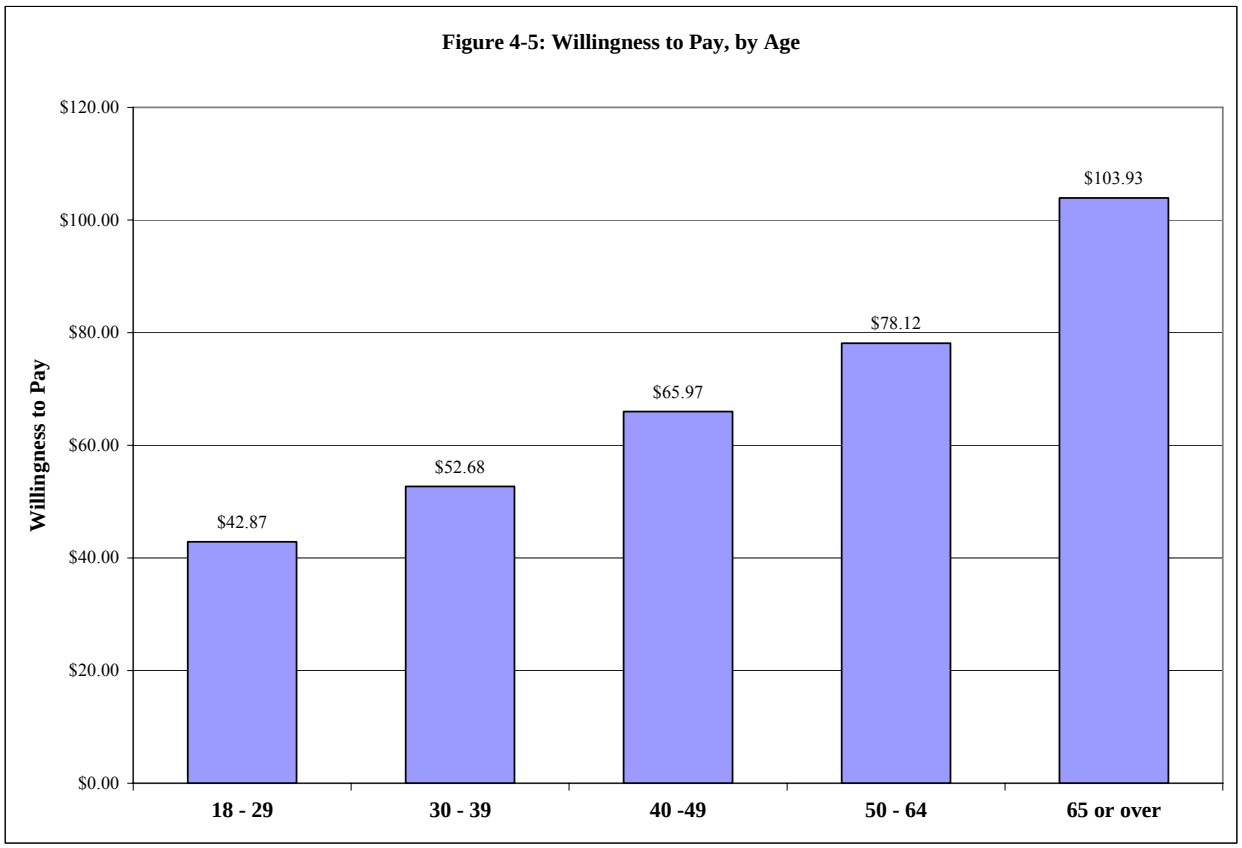


Figure 4-4: Willingness to Pay, by Income



In Figure 4-4, we can see that willingness to pay has a strong positive relation to income. Individuals making under $25,000 are willing to pay $36 while those making $100,000 or over are willing to pay $117. Positive relationships between income and willingness to pay are common, in general, and consistent with expectations for the relationship between income and the 10 percent expansion to KCTCS.

Finally, Figure 4-5 shows that older individuals are more willing to pay than younger individuals ($104 for 65 or over, $43 for 18 to 29 year olds). Older individuals are likely to have more disposable income than younger individuals, which may be one of the reasons for older individuals' higher willingness to pay. Also, because older individuals typically spend more on health related items, they are likely to receive greater benefits from improvements in health associated with increases in education, thus increasing their willingness to pay.



IV.4 Summary

This section has reported estimates of the total value to the residents of Kentucky of KCTCS. The estimates were obtained using the contingent valuation method, a method often used to obtain estimates of value for goods or polices for which markets do not exist or function well. The estimate of state wide total value for a 10 percent increase in KCTCS of $105.6 million is greater than the cost of the increase, indicating that an expansion of the system would result in positive net benefits for the state as a whole.

V. Conclusions

We have found that the typical Kentucky resident receives substantial individual returns associated with receiving a degree, diploma or certificate from a KCTCS college. The returns are particularly large for women. Returns to a college degree are also largest in the Ashland-Maysville and Mountain regions of the state. We also found that the citizens of Kentucky would be willing to pay more to increase the size of the system by 10 percent than it would cost to increase the system by this amount.

By comparing the estimated increase in individual returns from expanding the KCTCS system with the total returns that would result from expanding the system, we estimate what percentage of the increased benefits would accrue directly to the additional students that would attend a KCTCS college if the system were expanded and how much of the increased benefits would accrue to all Kentuckians regardless of whether or not they attended a KCTCS college.

Based on data from KCTCS, we estimate that a 10 percent increase in KCTCS would result in 543 additional people obtaining an associate's degree in a year. Based on data from the Decennial Census, our estimates show that these 543 people would experience an average increase in lifetime earnings of $246,000. If we multiply these numbers together we find that the estimated increase in individual returns from a 10 percent expansion of KCTCS is approximately $134 million. This estimate is quite similar to our estimate of the total benefits produced by expanding KCTCS, indicating that most of the increase in benefits that occur by expanding the system will be individual benefits gained by students who receive a degree from KCTCS.

We suspect that this estimate of the individual returns may be too large because the estimated returns are based on individuals who already have received an associate's degree. Presumably the additional people who would receive a degree if KCTCS were expanded would have a lower return than those who already have a degree. If instead, we use our estimates of the short-run individual returns based on student data from KCTCS to estimate the increase in individual returns from a 10 percent expansion in the system, then we find that the expansion would produce an estimated individual return of $70 million, which is approximately 70 percent of the overall benefit. This means that our estimate of the public returns (the social returns minus the individual returns) from a 10 percent expansion is around 30 percent.[3] We believe that this estimate of the individual returns is too low (and, therefore, the estimate of the public returns is too high) because it is based on earnings differentials immediately after students leave school, and previous research has shown that returns to schooling increase over time.

Treating these two estimates as upper and lower bounds shows the true increase in individual returns from a 10 percent expansion in KCTCS is between 70 and 100 percent of the total returns. In other words, most of the benefits that are produced by an expansion of the system accrue to people who attend a KCTCS college after the expansion. This result, in turn, implies

[3] To calculate these estimates, we followed a procedure similar to the procedure used to calculate the returns using the Census estimates. That is, using data from KCTCS, we calculate the additional women who would obtain degrees, diplomas and certificates and the number of men who would receive degrees, diplomas and certificates if KCTCS were expanded. We then multiply these numbers by the estimated increase in lifetime earnings that is associated completing the program and sum across the six groups.

that if the public finance principle of benefit financing is followed, any increase in the KCTCS system ultimately should be financed by students who attend KCTCS colleges.

If we assume that the true public returns is roughly in the middle of our two estimates of 0 and 30 percent, then this estimated return is between 10 and 20 percent. Under this scenario, the drop in crime, the increase in individual health, and the better public decision making that would occur with a 10 percent expansion of KCTCS is worth approximately $20 million to the citizens of Kentucky. This estimate should not be interpreted as saying that 20 percent of the total benefit generated by the entire KCTCS is a public benefit. As KCTCS expands and educates a larger percentage of the citizens in Kentucky, we would expect that the additional gain from expanding the system would eventually decline. However, our estimate does show that an expansion of KCTCS would continue to produce benefits for all citizens of Kentucky.

Our analysis has shown that the benefits to the citizens of Kentucky from expanding KCTCS by 10 percent significantly exceed the costs of expanding the system. We have also shown that there are large benefits from expanding the system in all regions of the state. Finally, our analysis has shown that, while most of the increase in benefits is for individuals, an expansion of KCTCS would generate substantial social benefits for all Kentuckians.

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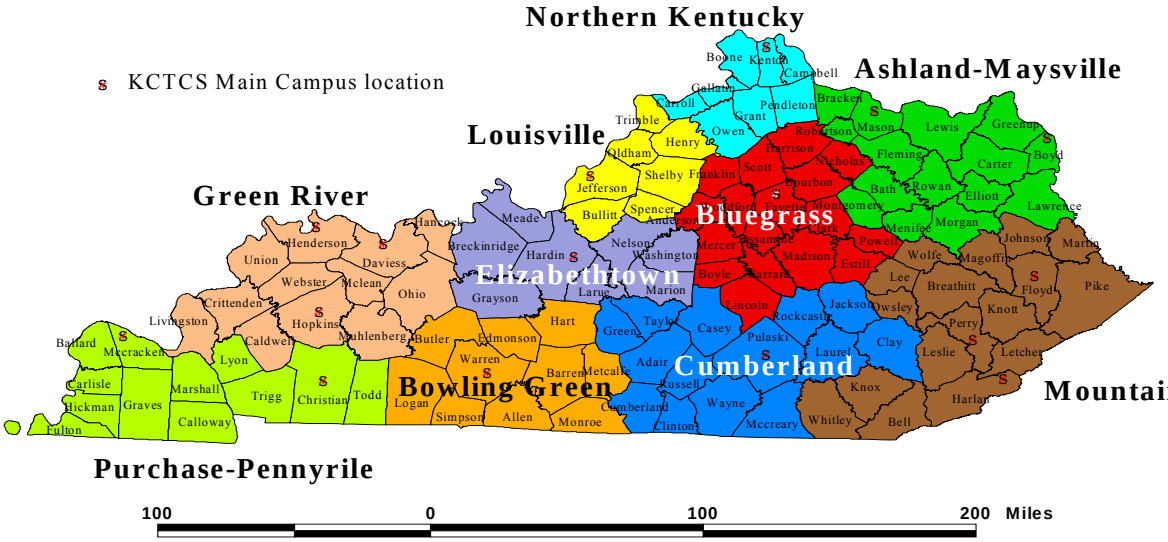
Appendix A. Data and Methods for Estimating Individual Returns using Census Data

It is, of course, impossible to precisely predict an individual's future earnings, but economists have developed methods to measure the average financial benefits to investments in education. These estimates of work-life earnings are expected average amounts based on current cross-sectional earnings data on workers of all ages, educational attainment, vocation, and other such characteristics. A linear regression model is statistically estimated, resulting in a model containing coefficients that give a prediction of the effects of education and other demographic variables on a worker's future earnings.

A.1 General Methodology and Data

We use data from the 2000 Decennial Census, specifically the five percent Public-Use Microdata Sample (PUMS) data for Kentucky, in this study. The Census five percent PUMS files contain individual records of the characteristics for a five percent sample of people and housing units. The Kentucky five percent PUMS dataset is divided up into 30 public-use microdata areas (PUMAs), each with a minimum population of 100,000. The PUMAs can easily be grouped so that they correspond fairly well with enrollment clusters for the 16 KCTCS main campuses. In order to ensure that there would be adequate sample sizes for our statistical purposes, ten of the PUMAs were combined into four larger areas, resulting in ten geographic regions for analysis. The ten regions correspond very closely with regions we have used in analysis on previous projects and fit nicely with with what we know about the general pattern of economic and commuting linkages within the state. Figure A-1 shows these regions.

Figure A-1: Kentucky Geographic Regions



Based upon U.S. Census Bureau Public Use Microdata Areas (PUMAs)
and KCTCS campus enrollment clusters (based on students' counties of residence) .

A.2 Estimation

We use data on nearly 84,000 individual Kentucky residents from the 2000 Census five percent PUMS file to estimate earnings equations for each of the ten geographic regions. Following standard practice in the literature, we fit a regression where the dependent variable is the logarithm of a worker's average earnings and the explanatory variables include a worker's experience, gender, marital status, and level of education. We also include explanatory variables for a worker's field of occupation since the monetary benefit from more schooling may vary considerably depending upon one's vocation. We ran the regression for all high school graduates in our database who worked at some point in 1999.

We make no distinction between year-round or part-year employment or between full-time or part-time employment. Factors determining employment status, such as layoffs, illness, family matters, etc., generally are independent of a worker's prior educational attainment. The goal is to create a lifetime earnings profile for the average 2006 high school graduate under various possible scenarios of future educational attainment.

Though in this report we are only interested in, and only report the results for, higher education through the associate's degree level, our model and data analysis include educational attainment above that level. We use six dummy variables for level of education beyond high school. The first is for workers who attended some college, but less than one year; the second is for those who attended more than a year of college but failed to earn a degree; the third is for those whose highest degree is an associate's degree; the fourth is for those whose highest degree is a bachelor's degree; the fifth is for those whose highest degree is a master's degree; and the sixth is for those whose highest degree is either a professional degree or a PhD. Since the omitted category is high school graduate, the dummy variables measure the difference in earnings compared with workers who finished their schooling with high school graduation.

Another variable measures the number of years a person could have been working after the completion of high school. Because we have no way of controlling for intermittent employment activity, we must assume that a person worked in each year after their schooling ended. For high school graduates we use the worker's age minus 18; for those who attended less than a year of college we use their age minus 19; for those who attended more than a year of college but did not get a degree and for those who have an associate's degree we use their age minus 20; for those who have a bachelor's degree we use their age minus 22; for those who have a master's degree we use their age minus 24; and for those who have either a professional degree or a PhD we use their age minus 26. We are not taking into account possible breaks in schooling or extra time needed to complete a degree. We also utilize the square of the experience variable in order to check if the work-life earnings profiles have the expected concave shape, where earnings initially grow with each year of added experience eventually reaching a peak and then declining.

The model includes dummy variables for gender, marital status, and for the Louisville region only, race. The gender dummy equals one for women and zero for men and measures the difference in earnings for women compared with that of men. We have two marital status dummies, the first of which equals one for workers who are either married or widowed, while the second equals one for workers who are either divorced or separated. Therefore, the base case is

a worker who has never been married. For the Louisville area only we utilize a dummy that equals one for workers who indicated their race as black on the Census form.

We also created seven dummy variables to capture differences among workers' occupations. The Census Bureau utilized a classification system for occupations with a few hundred occupational fields that were grouped into twenty-three major segments. We further aggregated that to seven occupational classes so that there would be a minimum of four hundred people in the database in each job class for each region. The seven occupational classes are 1) management, business, and finance; 2) professional science, the legal profession, and healthcare practitioners or technicians; 3) social services, education, the arts, media, and the military; 4) personal services; 5) sales and office functions; 6) agriculture, construction, extraction, and maintenance; and 7) production, transportation, and material moving. Since the seven job categories are exhaustive and mutually exclusive, we needed to eliminate one of them from the regression equations. We chose to omit the sales and office variable since more workers (25 percent) had those sorts of jobs than any of the other classifications. Thus, the remaining occupation dummies measure the difference in earnings compared to workers in the sales and office professions.

The model also includes interaction terms among all of the variables (the exception being marital status, race and occupation variables with the others in this group). This allows us to check, for example, if earnings change with experience differently depending upon one's educational attainment or gender or occupation, or if earnings profiles for a particular gender differ by occupation.

The coefficients from our regression equations measure the estimated change in predicted earnings, from what is predicted for a never-married man working in a sales or office job who is a high school graduate with no further education, due to factors such as higher education, occupation, gender, and marital status, both alone and in combination. For the Louisville region, the never-married, male high school graduate sales or office worker is also restricted to being white.

The fitted regression equations allowed us to chart the predicted experience-earnings profiles for various combinations of educational attainment, gender, marital status, and occupation. In turn, the predicted earnings for each level of education, marital status, and gender allow for the calculation of the present value of work-life earnings. The present values are based on the probability of surviving to each age, the probability of working at each age, and the ratio of the growth in wages to interest rates. Net present values, or the total returns to education, also take into account the costs of additional schooling. The factors utilized in the present value calculations are described below.

The return to investment in higher education is greater the longer one lives due to an extended work-life. We adjust the estimated earnings at each age by the probability that an individual reaches that particular age. The survival rate estimates use data from the U.S. National Center for Health Statistics (2006). Table A-1 shows an abbreviated version of these data.

Since people do not always work, we use the Census data to calculate the percentage of people in the ten geographic regions who were working in 1999 for each education level and by gender for five-year age ranges. These work probabilities adjust the earnings estimates downward to reflect the possibility that a person may not work at a particular age. Why a person may not be working is irrelevant to this study as the many possible reasons are largely independent of the decision to extend one's schooling after high school and we are interested in the average economic impact of higher education. Because of small sample sizes we combined education level categories above the high school graduate level. More specifically, we merged the data for the two categories of those who attended college less than one year and those who attended more than one year but failed to get a degree; those with associate's, a bachelor's degrees, a master's and a professional or PhD degree. See Table A-2 for these data.

Table A-1: Survival Probabilities, by Age and Gender (for selected ages)

Age	Males	Females
18	1.000	1.000
20	0.998	0.999
25	0.991	0.997
30	0.984	0.994
35	0.977	0.990
40	0.967	0.985
45	0.952	0.976
50	0.931	0.963
55	0.900	0.945
60	0.859	0.918
65	0.798	0.876
70	0.713	0.815
75	0.600	0.728
80	0.457	0.606

As a proxy for the future growth in wages, we use the average growth in the average hourly earnings of production workers from 1964 to 2006. These data come from the U.S. Bureau of Labor Statistics. The average growth rate in production wages was 4.60 percent. The interest rate we use is the average 3-month Treasury bill secondary market rate (discount basis) from 1964-2006 (Board of Governors of the Federal Reserve System 2007). The average interest rate was 5.80 percent. Because this period includes a wide range of economic conditions, we believe these averages are good proxies for the long-run average over the next several decades.

The Consumer Price Index is used to adjust the present value estimates from 1999 to 2006 dollars. The CPI for 1999 was 166.6 while the annual 2006 CPI was 201.6.

To calculate the total return to education we need to calculate the annual cost of higher education from tuition, fees, books and other supplies and then calculate the present value of these costs for each year of schooling. We assume that those who attend college for less that one year incur a full year of costs; that those who attend more than a year but do not get a degree and those who receive an associate's degree incur two years of costs. We further assume that all these costs are incurred in the years immediately succeeding high school graduation.

We use tuition, fees, books and supply cost information from KCTCS for the 2006-07 academic year. Fulltime tuition and fees in the KCTCS was $3,270. In all cases we assume that books and other supplies cost $800 per year, which is the budget figure published for student use by the University of Louisville. Table A-3 shows these present values of tuition, fees, books and other supplies.

Table A-2: Work Probabilities, by Age, Gender, and Region

	18-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75+
	Male High School Graduates											
Bluegrass	87%	91%	90%	88%	88%	88%	85%	78%	62%	40%	28%	23%
Bowling Green	88%	94%	91%	93%	89%	88%	85%	76%	60%	35%	29%	9%
Elizabethtown	86%	94%	91%	92%	93%	91%	89%	79%	56%	20%	26%	12%
Northern Kentucky	92%	91%	96%	90%	93%	91%	84%	82%	61%	29%	27%	18%
Green River	85%	93%	90%	92%	90%	87%	88%	73%	61%	25%	27%	15%
Louisville	85%	91%	92%	88%	90%	92%	85%	79%	57%	35%	20%	12%
Ashland-Maysville	77%	87%	86%	87%	82%	79%	79%	74%	52%	25%	22%	9%
Purchase-Pennyrile	89%	92%	91%	91%	91%	85%	83%	76%	61%	27%	14%	12%
Cumberland	84%	87%	89%	86%	86%	78%	73%	73%	54%	36%	17%	18%
Mountain	66%	78%	82%	76%	71%	70%	56%	49%	36%	20%	16%	14%
	Males with less than 1 year of college or more than a year but no degree											
Bluegrass	89%	95%	96%	94%	92%	93%	93%	85%	68%	48%	34%	17%
Bowling Green	89%	90%	96%	96%	88%	93%	87%	70%	58%	30%	29%	35%
Elizabethtown	90%	95%	96%	97%	95%	92%	90%	78%	67%	35%	20%	22%
Northern Kentucky	94%	98%	99%	96%	94%	95%	91%	86%	69%	48%	31%	12%
Green River	86%	97%	90%	96%	96%	90%	85%	69%	71%	46%	27%	25%
Louisville	91%	94%	97%	95%	92%	90%	87%	85%	64%	39%	31%	18%
Ashland-Maysville	82%	93%	95%	89%	91%	89%	82%	75%	43%	38%	35%	26%
Purchase-Pennyrile	90%	95%	96%	91%	90%	93%	89%	77%	62%	29%	27%	13%
Cumberland	85%	96%	88%	96%	79%	84%	79%	73%	67%	38%	25%	33%
Mountain	75%	87%	89%	86%	80%	78%	73%	61%	45%	26%	11%	0%
	Males with Associate's, Bachelor's, Master's, Ph.D. and professional degrees											
Bluegrass	91%	96%	98%	95%	97%	96%	94%	85%	68%	43%	52%	12%
Bowling Green	88%	98%	98%	100%	96%	93%	90%	87%	65%	35%	57%	0%
Elizabethtown	94%	96%	100%	94%	95%	91%	92%	76%	63%	29%	53%	31%
Northern Kentucky	96%	100%	98%	98%	98%	95%	96%	82%	76%	45%	59%	21%
Green River	87%	99%	98%	96%	95%	95%	93%	85%	75%	64%	45%	28%
Louisville	88%	95%	97%	98%	97%	97%	93%	89%	67%	46%	32%	19%
Ashland-Maysville	87%	96%	95%	93%	96%	93%	91%	89%	76%	43%	43%	40%
Purchase-Pennyrile	90%	96%	99%	96%	95%	88%	98%	81%	73%	27%	53%	20%
Cumberland	83%	94%	98%	95%	94%	85%	89%	74%	65%	42%	33%	31%
Mountain	76%	92%	93%	86%	86%	93%	80%	75%	53%	30%	40%	19%

Table A-2: Work Probabilities, by Age, Gender, and Region (continued)

	18-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75+
	Female High School Graduates											
Bluegrass	82%	78%	75%	78%	84%	77%	77%	65%	45%	22%	18%	6%
Bowling Green	82%	77%	80%	72%	82%	72%	72%	63%	48%	18%	10%	6%
Elizabethtown	83%	82%	73%	81%	79%	73%	74%	60%	44%	27%	17%	8%
Northern Kentucky	88%	75%	82%	83%	79%	78%	78%	65%	53%	23%	18%	8%
Green River	77%	70%	68%	77%	74%	74%	65%	58%	33%	18%	17%	4%
Louisville	82%	76%	79%	77%	79%	80%	72%	68%	47%	21%	18%	5%
Ashland-Maysville	72%	65%	64%	72%	71%	73%	58%	54%	37%	18%	16%	5%
Purchase-Pennyrile	78%	68%	78%	78%	75%	75%	61%	58%	40%	15%	15%	7%
Cumberland	68%	64%	66%	75%	78%	70%	60%	49%	33%	25%	18%	1%
Mountain	55%	53%	55%	63%	60%	55%	41%	45%	30%	16%	10%	2%
	Females with less than 1 year of college or more than a year but no degree											
Bluegrass	89%	86%	82%	88%	86%	83%	86%	71%	53%	26%	20%	9%
Bowling Green	90%	83%	81%	80%	88%	81%	79%	76%	52%	19%	17%	11%
Elizabethtown	87%	79%	80%	83%	85%	93%	77%	73%	41%	30%	19%	9%
Northern Kentucky	94%	86%	85%	83%	89%	87%	89%	72%	51%	39%	24%	8%
Green River	79%	79%	80%	82%	86%	84%	84%	60%	47%	22%	20%	14%
Louisville	91%	91%	88%	83%	84%	86%	81%	69%	58%	34%	20%	6%
Ashland-Maysville	83%	78%	80%	85%	83%	79%	71%	68%	48%	18%	32%	8%
Purchase-Pennyrile	86%	81%	77%	82%	82%	88%	71%	66%	43%	50%	23%	7%
Cumberland	86%	78%	80%	71%	82%	83%	68%	57%	43%	35%	30%	9%
Mountain	61%	67%	66%	75%	67%	72%	54%	61%	37%	20%	15%	4%
	Females with Associate's, Bachelor's, Master's, Ph.D. and professional degrees											
Bluegrass	93%	90%	85%	85%	90%	88%	84%	75%	49%	32%	28%	5%
Bowling Green	95%	92%	87%	86%	88%	90%	82%	74%	52%	36%	33%	3%
Elizabethtown	87%	91%	81%	86%	94%	90%	87%	62%	20%	29%	13%	3%
Northern Kentucky	97%	89%	87%	86%	85%	90%	87%	69%	43%	33%	25%	8%
Green River	98%	90%	89%	88%	86%	93%	90%	61%	44%	29%	0%	6%
Louisville	92%	92%	85%	85%	82%	88%	80%	72%	52%	19%	23%	10%
Ashland-Maysville	95%	93%	85%	88%	88%	88%	78%	68%	42%	36%	43%	7%
Purchase-Pennyrile	91%	85%	90%	85%	86%	85%	77%	76%	46%	23%	8%	5%
Cumberland	84%	86%	89%	82%	77%	87%	76%	67%	35%	45%	12%	10%
Mountain	74%	87%	88%	85%	82%	87%	76%	43%	38%	0%	30%	6%

Table A-3: Present Values of Tuition, Fees, Books, and Supplies

Educational Attainment	Present Value
Less than 1 year of college	$4,024
More than 1 year of college, no degree	$8,003
Associate's degree	$8,003

Additionally, there are also opportunity costs to obtaining a higher education. A college student is foregoing the income that could have been earned had he or she been working since high school graduation. Since we have assumed that no income is earned until a person's schooling is finished, in calculating the difference between a high school graduate's present value of work-life earnings and that of someone with more education the opportunity costs are accounted for.

A.3 Present Values

The present value of earnings for each degree is the sum over each year of age of the earnings adjusted for work probability and survival probability, and discounted by the ratio of the growth in wages to the interest rate. During the years in school, the earnings for a particular degree are equal to zero. Table A-4 shows, for each of the ten geographic regions, the estimated present values of earnings through age 80 for each education level by gender.

In general, the present value of earnings for women is about half of that for men. Women with only a high school degree do the worst, compared to men, while women who have an associate's degree come closest to similar men's earnings (generally about 60 percent of the present value of men's lifetime earnings, though for women in the Purchase-Pennyrile region the present value is under 50 percent of that for men). This is the result of the particular mix of occupations of men and women, differences in the number of full-time versus part-time workers, and other life choices.

Among the geographic regions, the present values of lifetime earnings, regardless of education level, are generally highest for the Northern Kentucky, Jefferson, and Bluegrass regions, and lowest for the Mountain, Cumberland, and Ashland-Maysville regions. The present values of the latter group are generally about 70 percent those of those in the former group.

For those whose education ends with high school graduation, the present value of earnings ranges from about $188,000 for women from the Mountain region to nearly $950,000 for men from the Northern Kentucky region. However, women in the Mountain region can increase the present value of their lifetime earnings by nearly 70 percent with just another year of education. Generally, for men the extra year of higher education increases the present value of earnings by about 20 percent, but for men in the Green River region earnings only increase by six percent. However, further years of higher education without a degree do not increase the present value of earnings for either men or women in most of the clusters, the major exception being women in the Purchase-Pennyrile region.

Table A-4: Present Value of Earnings, by Gender, Educational Attainment, and Region

Education Level	Bluegrass	Bowling Green	Elizabeth-town	Northern Kentucky	Green River	Louisville	Ashland-Maysville	Purchase-Pennyrile	Cumber-land	Mountain
Panel A - Male Workers										
Present value of earnings										
High School	$850,192	$778,465	$803,359	$946,407	$832,340	$854,949	$689,284	$792,542	$626,995	$536,362
Less than 1 year of college	$989,420	$929,267	$971,666	$1,116,409	$885,151	$1,054,057	$835,682	$939,359	$804,313	$684,670
More than 1 year of college, no	$956,100	$821,343	$956,512	$1,138,513	$926,703	$1,004,261	$837,333	$920,643	$707,051	$654,121
Associate's degree	$1,034,272	$1,012,256	$958,350	$1,242,733	$972,583	$1,146,523	$1,048,642	$1,076,729	$841,221	$800,289
Difference from High School										
Less than 1 year of college	$139,227	$150,803	$168,308	$170,001	$52,811	$199,108	$146,398	$146,817	$177,318	$148,308
More than 1 year of college, no	$105,907	$42,878	$153,153	$192,106	$94,363	$149,311	$148,048	$128,101	$80,056	$117,759
Associate's degree	$184,080	$233,791	$154,991	$296,326	$140,243	$291,574	$359,357	$284,187	$214,226	$263,927
Total return to extra education										
Less than 1 year of college	$135,203	$146,778	$164,284	$165,977	$48,787	$195,084	$142,374	$142,793	$173,294	$144,284
More than 1 year of college, no	$97,904	$34,876	$145,150	$184,103	$86,360	$141,309	$140,046	$120,098	$72,053	$109,756
Associate's degree	$176,077	$225,788	$146,988	$288,323	$132,240	$283,571	$351,355	$276,184	$206,223	$255,924
Panel B - Female Workers										
Present value of earnings										
High School	$394,868	$364,230	$353,450	$467,649	$304,721	$431,920	$289,290	$327,609	$287,612	$188,533
Less than 1 year of college	$503,199	$432,933	$439,143	$587,063	$392,543	$550,547	$366,538	$379,939	$365,575	$319,953
More than 1 year of college, no	$519,422	$432,107	$467,805	$559,940	$397,613	$548,367	$364,346	$426,253	$337,901	$318,257
Associate's degree	$643,470	$647,010	$592,916	$739,698	$582,585	$656,045	$582,860	$501,530	$449,688	$471,460
Difference from High School										
Less than 1 year of college	$108,332	$68,702	$85,694	$119,414	$87,822	$118,627	$77,248	$52,330	$77,963	$131,420
More than 1 year of college, no	$124,554	$67,877	$114,355	$92,291	$92,892	$116,447	$75,056	$98,644	$50,289	$129,723
Associate's degree	$248,602	$282,780	$239,467	$272,049	$277,864	$224,125	$293,570	$173,921	$162,076	$282,926
Total return to extra education										
Less than 1 year of college	$104,307	$64,678	$81,669	$115,389	$83,798	$114,603	$73,224	$48,306	$73,939	$127,396
More than 1 year of college, no	$116,551	$59,874	$106,352	$84,288	$84,889	$108,444	$67,054	$90,641	$42,287	$121,721
Associate's degree	$240,599	$274,777	$231,464	$264,046	$269,861	$216,122	$285,567	$165,918	$154,073	$274,924

NOTE: Figures are 2006 dollars. Present values are the results of regressions that do not take into account occupation, marital status or race. It is assumed that higher education is pursued immediately after high school graduation and that there are no earnings while attending school. Total returns take into account the costs of higher education based on a full-time load of courses at a KCTCS school. Present values are based on predicted annual earnings through the age of 80, discounted according to the probablility that a person is employed at a given age, survival rates, interest rates, and earnings growth rates.

Our results on the long-term individual returns from earning an associate's degree are larger than what is usually found in the literature we reviewed in Section II. For example, Kane and Rouse (1995) find a 20 to 30 percent gain from earning an associate's degree in one of the two datasets they analyze, and a roughly 25 percent gain for women in the other, while Jacobson et al. (2005a) find an earnings increase from one year of technically oriented vocational and math and science courses of 14 percent for men and 29 percent for women. Our present value calculations produce estimates of increased earnings of around 32 percent for men and 75 percent for women.

Both the Kane and Rouse (1995) and Jacobson et al. (2005a) articles utilize datasets that follow a cohort of people over time and each restricts the sample analyzed to only people who are working at the end of the analysis period. While we, too, only analyze data for people who were working, our dataset is cross-sectional rather than longitudinal. So our estimates can tell us what a hypothetical person, of a certain age, from a particular region, with a given level of education, would earn (on average) if they worked in that year. In our present value calculations, however, we do not assume that a person will always be working, but discount by the percentage of people in each 5 year age group that actually worked in 1999. This was calculated by region and by education level. It turns out that the probability that associate's degree holders worked in 1999 is significantly greater than for high school graduates. It varies by region and age group but is typically on the order of 10 percent. If we recalculate the present values assuming 100 percent probability of employment at each age, it significantly reduces the gain from an associate's degree. The gain is now on the order of 19 percent for men (ranging from 4.6 percent for the Green River region to 26.5 percent for the Purchase-Pennyrile region) and 48 percent for women (ranging from 29.1 percent for the Cumberland region to 79.7 percent for the Mountain region). This is clearly within the ballpark that previous studies have established and any remaining discrepancy may be due to the poor prospects of high school graduates in much of the state. We think the large returns we find for women are probably valid since there is such a huge switch at the associate's degree level to more technical jobs in our sample.

See Section III for a discussion of the results for people with an associate's degree.

Figure A-2: Total Returns to Extra Education, by Gender, Occupation and Region

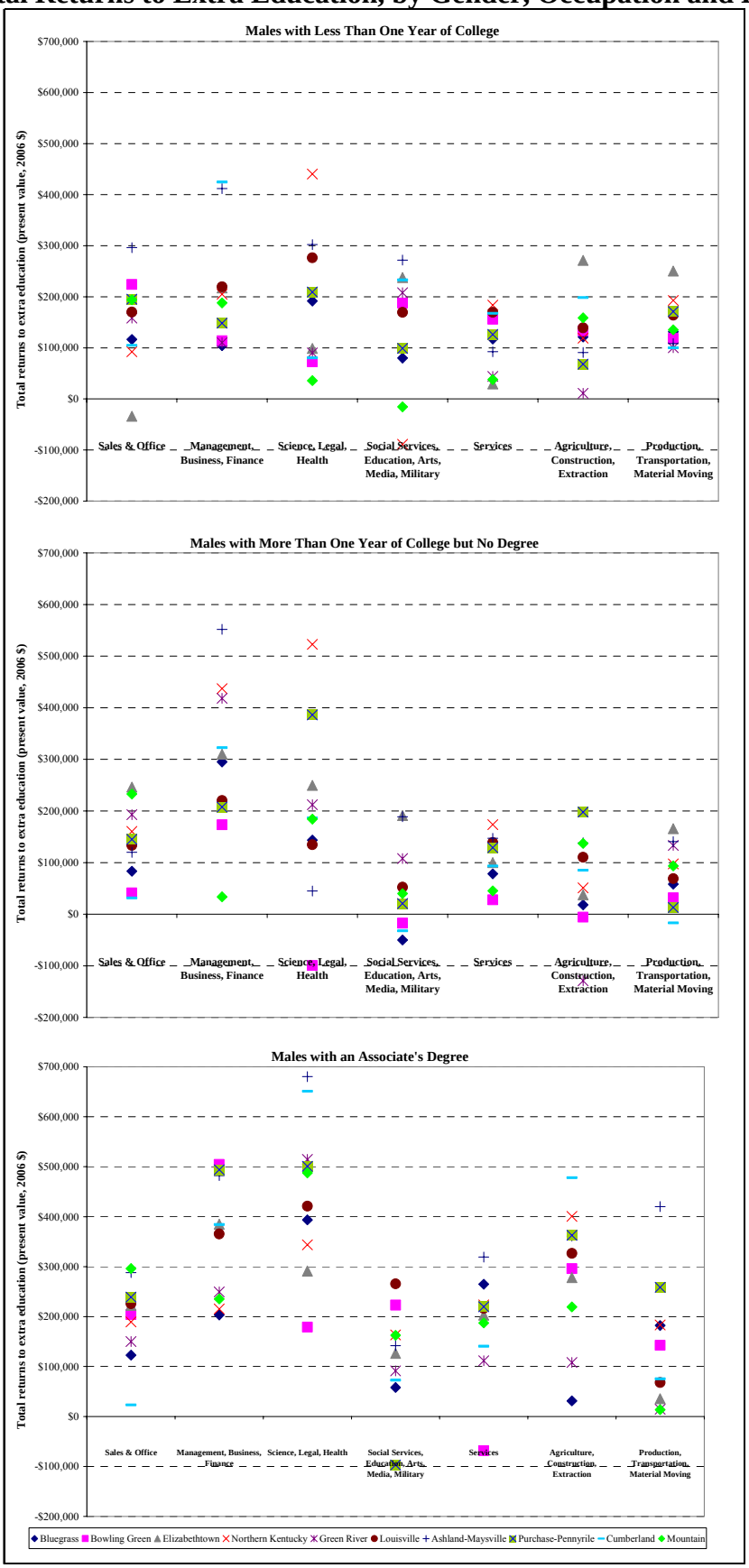
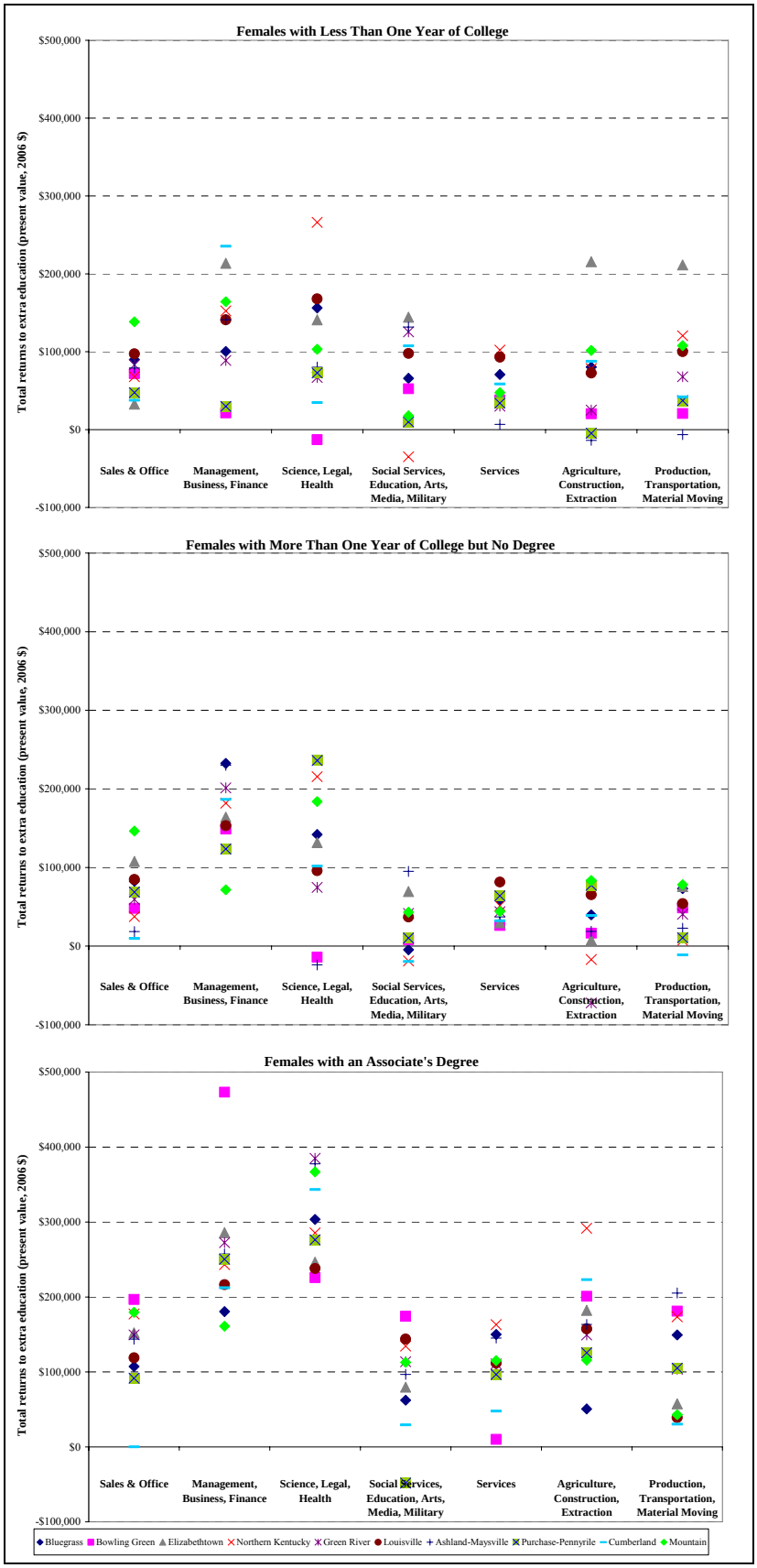


Figure A-2: Total Returns to Extra Education, by Gender, Occupation and Region (cont.)



A.4 Individual Returns to Higher Education

To calculate the individual returns to education, we subtract the present value of the cost of tuition, fees, books, and other supplies from the difference in the present value of earnings for the particular degree from the present value of earnings for a high school graduate. The estimated returns are also in Table A-4. Generally, higher education is a good deal, reaping long-run rewards much greater than the short-run monetary outlay. But there is a great deal of variation both between the occupation classes and among the geographic regions. The charts in Figure A-2 illustrate this.

For both men and women with less than a year of college, returns are lowest in the services sector and highest in the Management, Business, and Finance and Science, Legal and Health sectors. But the spread between the different regions is also greatest for those better returning sectors. While the Northern Kentucky region can boast of the best total return for many occupational classed for both men and women, it is also the home of the worst return among all the regions and occupations for the Social Services, Education, Arts, Media, and Military occupations. In general, both men and women in the Elizabethtown region and men in the Ashland-Maysville region experience above average returns for less than one year of college. The relative position of the other regions varies a great deal from one set of occupations to the next.

The disparity between the returns for the Management, Business and Finance and Science, Legal and Health occupational classes increases considerably for individuals with more than a year of college but still no degree. But in these two occupations the returns for the Bowling Green, Ashland-Maysville, and Mountain regions lag far behind the other regions of the state. Generally, men in the Northern Kentucky region experience above average returns for this level of education, but no other region, for either men or women, is consistently above average across the occupations.

A.5 Marital Status

We also included in our models variables that took into account a worker's marital status. Table A-5 summarizes our findings on the total return to higher education for three subsets of workers – never married, married or widowed, and divorced or separated. We find that for men there is definitely a marriage premium. With a few exceptions, the present values of work-life earnings are much higher for married men compared to both never married men and divorced men. Indeed, the disparity often increases as the level of education gets higher. On the other hand, the present values of work-life earnings for married women are almost uniformly five to fifteen percent below that predicted for never married and divorced women. Undoubtedly, this reflects a host of life choices leading to less intense participation in the labor force over a period of years.

Despite the stark differences between men and women in terms of the overall level of their earnings and marital status, our results also show that there is not much difference at all in terms of the total return to higher education that men and women achieve. Women in all three marital status categories do about equally well in terms of total returns for each level of education and are on par with the returns realized by similarly situated men. This is especially true at the

associate's degree level, where women move markedly out of the Sales & Office and Personal Services occupation groups and into the Professional Science, Legal, & Healthcare occupations.

Table A-5: Total Returns to Higher Education, by Marital Status

Education Level	Bluegrass	Bowling Green	Elizabeth-town	Northern Kentucky	Green River	Louisville	Ashland-Maysville	Purchase-Pennyrile	Cumber-land	Mountain
Panel A - Male Workers										
Less than 1 year of college										
Never married	$126,506	$94,833	$335,036	$239,170	$178,433	$195,767	-$98,092	$207,342	$113,538	$68,787
Married or Widowed	$92,144	$125,266	$116,794	$159,507	$19,384	$181,372	$224,738	$107,147	$195,221	$129,291
Divorced or Separated	$164,893	$227,942	$97,022	$129,424	-$7,512	$87,991	$217,753	$75,912	$65,440	$168,607
More than 1 year of college, no degree										
Never married	$83,958	$31,589	$85,513	$109,201	$213,768	$93,522	$88,535	$90,570	$44,745	$11,082
Married or Widowed	$88,485	$37,001	$150,726	$216,922	$55,908	$131,668	$172,746	$140,663	$98,130	$134,453
Divorced or Separated	$98,084	$51,692	$139,353	$120,064	-$18,536	$113,722	$9,256	$10,403	-$45,843	$112,636
Associate's degree										
Never married	$88,421	-$45,973	$44,135	$214,593	$8,535	$180,627	$249,317	$178,065	$134,215	$83,795
Married or Widowed	$197,010	$269,218	$189,294	$299,690	$173,858	$247,458	$455,923	$276,702	$231,189	$327,738
Divorced or Separated	$204,656	$184,633	$33,485	$344,660	$12,767	$338,035	$236,281	$242,535	$145,723	$129,288
Panel B - Female Workers										
Less than 1 year of college										
Never married	$127,953	$51,700	$229,069	$214,882	$189,124	$170,165	-$59,359	$116,448	$69,815	$111,588
Married or Widowed	$84,810	$48,699	$67,318	$101,812	$72,850	$105,049	$86,337	$39,304	$83,786	$117,487
Divorced or Separated	$154,124	$120,865	$77,049	$128,951	$74,308	$87,069	$124,793	$44,676	$34,276	$176,239
More than 1 year of college, no degree										
Never married	$122,851	$57,792	$96,413	$73,780	$201,072	$113,067	$75,593	$102,618	$41,672	$73,296
Married or Widowed	$102,580	$57,040	$101,541	$86,710	$76,835	$99,584	$78,375	$98,012	$56,117	$118,322
Divorced or Separated	$134,553	$71,430	$125,505	$77,194	$57,096	$124,775	$20,286	$56,978	-$10,528	$141,672
Associate's degree										
Never married	$203,193	$89,326	$197,206	$285,014	$220,151	$213,434	$293,090	$161,033	$140,962	$199,772
Married or Widowed	$233,607	$299,560	$246,050	$240,502	$284,999	$184,983	$290,348	$158,298	$160,624	$292,882
Divorced or Separated	$298,338	$277,194	$191,633	$384,654	$236,012	$320,971	$256,203	$212,178	$135,673	$240,818

NOTE: Figures are 2006 dollars. Present values are the results of regressions that do not take into account occupation or race. It is assumed that higher education is pursued immediately after high school graduation and that there are no earnings while attending school. Total returns take into account the costs of higher education based on a full-time load of courses at a KCTCS school. Present values are based on predicted annual earnings through the age of 80, discounted according to the probablility that a person is employed at a given age, survival rates, interest rates, and earnings growth rates.

A.6 Race

Our models include a variable for race of the worker in the Louisville region, the only region in the state with enough African-American workers to ensure a statistically meaningful result. Table A-6 summarizes our results by race and gender for the Louisville region. We see that at each level of education through the associate's degree white men are predicted to have much higher present values for their work-life earnings than their black counterparts. On the other hand, black women actually surpass white women in terms of the present value of their work-life earnings after completing at least a year of higher education. This could be due to a greater intensity of participation in the labor force as well as differences in occupations. In any case, it is quite clear that black women experience greater total returns to higher education at each level of education. This is also true for black men, as well. Though not shown, at each increase in education there is more parity between the expected work-life earnings of white and black men and women in the Louisville region.

Table A-6: Present Value of Earnings by Gender, Race, and Educational Attainment for the Louisville Region

	Male		Female	
	White	**Black**	**White**	**Black**
Present value of earnings				
High School	$904,050	$576,719	$445,193	$369,486
Less than 1 year of college	$1,090,022	$791,858	$556,964	$526,429
More than 1 year of college, no degree	$1,037,701	$806,922	$548,556	$554,918
Associate's degree	$1,174,038	$935,622	$653,475	$675,780
Difference from High School				
Less than 1 year of college	$185,972	$215,140	$111,771	$156,943
More than 1 year of college, no degree	$133,651	$230,203	$103,363	$185,432
Associate's degree	$269,988	$358,904	$208,282	$306,294
Total return to extra education				
Less than 1 year of college	$181,948	$211,116	$107,747	$152,919
More than 1 year of college, no degree	$125,649	$222,200	$95,361	$177,429
Associate's degree	$261,986	$350,901	$200,279	$298,292

NOTE: Figures are 2006 dollars. Present values are the results of regressions that do not take into account occupation or marital status. It is assumed that higher education is pursued immediately after high school graduation and that there are no earnings while attending school. Total returns take into account the costs of higher education based on a full-time load of courses at a KCTCS school. Present values are based on predicted annual earnings through the age of 80, discounted according to the probablility that a person is employed at a given age, survival rates, interest rates, and earnings growth rates.

A.7 Caveats

When linking education to earnings, we use terms like 'associated' as opposed to more causal terms such as 'cause.' There is a large literature in economics that probes the underlying factors causing an individual to have more or less income. Family background, innate intelligence, personality traits, and local economic conditions all play a part. Some researchers have gone so far as to claim that higher education credentials are primarily a signaling device to employers that the individual has ability and perseverance, rather than a measure of value added by the educational institution. Our view is that, while the sorting and signaling functions are important, higher education also improves the individual's workplace productivity in crucial ways, including direct knowledge transfer, development of critical thinking skills, mentoring by faculty, peer networking and socialization.

We do not know from the Census data whether the surveyed person attended a KCTCS institution, a Kentucky private one-year or two-year institution, a four-year institution, an out-of-state institution, or possibly all four types. We only know that the person lived in Kentucky in 2000, had achieved a certain level of education, and had certain social and economic characteristics. Nevertheless, because of its relative accessibility in terms of both location and price, KCTCS dominates the market for higher education below the baccalaureate level. For

example, in Fall 1999 the full-time equivalent enrollment at public 2-year colleges (KCTCS) in Kentucky was 28,792, compared to 4,712 for private 2-year colleges (U.S. Department of Education, National Center for Education Statistics 2001).

Also, the Census does not provide an educational breakout for individuals who obtain a credential less than an associate's degree from a community or technical college. This means we cannot estimate the individual returns of credentials. Since this is an important and growing component of KCTCS programming, we address this shortcoming in another section using administrative data from KCTCS.

Technically, these results are based on cross-sectional data that give a picture of the earnings of workers in a given year. This analysis therefore assumes that as today's younger workers age their earnings will resemble the current earnings of older workers. But the earnings of older workers today may not be reflective of the earnings of workers of the same age in the future. For example, as the economy shifts away from skilled manufacturing jobs we may find that the difference in earnings between a high school graduate and those who attend college keeps widening.

The mix of occupations in the Kentucky economy may change in the future (or be different for younger and older workers today), and since the experience-earnings profiles differ substantially for some of the occupational classes our estimates may not hold true.

Different values of the interest rate and the growth in earnings will lead to different estimated results, though they will affect all groups and educational levels equally. However, the returns to higher education will decrease if the interest rate increases relative to the growth in earnings.

Survival probabilities may vary depending on factors correlated with educational attainment. For instance, smoking may decrease and exercise may increase with education, resulting in higher survival probabilities for college graduates than for high school graduates. If this is true, then our present values underestimate the returns to education (though in this case, part of the return is due to a factor independent of the actual education).

The estimates are based upon the regression coefficients, which have a degree of statistical error. The estimated coefficients are the best linear unbiased coefficients, however, meaning that they are the best that we can do with the data at hand.

Appendix B. Data and Methods for Estimating Short-run Individual Returns using KCTCS Data

The administrative data in section III, part B, are from KCTCS and they include data from several sources. The first source is the student demographic file, which contains student-level information on demographics such as age, race, and gender. The second source is the course level data. These data contain descriptive information on the type of course as well as the grade and the number of credits received. Data are available for each course taken by each student.

The third data source is the outcome file. These data identify each degree, certificate, and diploma awarded. Certificates are specialized programs where students can demonstrate a specific set of skills to potential employers. Schools offer certificates in several program areas. Diplomas tend to target broader areas than certificates and usually require more credits (often one year or more of full-time studies). For example, KCTCS offers a diploma titled medical office assistant, which requires 44 to 47 credits; a medical administrative certificate from KCTCS requires 33 to 35 credits.

The outcome data also contain transfer information from the National Student Clearinghouse. The transfer data identify the date and name of transfers to all participating four-year institutions from 2002 to 2006. The National Student Clearinghouse contains nearly 90 percent of all students, including all four-year schools in Kentucky and most schools in neighboring states.[4]

KCTCS receives quarterly earnings data from the state's unemployment insurance program. Total wages are reported for each person and job. Data are from the first quarter of 2000 through the fourth quarter of 2006.

Our focus is on the cohort of students who started at KCTCS between summer 2002 to spring 2003. For evaluating the individual returns to KCTCS, we exclude students who are in correctional institutions, less than 20 years old as of June 1, 2002, more than 60 years old as of June 1, 2002, or transferred to a four-year school. These students are excluded in order to study the labor market returns of individuals most likely to be in the labor market immediately before and after their attending KCTCS.

The KCTCS database provides detailed information on the cohort of students who entered KCTCS during the 2002-2003 school year. We use these data to estimate the change in earnings for students associated with KCTCS attendance. Specifically, we compare the post-KCTCS earnings of a student with the pre-KCTCS earnings of the same student. We use the group of KCTCS students before they become students as a comparison group for those who become KCTCS students, the treatment group. The principal difference between the two groups is that the treatment group has attended KCTCS and the control group has not.

More formally, we estimate the multivariate regression given in equation (1) to measure the effect of KCTCS attendance on earnings.

[4] This information comes from the National Student Clearinghouse webpage (www.studentclearinghouse.org).

(1) $$LOGEARN_{it} = \beta \cdot KCTCS_{it} + \delta \cdot DEMOG_{it} + \lambda \cdot ENROLL_{it} + \eta_i + \tau_t + \varepsilon_{it}.$$

LOGEARN is the log earnings for the six-month period, where the six-month period is either January through June or July through December. This time period is chosen because the earnings data are quarterly but the KCTCS data are by semester. A six-month period is the "smallest common denominator" for these two time periods. The spring semester is assigned to the first half of the year, whereas the summer and fall terms are assigned to the second half of the year.

The input of interest is the KCTCS outcome. The vector *KCTCS* contains three dichotomous variables (equal to zero or one): one for having an associate's degree as the highest degree, one for having a diploma as the highest degree, and one for having a certificate as the highest degree. For each KCTCS outcome (degree, diploma, or certificate), the estimated change in earnings should be interpreted as the change relative to the same person's earnings before she completed the degree. This variable is discussed in more detail below. *DEMOG* is a set of demographic variables that change over time. Specifically, the variables are age and age squared (at the start of the six month period), as well as interactions of these two variables with a dichotomous variable for nonwhite. *ENROLL* is a dichotomous variable equal to one when the individual is attending KCTCS and zero otherwise. This variable is meant to account for the opportunity cost (in terms of earnings) for students while they attend KCTCS. η is a person fixed effect, where *i* denotes a person. These variables (there is one variable per person) capture all person-specific components that are constant over time, such as race/ethnicity. In fact, these variables can be thought of as the overall effect of all these time-invariant person characteristics. All such characteristics are captured in these variables and they cannot be measured separately. The model contains controls for each six-month period (τ), where *t* denotes a six-month time period. The last component (ε) is the unobservable component of earnings, often called an error term. There are 14 time periods, covering the first half of 2000 through the last half of 2006. Separate equations are estimated for men and women.

Our primary interest is in β, the coefficients on the three KCTCS variables in equation (1). Again, these variables are defined as the highest degree received as of that time period. For individuals with no degrees, diplomas, or certificates, these three variables are equal to zero in all time periods. For individuals with one of these outcomes, then the variable associated with the highest degree is equal to one after the degree is received, and the other two variables are equal to zero. An associate's degree is considered the highest degree offered; a diploma is considered the second highest degree offered; and a certificate is considered the third highest degree offered. For example, a person with a certificate and a diploma would have a value of one for diploma and a value of zero for associate's degree and for certificate. As mentioned above, these variables are only equal to one in the time periods after which the person has received the degree. In other words, if a person receives an associate's degree in May 2005, then the dichotomous variable for an associate's degree would equal zero for each six-month period before May 2005 because the person has not yet received the degree. The associate's degree variable is also zero for the period in which the person receives a degree, since the individual has only had the degree for part of the period. In our example, the associate's degree variable would equal zero in the six-month period from January to June of 2005. Finally, our example person would have a value

of one for the associate's degree variable for each six-month period starting with the July to December period for 2005. The general strategy is that this highest degree variable is equal to one in periods when the person has the highest degree. It is equal to zero for periods when the person does not have the highest degree.

The following tables contain the regression results from equation (1). Table B-1 contains the statewide regression results separately by gender. Table B-2 contains a breakdown of the number of students by highest degree received and region. Table B-3 contains the regression results by region for the combined sample of men and women. Table B-4 contains the regression results by region for women, and Table B-5 contains the results for men. Table B-6 contains the statewide regression results by major for women and men, separately.

In order to estimate the lifetime returns based on the KCTCS data we first compute the estimated increase in annual earnings associated with receiving either a certificate, diploma or associate's degree for men and women. We then assume that the typical worker who attended a KCTCS school will work until age 68. Since the typical worker in the KCTCS data is 33, this means they will work for an additional 35 years. Then, assuming a 3 percent real interest rate, we compute the present value of a stream of income over the next thirty-five years where the yearly income stream is equal to the dollar amount conversion of the estimated effect in Table B-1. Recall that earnings are measured in logs, so the coefficients in the table measure the percentage change in earnings. We convert these percentages to dollar amounts using the average earnings levels of men and women in 2000.

Table B-1: Statewide Short-Run Returns to Education, by Gender

	Men	Women
Associate's Degree	0.116 **	0.292 **
Diploma	0.062 **	0.288 **
Certificate	-0.038	0.103 **
Age	0.197 **	0.132 **
Age squared	-0.002 **	-0.001 **
Age * Nonwhite	0.005	0.006
Age Squared * Nonwhite	-0.0001	-0.0002
In School	-0.078 **	-0.247 **
Observations	109,114	124,121

NOTE: Results denoted by a double star (**) are statistically significant at the five percent level.

Table B-2: Number of Students, by Highest Degree Received and Region

	Bluegrass	Bowling Green	Elizabeth -town	Northern Kentucky	Green River	Louisville	Ashland-Maysville	Purchase-Pennyrile	Cumber -land	Mountain
					All					
Students	1,562	1,042	1,714	1,087	3,090	3,974	2,052	2,764	1,734	3,206
Associate's Degree	123	59	120	14	296	298	166	287	188	263
Diploma	153	95	44	79	72	62	119	45	52	113
Certificate	89	159	45	92	100	103	99	113	74	162
No Degree	1,197	729	1,505	902	2,622	3,511	1,668	2,319	1,420	2,668
					Panel A - Men					
Students	758	624	673	537	1,338	1,599	982	1,226	839	1,477
Associate's Degree	64	26	35	3	72	90	46	70	61	56
Diploma	43	40	20	10	25	21	54	12	10	39
Certificate	50	54	19	24	26	51	33	41	33	71
No Degree	601	504	599	500	1,215	1,437	849	1,103	735	1,311
					Panel B - Women					
Students	804	418	1,041	550	1,752	2,375	1,070	1,538	895	1,729
Associate's Degree	59	33	85	11	224	208	120	217	127	207
Diploma	110	55	24	69	47	41	65	33	42	74
Certificate	39	105	26	68	74	52	66	72	41	91
No Degree	596	225	906	402	1,407	2,074	819	1,216	685	1,357

Table B-3: Short-Run Returns to Education for All, by Region

	Bluegrass	Bowling Green	Elizabeth -town	Northern Kentucky	Green River	Louisville	Asland-Maysville	Purchase-Pennyrile	Cumber -land	Mountain
Associate's Degree	0.203 **	0.132 **	0.086	0.084	0.371 **	0.361 **	0.273 **	0.199 **	-0.066	0.300 **
Diploma	0.037	0.220 **	-0.007	0.565 **	0.284 **	0.245 **	0.174 **	0.250 **	0.140	0.279 **
Certificate	0.059	0.149 **	0.154 *	-0.051	-0.059	0.031	0.071	0.046	0.033	-0.063
Age	0.210 **	0.147 **	0.164 **	0.170 **	0.131 **	0.160 **	0.162 **	0.162 **	0.159 **	0.156 **
Age squared	-0.003 **	-0.002 **	-0.002 **	-0.002 **	-0.001 **	-0.002 **	-0.002 **	-0.002 **	-0.002 **	-0.002 **
Age * Nonwhite	-0.0003	0.028	-0.025	-0.014	0.014	0.003	0.032	-0.014	0.013	-0.009
Age Squared* Nonwhite	-0.0001	-0.0001	0.0002	-0.0002	-0.0004	-0.0001	-0.0003	0.0001	-0.0001	0.0000
In School	-0.243 **	-0.152 **	-0.199 **	-0.054 **	-0.181 **	-0.116 **	-0.228 **	-0.143 **	-0.226 **	-0.161 **
Observations	17,544	12,016	18,363	11,773	33,725	43,463	20,315	27,928	18,071	30,038

NOTE: Results denoted by a double star (**) are statistically significant at the five percent level. Results denoted by a single star (*) are statistically significant at the ten percent level.

Table B-4: Short-Run Returns to Education for Women, by Region

	Bluegrass	Bowling Green	Elizabeth -town	Northern Kentucky	Green River	Louisville	Asland-Maysville	Purchase-Pennyrile	Cumber -land	Mountain
Associate's Degree	0.311 **	0.010	0.131 *	0.115	0.432 **	0.461 **	0.299 **	0.257 **	-0.093	0.410 **
Diploma	0.119 *	0.193 **	0.135	0.562 **	0.420 **	0.332 **	0.365 **	0.271 **	0.230 **	0.346 **
Certificate	0.156	0.245 **	0.303 **	0.060	-0.099	-0.001	0.230 **	0.160 *	0.181 *	-0.087
Age	0.223 **	0.149 **	0.120 **	0.151 **	0.121 **	0.108 **	0.133 **	0.121 **	0.136 **	0.104 **
Age squared	-0.003 **	-0.002 **	-0.001 **	-0.002 **	-0.001 **	-0.001 **	-0.001 **	-0.001 **	-0.002 **	-0.001 **
Age*Nonwhite	0.030	0.088	0.0003	-0.133 *	-0.048	0.029	0.140 *	0.010	-0.115	-0.097 *
Age Squared* Nonwhite	-0.0005	-0.0008	-0.0002	0.0014	0.0002	-0.0004	-0.0018 *	-0.0002	0.0015	0.0012
In School	-0.337 **	-0.333 **	-0.236 **	-0.149 **	-0.277 **	-0.166 **	-0.346 **	-0.213 **	-0.367 **	-0.235 **
Observations	8,752	4,589	10,933	5,851	18,485	25,743	10,217	15,162	9,006	15,383

NOTE: Results denoted by a double star (**) are statistically significant at the five percent level. Results denoted by a single star (*) are statistically significant at the ten percent level.

Table B-5: Short-Run Returns to Education for Men, by Region

	Bluegrass	Bowling Green	Elizabeth -town	Northern Kentucky	Green River	Louisville	Asland-Maysville	Purchase-Pennyrile	Cumber -land	Mountain
Associate's Degree	0.106 *	0.303 **	0.043	-0.025	0.246 **	0.152 **	0.241 **	0.042	0.002	0.080
Diploma	-0.075	0.260 **	-0.126	0.754 **	0.052	0.104	-0.079	0.184	-0.191	0.214 **
Certificate	-0.007	0.015	0.012	-0.239 **	0.192 *	0.044	-0.241 **	-0.079	-0.109	-0.027
Age	0.208 **	0.149 **	0.233 **	0.192 **	0.148 **	0.218 **	0.203 **	0.206 **	0.189 **	0.208 **
Age squared	-0.002 **	-0.002 **	-0.003 **	-0.002 **	-0.002 **	-0.003 **	-0.002 **	-0.003 **	-0.002 **	-0.002 **
Age*Nonwhite	-0.043	-0.001	-0.060 *	0.198 **	0.079 **	-0.006	-0.041	-0.027	0.075	0.006
Age Squared* Nonwhite	0.0005	0.0003	0.0008 *	-0.0029 **	-0.0010 **	0.0001	0.0006	0.0003	-0.0010	-0.0003
In School	-0.155 **	-0.065 **	-0.160 **	0.039	-0.078 **	-0.047 **	-0.104 **	-0.054 **	-0.088 **	-0.084 **
Observations	8,792	7,427	7,430	5,922	15,240	17,720	10,098	12,765	9,065	14,655

NOTE: Results denoted by a double star (**) are statistically significant at the five percent level. Results denoted by a single star (*) are statistically significant at the ten percent level.

Table B-6: Short-Run Returns to Degree, by Field of Study and Gender

	Field of Study					
	Business	**Health**	**Humanities**	**Academic**	**Services**	**Vocational**
			All			
Associate's degree	0.061	0.546 **	-0.053	0.178 **	-0.019	0.077
Diploma	-0.201 **	0.390 **			0.149	0.056
Certificate	0.104 *	0.063 **			0.006	0.006
			Panel A - Men			
Associate's degree	-0.055	0.388 **	0.007	0.098 **	0.157 *	0.063
Diploma	-0.064	0.291 **			-0.103	0.025
Certificate	0.206	-0.110			-0.297 **	-0.027
			Panel B - Women			
Associate's degree	0.095 *	0.592 **	-0.073	0.242 **	-0.078	0.066
Diploma	-0.192 **	0.425 **			0.226 *	0.090
Certificate	0.114 *	0.110 **			0.082	0.080

Demographics			
	All	**Men**	**Women**
Age	0.160 **	0.198 **	0.127 **
Age squared	-0.002 **	-0.002 **	-0.001 **
Age * Nonwhite	0.004	0.006	0.009
Age Squared*Nonwhite	-0.0001	-0.0001	-0.0002
In School	-0.165 **	-0.078 **	-0.244 **

NOTE: Results denoted by a double star (**) are statistically significant at the five percent level. Results denoted by a single star (*) are statistically significant at the ten percent level.

Appendix C. Data and Methods for Estimating Total Returns Using Contingent Valuation

In order to determine the value Kentuckians place on KCTCS, we surveyed a random sample of Kentucky households and used the contingent valuation method to estimate the total returns from the system. Because the contingent valuation method relies on a survey, it is important to have a well-designed and tested survey. For this reason, we thoroughly tested our survey before it was sent to households. The first test consisted of a review of the initial draft of the survey by knowledgeable colleagues within the Department of Economics at the University of Kentucky to ensure that the survey contained pertinent information necessary for benefit estimation. In the second test, two professionally moderated focus groups consisting of Kentuckians were conducted to ensure that respondents' understanding and interpretation of the survey questions matched the intention of the survey authors. One of the two groups consisted of members of the Donovan Scholar Program, who are individuals over age 65 that are attending the University of Kentucky. The second focus group consisted of returning students that are attending the Maysville Community and Technical College. Focus groups were recorded and the results were used to fine-tune elements of the survey.

Knowledge Networks administered the survey in June and July of 2007. Knowledge Networks is a privately-owned firm specializing in survey research. They have a well-respected reputation in survey based research methods and their services have been employed in many government and academic research projects. One of the main benefits of employing Knowledge Networks is the use of a panel of online respondents designed to be representative of the U.S. population.

The survey data was collected using two samples. The first sample consisted of respondents in Kentucky drawn from Knowledge Networks nationally representative web panel. The second sample was based on a white pages phone number sample of Kentucky. Addresses were matched to phone numbers and the mail sample was distributed proportionally across the state.

The survey described the expansion in terms of the number of programs offered. The proposed increase was said to increase the number of programs offered from 96 to 105 and be accompanied by an accommodating increase in the number of faculty, staff, and structures (see Appendix D for a copy of the survey). As mentioned in section IV, measures of value are obtained when trades take place. The trade used to value KCTCS was described in the form of a referendum scenario. The survey was used to create a hypothetical referendum in which respondents had a chance to vote for or against the proposed expansion. The respondent was told that if the referendum passed, there would be a one-time increase in their taxes. The trade is then a dollar amount associated with the increase in taxes for the expansion of KCTCS. After a short description of the referendum, the respondent was asked the following question:

> "Would you vote for the referendum to expand the Kentucky Community and Technical College System by *10%* here and now if you were required to pay a one time *$T* out of your own household budget?"

T is a dollar amount from the following set: 400, 250, 200, 150, 125, 100, 75, 25. Only one tax amount was presented to each respondent, but different amounts were presented to different

individuals so that the value of KCTCS could be estimated. The value of the tax was chosen based on input from the focus groups and from data received from the web based panel. While other valuation formats exist, the referendum format is the valuation vehicle of choice according to a panel of experts (Arrow et al. 1993). In addition, the referendum scenario has clear economic implications for the respondent (Mitchell and Carson 1989), something that is important if a valuation vehicle is to reveal a respondent's true total value (Cummings et al. 1997; Haab et al. 1999).

Knowledge Networks invited 300 members of its web panel to participate in the web-based sample. Out of those 300, 275 responded, a response rate of 92 percent. The mail-based sample consisted of an initial mailing of 10,000 households. Of those 10,000, 804 were undeliverable and 9,196 were delivered. A total of 2,612 surveys were completed and returned for a response rate of 28 percent (2,612/9,196). The lower response rate of the mail version is not unusual for a survey like this one, but it leads to the question of whether the mail-based sample suffers from non-response bias. However, the results of the mail-based and web-based sample are very similar, which suggests that non-response bias is not a serious problem.

Table C-1: Demographics: KCTCS Survey vs. American Community Survey 2005

		KCTCS Survey	American Community Survey 2005
Gender	Male	57.69%	48.13%
	Female	42.31%	51.87%
Age	18-29	4.57%	20.93%
	30-39	12.92%	18.38%
	40-49	18.29%	20.51%
	50-64	36.34%	24.12%
	65 or over	23.55%	16.04%
Race	White	94.28%	90.97%
	Non-White	5.72%	9.03%
Education	Less than High School Diploma	7.66%	20.65%
	High School Diploma or Equivalent	27.29%	34.93%
	Some College	22.41%	20.30%
	Associate's Degree	8.69%	6.30%
	Bachelor's Degree	17.88%	11.06%
	Master's Degree or Beyond	16.07%	6.76%
Household Income	Under $25,000	20.51%	35.02%
	$25,000 - $39,999	15.90%	18.11%
	$40,000 - $59,999	20.26%	18.72%
	$60,000 - $99999	21.93%	18.29%
	$100,000 or more	13.65%	9.86%

NOTE: Both the KCTCS Survey statistics and the American Community Survey statistics are for those individuals 18 years old or over.

Table C-1 compares demographic information for survey respondents and for the U.S. Census Bureau's American Community Survey (ACS) 2005. As compared to the American Community Survey, the KCTCS survey sample tended to be slightly older, more educated, earn more income, and have more male and white respondents. In order to estimate the most representative willingness to pay, demographics from the ACS are used in the statistical calculation of willingness to pay. Below we discuss further about how this was done.

As mentioned in the literature review, one of the concerns with estimates obtained from contingent valuation studies has been hypothetical bias. In the present context, hypothetical bias refers to the widely recognized phenomenon that people say 'yes' too often in hypothetical referenda as compared to real referenda. Recent research has shown, however, that measures can be employed to mitigate the hypothetical bias such that real and hypothetical 'yes' responses are indistinguishable. One of the methods, often called certainty correction, asks respondents how certain they are of their referendum vote. Certainty is measured on a "definitely sure, probably sure" scale. Research has shown that individuals voting yes to a hypothetical referendum and who are definitely sure of their vote are statistically indistinguishable in their voting behavior when compared to individuals participating in a real referendum (Blumenschein et al. 2007; Blumenschein et al. 1998; Blumenschein et al. 2001). All other individuals—those who vote 'probably yes', and those who vote 'probably no' and 'definitely no' in hypothetical referenda—are similar to those individuals voting no in real referenda. The certainty-correction-hypothetical-bias-mitigation strategy employs this knowledge and recodes votes according to the respondent's certainty. Those individuals who vote yes and are definitely sure of their vote are coded as 'yes' while all other responses are recoded as 'no'.

To analyze responses, we use a logistic regression. The dependent variable is the recoded vote response and the independent variables include controls for age, sex, race, income, education, region, experience with KCTCS, and the amount of the tax, *T,* used in the survey. When willingness to pay for a particular policy is believed to be non-negative, the estimates from the logistic regression are combined using the formula: $(1 / b_{bid}) \times ln(1 + e^{z})$ where b_{bid} is the coefficient on the variable associated with the amount of the tax, and z represents the constant in the logistic regression with the effect of all of the other covariates evaluated at their means and added to the constant. To generate a mean willingness to pay most representative of the population of Kentucky, the means of demographic variables from the ACS were used instead of means obtained from the KCTCS survey. The result is an estimate of the total value of an average household in the State of Kentucky for a 10 percent increase in the size of KCTCS.

Table C-2: Logistic Regression Results where Dependent Variable = 'Definitely Yes'

		Coefficient	z-value	Marginal Effects	z-value
Tax	Tax Amount	-0.0047	-9.07	-0.0008	-9.45
Region	Bowling Green	-0.3213	-1.23	-0.0501	-1.35
	Elizabethtown	0.1717	0.68	0.0303	0.66
	Nothern Kentucky	-0.1228	-0.56	-0.0202	-0.58
	Green River	-0.1616	-0.69	-0.0263	-0.72
	Louisville	-0.0879	-0.51	-0.0147	-0.52
	Ashland-Maysville	-0.2121	-0.80	-0.0340	-0.84
	Purchase-Pennyrile	0.0688	0.29	0.0118	0.28
	Cumberland	0.0666	0.24	0.0115	0.24
	Mountain	0.1873	0.69	0.0332	0.66
Income	Income $25,000 - $39,999	0.5538	2.56	0.1032	2.37
	Income $40,000 - $59,999	1.0072	4.79	0.1967	4.34
	Income $60,000 - $99,999	1.1287	5.17	0.2223	4.68
	Income $100,000 or more	1.3620	5.56	0.2841	4.99
Education	Taken Class from KCTCS	0.0704	0.47	0.0120	0.46
	Attended Work Related Program	-0.0003	0.00	-0.0001	0.00
	Attend Other Higher Ed Instituition	0.2922	1.82	0.0491	1.83
	Previous Knowledge of KCTCS	0.3793	1.77	0.0589	1.94
	Family Member Attend KCTCS	0.1833	1.40	0.0311	1.40
	Attended Community Function at KCTCS	0.1160	0.79	0.0200	0.77
	Attended Business Function at KCTCS	0.1404	0.87	0.0243	0.85
	Know Someone Working for KCTCS	0.1845	1.37	0.0320	1.34
	Number of Years Lived in Kentucky	-0.0085	-2.47	-0.0014	-2.47
	Employed	-0.2935	-2.04	-0.0504	-2.01
	High School Diploma or Equivalent	0.2392	0.71	0.0419	0.69
	Some College	0.4696	1.34	0.0850	1.26
	Associate's Degree	0.6165	1.58	0.1187	1.43
	Bachelor's Degree	0.5004	1.33	0.0919	1.24
	Master's Degree or Beyond	0.5368	1.41	0.0995	1.30
Age	Age 18-29	-1.0367	-3.02	-0.1317	-4.28
	Age 30-39	-0.8067	-3.19	-0.1144	-3.89
	Age 40-49	-0.5493	-2.46	-0.0842	-2.74
	Age 50-64	-0.3501	-2.06	-0.0578	-2.12
Gender	Female	-0.0966	-0.81	-0.0163	-0.82
Race	White	-0.3293	-1.33	-0.0603	-1.24
Children	Number of Children	-0.0949	-1.36	-0.0161	-1.36
	Constant	-1.3760	-2.75	-	-
	Sample Size	2016			
	Likelihood Ratio Statistic	311.76			
	Pseudo R-squared	0.1353			

NOTE: Base categories for region, income, education, and age are respectively Bluegrass, Under $25,000, Less than a High School Diploma, 65 or over.

Table C-2 presents the results of the logistic regression. The coefficients of the logistic regression indicate whether the independent variable has a positive or negative influence on the probability of responding 'definitely yes' to the referendum vote. More informative are the marginal effects. The marginal effect of each independent variable represents the change in the probability of saying 'definitely yes' for one unit change in the independent variables. For example, the marginal effect of the number of years lived in Kentucky is -0.0015. This number indicates that for each additional year a person has lived in Kentucky, the probability of that person responding 'definitely yes' to the referendum vote decreases by 1.5 percent. Similar interpretations follow for the tax amount and the number of children in a household. The interpretation of the marginal effect for the independent variables represented by dummy variables is relative to the base category for the particular group of dummy variables. Consider the income variables. The omitted group is 'Income less than $25,000.' The interpretation of the marginal effects for income is relative to this base group. The marginal effect for 'Income $25,000 - $39,999' is 0.1037. The interpretation of this number is that the probability of voting definitely yes is 10.37 percent higher for individuals making $25,000 - $39,999 than it is for individuals in the base group—those with income less than $25,000.

C.1 Budget Allocation Questions

When asking respondents how much they would be willing to pay to expand KCTCS we wanted to ensure that respondents were considering the alternative uses of the money. Instead of expanding KCTCS the additional resources could be used to expand other education programs such as K-12 or other public post-secondary schools, other government programs such as Medicaid or state parks, or the individuals could use the money on personal consumption. In an effort to get respondents thinking about allocating resources, we asked respondents how they would allocate an additional $100 million in each of the following three scenarios: within the overall state budget; within the state budget for public education and within the KCTCS budget (see Appendix D for a copy of the survey and allocation exercises). In these questions, the respondent was told that allocating money to a given budget category would allow the programs in that category to expand beyond current levels. If the respondent allocated no money to a given category, they were told that the programs in that category would be maintained at current levels.

While this information is not directly relevant for assessing how much citizens are willing to pay to expand KCTCS, the responses to these questions do provide information on how citizens value one government program relative to another government program, and therefore, their responses tell us about the preferences of citizens. Citizens' preferences are important inputs if the level of public goods and services is to be provided efficiently and the technique we employ here allows for a sample of citizens' preferences.

In this section of the report, we present the results for the budget allocation exercises. We also present the average responses to the question asking respondents what they believe are the primary benefits to education and training. The responses to this question provide some idea about what benefits respondents believe they would receive if the KCTCS system expanded by 10 percent.

C.1.1 Overall State Budget Allocations

The mean allocation to each of the overall state budget categories is presented in Figure C-1. This figure shows that public education, consisting of both local K-12 schooling as well as state post-secondary institutions, would receive the largest increase in funds from the increased spending. On average respondents would allocate almost one-quarter of the additional $100 million in spending to public education. The average citizen would also allocate a substantial portion of the additional funds for state-financed health care such as Medicaid and mental health services. Education and health care are the two biggest priorities for the typical citizen in Kentucky. All other spending categories would receive significantly less money that these two programs, with no single program receiving substantially larger support than any other of the remaining programs.

C.1.2 Education Budget Allocations

Figure C-2 shows the mean allocation of respondents to each of the categories of the state education budget from a hypothetical $100 million increase in the budget. Primary and secondary schools would be the biggest beneficiary from the additional funds, receiving almost one-third of the additional $100 million. Vocational and work force training, KCTCS, and state four-year colleges would receive approximately an equal increase in funding from the typical citizen of $21 million. It is likely that the K-12 schools would receive the largest increase in resources because most citizens in Kentucky have had some personal interaction with K-12 schools, while a much smaller percentage have attended a public post-secondary school.

C.1.3 KCTCS Budget Allocations

Respondent preferences over KCTCS budget allocations appear in Figure C-3. Given the opportunity, the typical respondent would allocate much of the additional funding to financial aid and scholarships for students. This allocation is consistent with the belief on the part of respondents that a lack of resources is preventing otherwise qualified students from attending post-secondary schools. Respondents also choose to provide over $12 million in additional funding to instruction presumably because they believe that quality instructors are an integral part of the educational experience. Respondents choose to allocate a similar amount of additional resources to the other budget categories

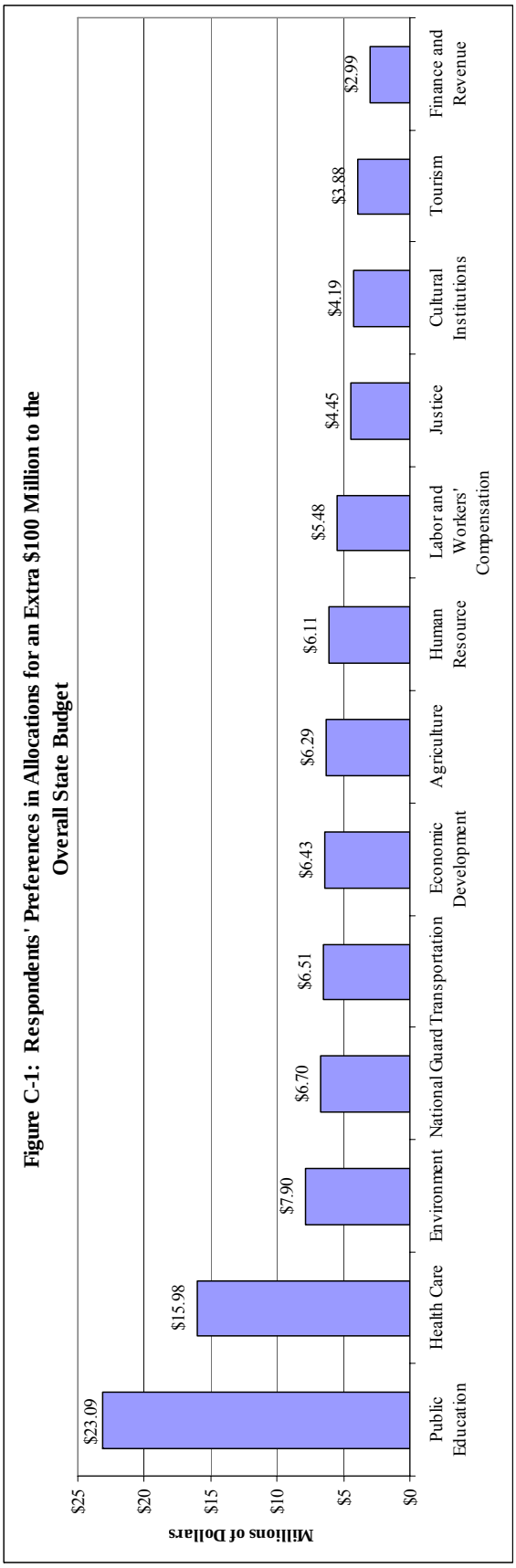


Figure C-1: Respondents' Preferences in Allocations for an Extra $100 Million to the Overall State Budget
Millions of Dollars
$0
$5
$10
$15
$20
$25
$23.09
$15.98
$7.90
$6.70
$6.51
$6.43
$6.29
$6.11
$5.48
$4.45
$4.19
$3.88
$2.99
Public Education
Health Care
Environment
National Guard
Transportation
Economic Development
Agriculture
Human Resource
Labor and Workers' Compensation
Justice
Cultural Institutions
Tourism
Finance and Revenue

Figure C-2: Respondents' Preferences in Allocations for an Extra $100 Million to the Overall State Education Budget

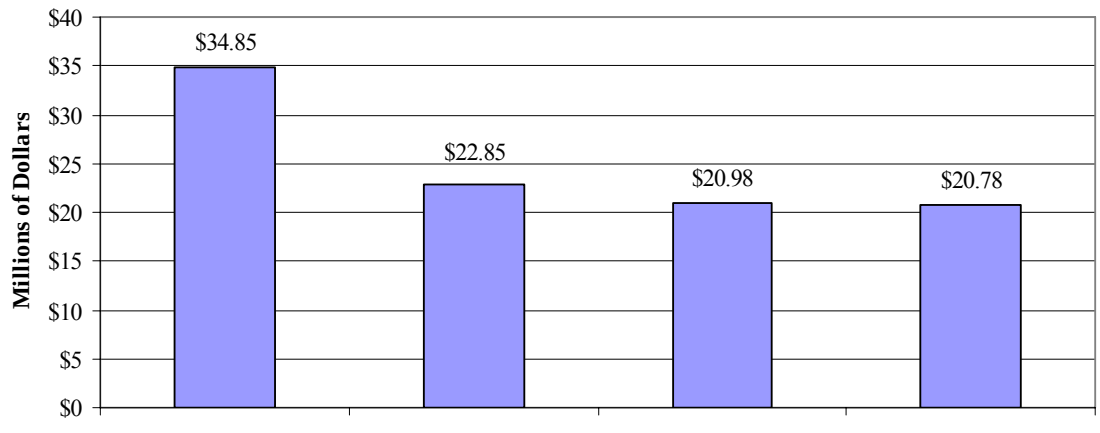
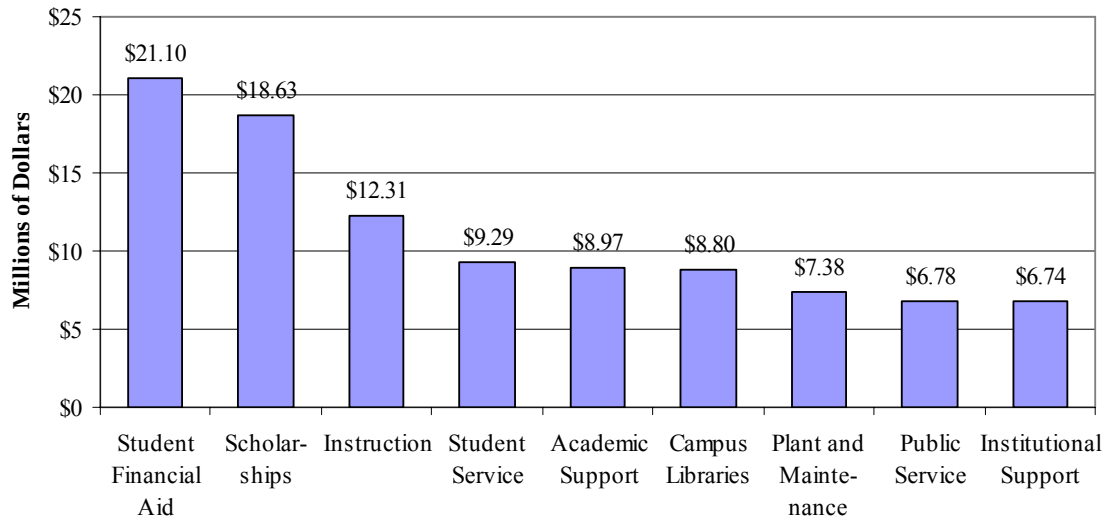


Figure C-3: Respondents' Preferences in Allocations for an Extra $100 Million to the KCTCS Budget

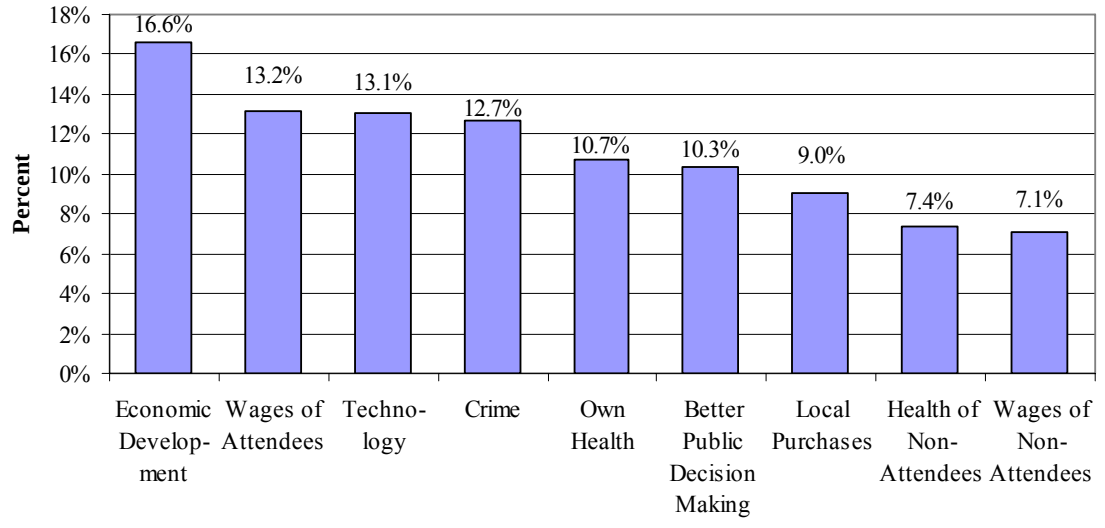


C.1.4 Benefits of Higher Education and Training

In order to measure respondents' beliefs about the benefits of education and training, we asked respondents to allocate points to the various benefit categories. Respondents were told that allocating more points to a given category indicated that they believed education provided much benefit in the given category. Allocating no money to a given category indicated that they believed education produced no benefits to the given category.

The results appear in Figure C-4. Respondents clearly believe that one of the main benefits from education is the additional economic development that occurs as the result of the increased education of the workforce. This is an important point for policy makers to consider when establishing new development policy. Respondents also believe that an increase in the wages of students, an increase in the speed of technological change and a fall in crime are all additional important benefits from education that occur in approximately equal amounts. The fact that respondents' feel higher wages are one of the primary benefits from additional schooling is consistent with our results in Section III that individual returns to school make up a large portion of the total returns to school. Respondents also believe that two other important benefits are improved health of students who receive additional schooling as well as improved public decision making. The fact that respondents believe that reduced crime, improved health and better public decision making are all important benefits of schooling is consistent with our finding that public benefits are an important component of the total benefits from the public provision of higher education.

Figure C-4: Respondents' Beliefs about the Benefits of Education and Training



C.2 Exposure to KCTCS Questions

Table C-3 shows the survey results relating to exposure to KCTCS. It shows the survey results for eight yes/no questions that ask respondents' familiarity with the KCTCS system. The response to question four illustrates that the vast majority of Kentuckians are familiar with the KCTCS system. Specifically, 85 percent knew that Kentucky had a community and technical college system before they received the questionnaire.

Other questions in the survey provided some evidence about ways in which the respondents are familiar with KCTCS. Among the seven remaining survey questions, the most common way in which respondents were familiar with KCTCS was due to the existence of a branch campus in the respondents' county. According to question 3, 61 percent of respondents stated that there is a branch of KCTCS in their county.

The fifth question asked about whether a family member had taken a class at KCTCS. Nearly one-half of respondents – 48 percent – stated that a family member had taken a class at a KCTCS branch campus. The first question asks whether or not the respondent had taken a class at KCTCS. Twenty-four percent of respondents had taken a class at KCTCS.

Kentuckians may also be familiar with KCTCS because they know someone who works there. In fact, 21 percent of respondents stated that someone they knew works for KCTCS.

KCTCS offers events and work-related training with which people may be familiar. Twenty percent of respondents stated that they had attended a community function such as a play at KCTCS. A smaller percentage – 14 percent – reported that they had attended a business function such as a training meeting at KCTCS. Only 12 percent of respondents stated that they had ever attended a work-related training program at a branch of KCTCS. This question had the lowest percentage of "yes" responses among the questions asking about familiarity with KCTCS. In other words, respondents were less likely to be familiar with KCTCS due to job-related training than due to the other factors listed in Table C-3.

Table C-3: Survey Results for Questions Relating to Exposure to KCTCS

	Yes	No
Q1. Have you ever taken a class from the Kentucky Community and Technical College System?	24%	76%
Q2. Have you ever attended a work related training program at a branch of the Kentucky Community and Technical College System?	12%	88%
Q3. Is there a branch of the Kentucky Community and Technical College System in your county?	61%	39%
Q4. Before you received this questionnaire, did you know that Kentucky had a Community and Technical College System?	85%	15%
Q5. Has anyone in your family attended a class at a branch of the Kentucky Community and Technical College System?	48%	52%
Q6. Have you ever attended a community function such as a play, a concert, or a town meeting on the campus of a Kentucky Community or Technical College?	20%	80%
Q7. Have you ever attended a business function such as a business meeting, a training meeting, or a roundtable on the campus of a Kentucky Community or Technical College?	14%	86%
Q8. Does anyone you know work for the Kentucky Community and Technical College System?	21%	79%

Appendix D. Survey Form

A Survey about Budget Choices and Community Colleges

UNIVERSITY OF KENTUCKY

CBER

If you have any questions, contact

Kenneth R. Troske
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Lexington, KY 40506-0034
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THE KENTUCKY COMMUNITY AND TECHNICAL COLLEGE SYSTEM

The Kentucky Community and Technical College System is composed of 16 colleges with 65 campuses in the State of Kentucky and serves over 86,000 students. The system offers a general, two-year academic curriculum with credits that transfer to four-year programs. In addition, the system offers associate degree, certificate, and diploma programs, continuing education, work force training, adult education, and community development programs. The Kentucky Community and Technical College System maintains an open admissions policy and serves as the primary point of access for many Kentuckians seeking postsecondary education.

Q1 Have you ever taken a class from the Kentucky Community and Technical College System?

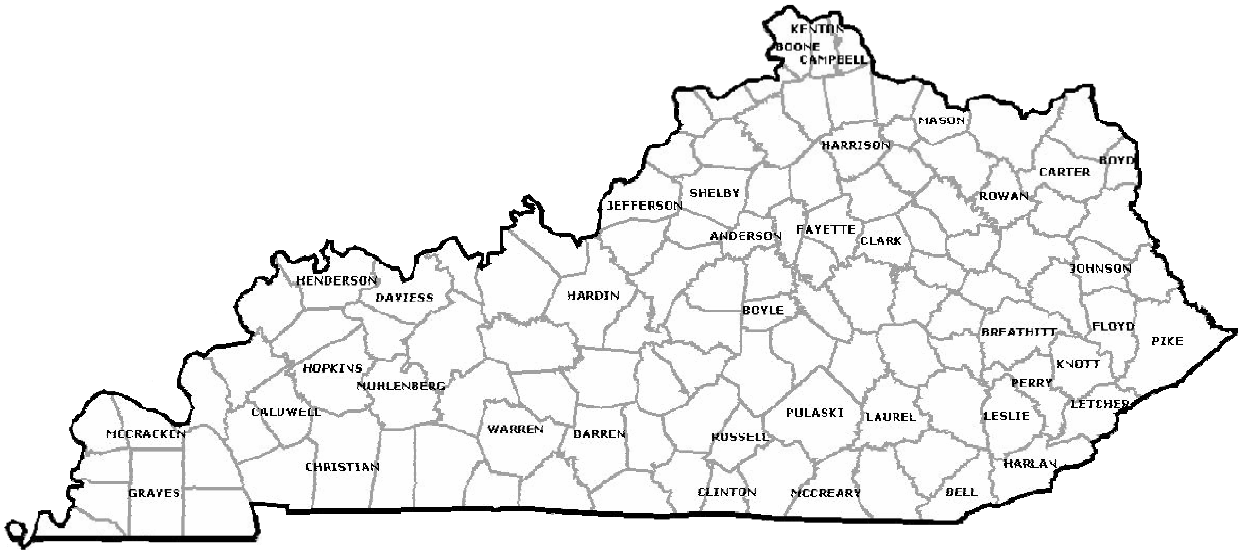
Yes	☐	1
No	☐	2

Q2 Have you ever attended a work related training program at a branch of the Kentucky Community and Technical College System?

Yes	☐	1
No	☐	2

Q3 Is there a branch of the Kentucky Community and Technical College System in your county?

COUNTIES WITH COMMUNITY COLLEGE ARE SHOWN ON THE MAP



Yes	☐	1
No	☐	2

Q4 Before you received this questionnaire, did you know that Kentucky had a Community and Technical College System?

Yes	☐	1
No	☐	2

Q5 Has anyone in your family attended a class at a branch of the Kentucky Community and Technical College System?

Yes	☐	1
No	☐	2

Q6 Have you ever attended a community function such as a play, a concert, or a town meeting on the campus of a Kentucky Community or Technical College?

Yes	☐	1
No	☐	2

Q7 Have you ever attended a business function such as a business meeting, a training meeting, or a roundtable on the campus of a Kentucky Community or Technical College?

Yes	☐	1
No	☐	2

Q8 Does anyone you know work for the Kentucky Community and Technical College System?

Yes	☐	1
No	☐	2

BUDGET CHOICES

We make choices every day. For example, we have to choose between different kinds of food to eat, types of clothes to buy, and forms of entertainment to enjoy. As individuals, we choose personal goods by spending our money and time. Together, through our state government, we also make choices about a variety of public programs and policies here in Kentucky. We make these choices about public goods by voting for officials and supporting organizations.

In this part of the survey we will ask you to carefully consider your preferences and make decisions which are important to the state of Kentucky. In the following section you will consider Kentucky's overall state budget and make choices about its various budget categories. After you answer questions about the state budget, you will also answer

questions about the state education budget and the budget for the Kentucky Community and Technical College System.

CHOICES FOR KENTUCKY'S OVERALL STATE BUDGET

Please consider the budget categories below. If you were making the choices for the state of Kentucky and an extra $100 million were available to be added to the existing budgets, how much of the $100 million would you put in each of the following budget categories? If you put more money into a given area, the programs in that area would be expanded. If no money is allocated to a given area, programs would be maintained at current levels. The total should add up to 100.

1	**$**_____	**AGRICULTURE**: Animal health, livestock services, and pest management
2	**$**_____	**CULTURAL INSTITUTIONS**: State libraries, arts and humanities, museums, and historical societies.
3	**$**_____	**ECONOMIC DEVELOPMENT**: Industrial development, marketing information, community and regional planning, housing and building construction.
4	**$**_____	**ENVIRONMENT**: Air and water pollution prevention, waste management, mining and minerals, forestry, conservation, and energy efficiency.
5	**$**_____	**FINANCE AND REVENUE**: Investment and debt management, computer information systems, property valuation, taxation and collection.
6	**$**_____	**HEALTH CARE**: Medicare, Medicaid, county health departments, mental health services, and services for the disabled.
7	**$**_____	**HUMAN RESOURCES**: Social services, food stamps, and aid to families with dependent children.
8	**$**_____	**JUSTICE**: Jails and correctional systems, state police, and the courts.
9	**$**_____	**LABOR AND WORKER'S COMPENSATION**: Occupational safety and health payments to workers suffering job-related injuries and diseases
10	**$**_____	**NATIONAL GUARD**: Military affairs, veterans affairs, and disaster relief.
11	**$**_____	**SCHOOLS**: Public elementary, middle, and high school construction and maintenance, teacher salaries and retirement system, and Kentucky Educational Television.
12	**$**_____	**TOURISM**: State parks, fish and wildlife programs, and the state fair.
13	**$**_____	**TRANSPORTATION**: Highway construction and maintenance, airports, and public transportation.
14	**$**_____	**UNIVERSITIES**: State university and community college construction and maintenance, faculty/staff salaries, research, and student loans.

PLEASE MAKE SURE THE TOTAL ADDS UP TO $100

CHOICES FOR KENTUCKY'S OVERALL PUBLIC EDUCATIONAL BUDGET

Budget choices are made all the time within state agencies. If you were making the choices for the education budget for the state of Kentucky and an extra $100 million were available to be added to the budget categories shown below, how much of the $100 million would you put in each category? If you put more money into a given category, the programs in that category would be expanded. If no money is allocated to a given category, programs would be maintained at current levels. The total should add up to 100.

1	**$**_____	**LOCAL K-12 PUBLIC SCHOOLS:** Expenditures in this category are used to fund teaching and learning programs, tutoring services, nutrition and health services, student assessment programs, construction of new buildings, and purchases of new technology for local K-12 public schools.
2	**$**_____	**STATE 4-YEAR COLLEGES:** Expenditures in this category are used to fund instruction, research, public service, academic support, scholarships/fellowships, construction of new buildings, and purchases of new technology at the state 4-year colleges such as the University of Kentucky, the University of Louisville, and the regional state universities.
3	**$**_____	**KENTUCKY COMMUNITY AND TECHNICAL COLLEGE SYSTEM:** Expenditures in this category are used to fund instruction, public service, academic support, scholarships/fellowships, construction of new buildings, and purchases of new technology for the Kentucky Community and Technical College System.
4	**$**_____	**VOCATIONAL AND WORK FORCE TRAINING PROGRAMS:** Expenditures in this category are used to fund education and technical training to new and existing workers to match the needs of Kentucky businesses and industry.

PLEASE MAKE SURE THE TOTAL ADDS UP TO $100

CHOICES FOR THE KENTUCKY COMMUNITY AND TECHNICAL COLLEGE BUDGET

Budget choices must also be made within college systems. If you were making the choices for the Kentucky Community and Technical College System and an extra $100 million were available to add to the existing budget categories shown below, how much of the $100 million would you put in each category? If you put more money into a given category, the programs in that category would be expanded. If no money is allocated to a given category, the programs would be maintained at current levels. The total should add up to $100. Your responses will help administrators make decisions that reflect the views of the people of Kentucky.

1	**$**_____	**INSTRUCTION**: This budget category is used for academic instruction, occupational and technical instruction, community education, preparatory and adult basic education, and departmental research.
2	**$**_____	**PUBLIC SERVICE**: This budget category is used for services designed to benefit community members, such as seminars, community projects, and hosting organizations that provide service to particular community sectors.
3	**$**_____	**ACADEMIC SUPPORT**: This budget category is used to provide media and technology, museums and galleries, audio/visual services, computing services, and faculty development courses to the Kentucky Community and Technical College System.
4	**$**_____	**CAMPUS LIBRARIES**: This budget category is used to provide information services to students, faculty, and staff. Resources and services include books, periodicals, interlibrary load, and on-line access to library services.
5	**$**_____	**STUDENT SERVICES**: This budget category is used for student social and cultural activities, counseling and career guidance, student admissions and records, student health services, and intercollegiate activities.
6	**$**_____	**INSTITUTIONAL SUPPORT**: This budget category is used for administrative services, public relations, and employee benefits.
7	**$**_____	**OPERATION AND MAINTENANCE OF PLANT**: This budget category is used for operation and maintenance of physical plant, campus grounds, facilities, utilities, and property insurance.
8	**$**_____	**SCHOLARSHIPS**: This budget category is used to provide awards, scholarships, grants and scholastic prizes to students.
9	**$**_____	**STUDENT FINANCIAL AID**: This budget category includes state, local, and federal funds available to students as low interest loans.

PLEASE MAKE SURE THE TOTAL ADDS UP TO $100

BENEFITS OF EDUCATION AND TRAINING

Community and technical colleges, universities, and other educational programs offer many benefits to individuals and society. Please indicate the areas in which you feel these benefits occur. To do this assume you have 100 points to allocate among the benefit categories listed below. More points placed in a given category indicates your opinion that community and technical colleges, universities, and other educational programs provide much benefit in the given category. Allocating no points to a given category indicates your opinion that community and technical colleges, universities, and other educational programs provide no benefits in the given category. The total should add up to 100.

1	**$**_____	**ECONOMIC DEVELOPMENT:** Increased education or training improves the local workforce, thus benefiting local business and attracting new businesses.
2	**$**_____	**LOCAL PURCHASES**: Postsecondary institutions make purchases of goods and services from surrounding businesses and individuals.
3	**$**_____	**CRIME**: Education and training operate through various channels to lower the number of violent crimes and property crimes.
4	**$**_____	**BETTER PUBLIC DECISION MAKING**: Having better educated or well trained residents results in better decision making on civic matters such as voting and more knowledgeable public officials.
5	**$**_____	**TECHNOLOGY**: Increased education or training promotes technological change or makes it easier to use existing technology.
6	**$**_____	**WAGES OF ATTENDEES**: Individuals with more education tend to have higher wages. The higher wages are in the form of increased pay at existing jobs or new career opportunities with higher pay.
7	**$**_____	**WAGES OF NON-ATTENDEES**: Individuals with more education or training tend to raise the productivity and wages of those who work with them, even those who do not directly seek more education.
8	**$**_____	**OWN HEALTH**: Individuals with more education or training tend to make better decisions about their lifestyles and health and are thus healthier.
9	**$**_____	**HEALTH OF NON-ATTENDEES**: Individuals with more education or training tend to have better health which can be beneficial to those around them due to lower chances of getting sick.

PLEASE MAKE SURE THE TOTAL ADDS UP TO $100

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POST HIGH SCHOOL OPPORTUNITIES

Q9 After graduating, high school graduates have a number of options other than going to college such as obtaining a full time job, serving in the military, or performing other public service such as enlisting in the Peace Corps. What would you say are the most common things for high school graduates to do after graduation?

Please select up to <u>THREE</u> categories below.

Obtain a full-time job	☐	1
Obtain a part-time job	☐	2
Go to college	☐	3
Obtain technical or vocational training	☐	4
Join the military	☐	5
Join the Peace Corps or perform other public service	☐	6
Other **[Please write it down below]** (_____)	☐	7

Q10 The Kentucky Community and Technical College System offers one alternative to those seeking more education or vocational skills after completing high school. Other institutions offer many of the same educational and training opportunities as the Kentucky Community and Technical College System. Some of these institutions are listed below.

4 Year State Colleges such as:
- Eastern Kentucky University
- Kentucky State University
- Morehead State University
- Murray State university
- Northern Kentucky University
- University of Kentucky
- University of Louisville
- Western Kentucky University
- more, including outside Kentucky

4 Year Private Colleges such as:
- Asbury College
- Berea College
- Brescia University
- Centre College
- Georgetown College
- Pikeville College
- Sullivan University
- Transylvania University
- more, including outside Kentucky

Other Private Colleges such as:
- Louisville Technical Institute
- Spencerian College
- University of Phoenix
- In house corporate programs
- more, including outside Kentucky

Online Colleges such as:
- Capella University Online
- Kaplan University Online
- Strayer University Online
- more, including outside Kentucky

Have you ever attended one of the types of colleges listed above?

Yes	☐	1	**PLEASE CONTINUE TO QUESTION Q11.**
No	☐	2	**PLEASE CONTINUE TO THE REFERENDUM SECTION AFTER Q11**

Q11 If you said 'Yes' to the previous question (Q10), please list the school(s) you attended?

WRITE DOWN THE SCHOOL NAMES:

_____

_____

REFERENDUM

The next section asks you to consider a hypothetical expenditure out of your own household budget. As you answer the questions please keep in mind your own household budget which you spend on such things as food, housing, and transportation.

The Kentucky Community and Technical College System provides services to over 86,000 attendees in the state of Kentucky. The system currently offers 96 programs of study ranging from auto body repair to nuclear medicine technology. The system, like many state activities, changes over time in response to preferences of individuals like you. For this study, please consider a hypothetical expansion of **10%** in the size of the system. The **10%** expansion would increase the number of programs offered at the Community and Technical College System from **96 to 105**. In addition, the expansion would include an increase in the number of faculty, staff, and structures to accommodate the expansion.

Much of the funding for the Kentucky Community and Technical College System comes from tax dollars. Private citizens have a say in how tax dollars are spent by voting during elections that include public referendums.

Please consider one such public referendum. The issue to be decided is whether to expand the Kentucky Community and Technical College System by **10%** (as described above). The expansion would only take place if a majority votes for the expansion in a public referendum. The referendum would require every tax payer to pay an additional, one-time $**400** increase in their taxes.

Assume that you are being offered the opportunity to vote on the referendum described to you.

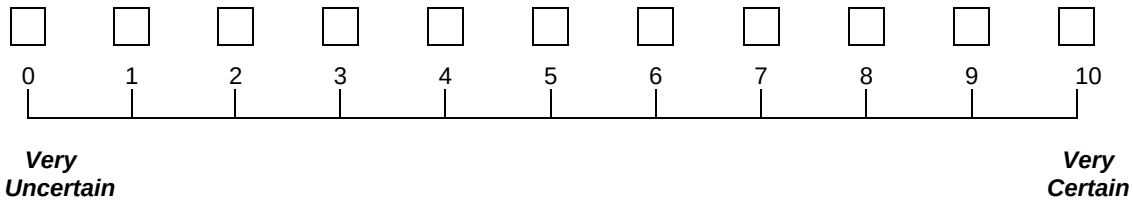
Q12 Would you vote for the referendum to expand the Kentucky Community and Technical College System by **10%** here and now if you were required to pay a one time **$400** out of your own household budget?

Yes	☐	1	**PLEASE CONTINUE TO QUESTION Q13**
No	☐	2	**PLEASE SKIP TO QUESTION Q16**

Q13 Are you "probably sure" or "definitely sure" that you would contribute **$400** for the expansion of the Kentucky Community and Technical College System?

Probably Sure	☐	1
Definitely Sure	☐	2

Q14 You answered YES to the referendum vote, on a scale from 0 to 10, how certain are you of your answer? Please select your answer on the scale below.



Q15 You answered YES to the referendum vote, which of the following reasons best describes why? **PLEASE SELECT ONLY <u>ONE</u> ANSWER**

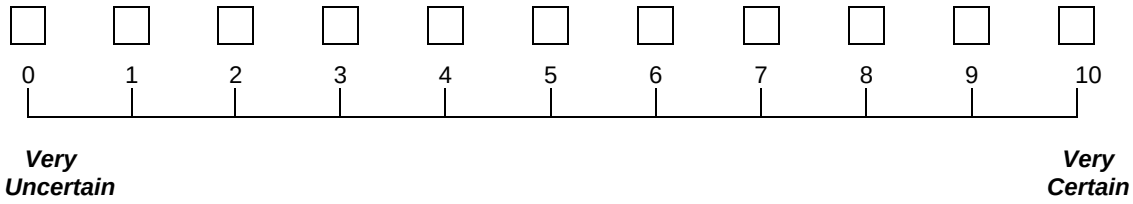
It is important that the Kentucky Community and Technical College System expands so that more students have access to the system.	☐	1
My community could greatly benefit by increased public services provided by the Community and Technical College System.	☐	2
Expanding the system now will make it easier for my children to get an education in the future.	☐	3
Expanding the system offers one way to improve Kentucky's economy.	☐	4
Other **[Please write it down below]** (_____)	☐	5

PLEASE SKIP TO DEMOGRAPHICS - Q19

Q16 Are you "probably sure" or "definitely sure" that you would not contribute **$400** for the expansion of the Kentucky Community and Technical College System?

Probably Sure	☐	1
Definitely Sure	☐	2

Q17 You answered NO to the referendum vote, on a scale from 0 to 10, how certain are you of your answer? Please select your answer on the scale below.



Q18 You answered NO to the referendum vote, which of the following reasons best describes why? **PLEASE SELECT ONLY ONE ANSWER**

I can't afford the increase in taxes.	☐	1
The Kentucky Community and Technical College has no value to my household.	☐	2
I feel that there are suitable alternatives to the Kentucky Community and Technical College System.	☐	3
My household should not have to pay more taxes to fund the expansion.	☐	4
Other **[SPECIFY]** (_____).	☐	5

DEMOGRAPHICS

Q19 The following questions will help us analyze the results of this study. Your answers will be kept strictly confidential.

How many years have you lived in Kentucky?

_____ years

Q20 How many years have you lived in your current place of residence?

_____ years

Q21 Are you male or female?

Male	☐	1
Female	☐	2

Q22 In which year were you born?

_____

Q23 Please indicate what racial group best describes you.
PLEASE SELECT ONLY <u>ONE</u> ANSWER

White, Non-Hispanic	☐	1
Black, Non-Hispanic	☐	2
Other, Non-Hispanic	☐	3
Hispanic	☐	4
More than one race, Non-Hispanic	☐	5

Q24 What is the highest level of education **<u>anyone</u>** in your household has completed?
PLEASE SELECT ONLY <u>ONE</u> ANSWER

Less than High school	☐	1
Some High school, no diploma	☐	2
Graduated from High school - Diploma or equivalent	☐	3
Some college, no degree	☐	4
Associate degree	☐	5
Bachelor's degree	☐	6
Master's degree	☐	7
Professional degree (MD, DDS, LLB, JD)	☐	8
Doctorate Degree	☐	9

Q24a What is the highest level of education **<u>you</u>** have completed?
PLEASE SELECT ONLY <u>ONE</u> ANSWER

Less than High school	☐	1
Some High school, no diploma	☐	2
Graduated from High school - Diploma or equivalent	☐	3
Some college, no degree	☐	4
Associate degree	☐	5
Bachelor's degree	☐	6
Master's degree	☐	7
Professional degree (MD, DDS, LLB, JD)	☐	8
Doctorate Degree	☐	9

Q25 What is your working status?
PLEASE SELECT ONLY <u>ONE</u> ANSWER

Working full time	☐	1
Working part time	☐	2
With a job, but on medical leave, vacation, or strike	☐	3
Unemployed, temporarily laid off, or looking for work	☐	4
Retired	☐	5
Homemaker	☐	6
In school, also working full or part time	☐	7
In school, not working for pay	☐	8

Q25A Do you have internet access in your home?

Yes	☐	1
No	☐	2

Q26 If you are employed, in which county do you work?

_____

☐ Not applicable

Q27 If you are employed, in which zip code do you work?

_____

☐ Not applicable

Q28 Which of the following is most representative of your household income?
PLEASE SELECT ONLY <u>ONE</u> ANSWER

Less than $5,000	☐	1	$40,000 to $49,999	☐	11
$5,000 to $7,499	☐	2	$50,000 to $59,999	☐	12
$7,500 to $9,999	☐	3	$60,000 to $74,999	☐	13
$10,000 to $12,499	☐	4	$75,000 to $84,999	☐	14
$12,500 to $14,999	☐	5	$85,000 to $99,999	☐	15
$15,000 to $19,999	☐	6	$100,000 to $124,999	☐	16
$20,000 to $24,999	☐	7	$125,000 to $149,999	☐	17
$25,000 to $29,999	☐	8	$150,000 to $174,999	☐	18
$30,000 to $34,999	☐	9	$175,000 or more	☐	19
$35,000 to $39,999	☐	10			

Q29 Please list the ages of each individual that resides in your household NOT including yourself.

_____ years
_____ years
_____ years
_____ years
_____ years
_____ years
_____ years
_____ years
_____ years
_____ years