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THE VALUE OF KENTUCKY'S EQUINE INDUSTRY TO KENTUCKY STATE RESIDENTS: A CONTINGENT VALUATION STUDY

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2016

THE VALUE OF KENTUCKY'S EQUINE INDUSTRY TO KENTUCKY STATE
RESIDENTS:

A CONTINGENT VALUATION STUDY

THESIS

A thesis submitted in partial fulfillment of the
requirements for the degree of Master of Science in
Agricultural Economics in the College of Agriculture, Food and Environment
at the University of Kentucky

By

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Lexington, KY

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Lexington, KY

2016

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ABSTRACT OF THESIS

THE VALUE OF KENTUCKY'S EQUINE INDUSTRY TO KENTUCKY STATE RESIDENTS:

A CONTINGENT VALUATION STUDY

This thesis examines whether the presence of the equine industry improves the quality of life for Kentucky residents; the contingent valuation method (CV) is used to estimate the value Kentucky residents place on the presence of the equine industry in Kentucky. The data comes from Phase II of the 2012 Kentucky Equine Survey of Kentucky residents. Seven thousand seven hundred fifty-seven surveys were distributed throughout the one hundred twenty counties in Kentucky. Four versions of the survey were distributed; the versions varied by the percentage decline in the equine industry. Surveys distributed to Bluegrass counties were distinguished by the color of paper the survey was printed on; the paper color identified the housing quartile of the respondent. Each version of the survey included a dichotomous choice experiment predicting a percentage decline in the equine industry. A payment card willingness-to-pay experiment followed the dichotomous choice experiment. Attitude questions, demographic data, and a consequentiality question were included at the end of the survey. The goal of the study was to identify if and in what way Kentucky residents' lifestyle, beliefs, and knowledge of the equine industry influence their willingness to avoid a loss of the equine industry.

KEYWORDS: Equine, Contingent Valuation (CV), Willingness to Pay, Payment Card, Dichotomous Choice, 2012 Kentucky Equine Survey

Stephanie J Waters

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THE VALUE OF KENTUCKY'S EQUINE INDUSTRY TO KENTUCKY STATE
RESIDENTS:

A CONTINGENT VALUATION STUDY

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Chapter 1: Introduction

1.1 Welcome to the Horse Capital of the World

The state of Kentucky is home to 242,000 horses and 35,000 equine operations (2012 Kentucky Equine Survey). Fifteen counties comprise the “Bluegrass Region” of Kentucky, whose pastures, rich in minerals, are known for helping build strong horses. Lexington, located in the heart of the Bluegrass Region, is known to many as the “Horse Capital of the World.” Approximately 35% of the state’s equine population resides in the Bluegrass Region and 10% of the state equine population resides in Fayette County, which encompasses the city of Lexington (2012 Kentucky Equine Survey). The equine industry is a unique element of Kentucky’s culture and an integral component of the state’s economy.

1.1.1 Why are horses economically important for Kentucky?

The 2012 Kentucky Equine Survey valued the equine industry’s equine related assets at \$23.4 billion with an economic impact of approximately \$3 billion. It is important to understand that the equine industry is not just represented by horses but comprised of educational and research institutions, numerous equine operations, equine related activities, and specialized businesses owned and operated by a diverse group of individuals from around the world. Based upon the size and concentration of equine oriented businesses in Kentucky, especially the Bluegrass Region, the equine industry could be considered an “economic cluster,” a geographic collection of interconnected businesses linked to a specific field or industry (Garkovich et al, 2008). Kentucky’s equine cluster provides many benefits to the community including approximately 40,000 jobs, directly or indirectly related to equine operations. Table 1.1 includes seven important equine facts concluded from the 2012 Kentucky Equine Survey.

| Table 1.1 Important Equine Facts | |
|--|----------------|
| Total Equine Population | 242,400 |
| Total Number of Equine Operations | 35,000 |
| Total Number of Acres Devoted to Equine-Related Activities | 1.1 million |
| Total Operating Expenditures | \$839 million |
| Total Capital Expenditures | \$338 million |
| Total Income from Sales and Services | \$1.1 billion |
| Value of Equine and Equine Related Assets | \$23.4 billion |

For the purposes of the survey, an equine is defined as a horse, pony, mule, or donkey. An equine operation is an address with at least one equine and is not necessarily a horse farm or riding stable.

Table 1.2 presents the total economic impact of the equine industry reported in the 2012 Kentucky Equine Survey.

| Table 1.2 Total Economic Impact of Kentucky's Equine Industry | | | |
|--|------------------|----------------|----------------|
| | Employment(Jobs) | Output | Value Added |
| Direct Equine Industry Impacts | 32,022 | \$1.78 billion | \$813 million |
| Total Equine Industry Impacts | 40,665 | \$2.99 billion | \$1.40 billion |

1.1.2 The demographics of Kentucky's equine population

Historically, horses have been used for transportation purposes, agricultural purposes, racing, and as breeding stock. Over time, as technological advances led to the development of motor vehicles and farm machinery, the role of horses transformed. Today in Kentucky, horses play a variety of roles in horse owners' lives, typically in the form of business investments and for recreation. Table 1.3 outlines the uses of horses in Kentucky reported from the 2012 Kentucky Equine Survey.

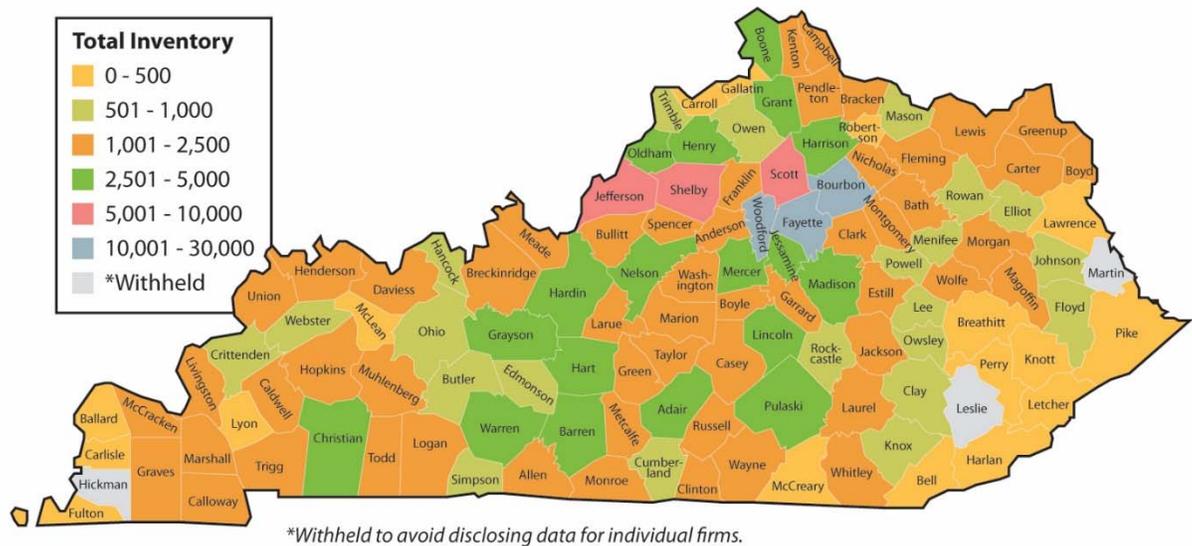
| Table 1.3 Uses of Horses in Kentucky | |
|---|--------|
| Primary Use and Number of Horses | |
| Trail | 78,630 |
| Broodmare | 37,300 |
| Idle | 31,940 |
| Show | 24,130 |
| Young Horse | 22,310 |
| Race | 10,690 |
| Work | 10,120 |
| Stallion | 3,080 |

Kentucky is home to one of the most famous horse races in the world, the Kentucky Derby. Because of this event, many think of the thoroughbred when they think of Kentucky. While thoroughbreds are the most predominant breed making up 22% of the total equine population, the remaining 78% of the total population is comprised of more than twenty other breeds. Table 1.4 details the state's equine population reported in from the 2012 Kentucky Equine Survey.

| | |
|-------------------------|--------|
| Thoroughbred | 54,000 |
| Quarter Horse | 42,000 |
| Tennessee Walking Horse | 36,000 |
| American Saddlebred | 14,000 |
| Donkeys and Mules | 14,000 |
| Mountain Horse Breeds | 12,500 |
| Standardbred | 9,500 |
| Miniature Horses | 7,000 |
| Ponies | 7,000 |
| Paint | 6,500 |

Figure 1.1 provides a breakdown of the equine population by county as collected from the 2012 Kentucky Equine Survey. Note the large concentration of the equine population in the Bluegrass Region, the area surrounding Fayette County.

Figure 1.1 Equine Inventory by County



1.2 Purpose of this Study

Interest in the equine industry is growing worldwide as more individuals become involved in the industry and more horses are showcased in popular sporting events. In 2012, the Kentucky Horse Council and the University of Kentucky combined force, to implement a statewide Kentucky Equine Survey. Prior to 2012, current information and data for public use in decision making were limited, particularly in Kentucky. A previous survey of Kentucky's equine industry was performed in 1977 and an economic impact study was performed in 1990. Both the survey and the study provided essential data and information on the equine population and the economic impact of the Kentucky equine industry. Thirty-five years of changes in economic conditions,

environmental regulation, and technological innovation has occurred both locally and globally; these changes have presented new opportunities and new challenges to both Kentucky's equine industry and the equine industry worldwide. While it is impossible to capture and analyze thirty-five years of undocumented changes, it is possible to capture the present equine industry and detail its significance to Kentucky.

The Kentucky Equine Survey Project was conducted in two phases. Phase I of the 2012 Kentucky Equine Survey Project sought to "obtain an estimate of the inventory of all breeds of equine (horses, ponies, donkeys, and mules) as well as an estimate of equine-related assets, sales and income, and expenditures." Phase II of the study examined the economic impact -- market and non-market value -- of the Kentucky equine industry.

This thesis presents findings from the non-market study of the 2012 Kentucky Equine Survey. The purpose of this non-market study is to determine the impact of the equine industry's presence in Kentucky, including the impact it has on Kentucky's residents and their quality of life. To test whether the presence of the equine industry improves the quality of life in Kentucky, we must estimate the value that Kentucky residents place on the presence of the equine industry in the state. The value, sign and magnitude, will indicate whether the presence of the equine industry improves the quality of life in Kentucky and will help us achieve a greater understanding of the equine industry and its effects.

Past research has focused on the value consumers place on the preservation of agricultural land, Agricultural land is a broad characterization and little research has been conducted specifically on equine land and the benefits it provides. This study attempts to make a connection between the value individuals place on the equine industry with their knowledge and attitudes towards the equine industry.

1.3 Objective of Study

There are three foci of the study: a) estimate the willingness to support a hypothetical horse preservation program; b) estimate the willingness to pay to preserve the horse industry; and c.) assess the consequentiality of the survey, i.e. the respondent's perception of the survey's impact on future equine policy.

The first objective of the study is to evaluate the respondents' attitudes towards a perceived loss in the equine industry and their willingness to support a free hypothetical horse farm preservation program.

The second objective of the study is to measure residents' willingness to pay to avoid a loss in the equine industry and the factors that influence it. Factors that influence the willingness to pay may include respondents' beliefs, preferences, or attitudes towards the equine industry, their involvement in the equine industry, and their personal characteristics including age, education, income, etc.

The third objective of the study is to evaluate respondents' perceived consequentiality of the survey and its impact on their willingness to pay. Respondents' perceptions of the survey's impact on future equine policy may or may not influence their willingness to support a hypothetical horse farm preservation program and willingness to pay to avoid a loss in the equine industry.

1.4 Thesis Structure

This thesis is organized into six chapters. Chapter 2 presents relevant information and related literature in the field of contingent valuation focusing on agricultural land preservation, Chapter 3 presents the research methodology of the non-market survey including survey design and implementation, Chapter 4 discusses the data collected and analyzed from the non-market survey, Chapter 5 analyzes the empirical results of the research, and Chapter 6 discusses the conclusions. Appendices and References follow Chapter 6.

Chapter 2: Literature Review

2.1 Agricultural Land Preservation

2.1.1 Benefits of Agricultural Land Preservation

The agricultural industry provides many benefits to the local and global community. Benefits can be broken down into market and non-market benefits. Market benefits include jobs created by the agricultural industry, income generated from the production and sale of agricultural commodities, outputs produced by various agricultural inputs, and agricultural commodities themselves. Non-market benefits are broken down into use and non-use values (Freeman, 2003). The use value may be defined as the economic value associated with utilizing the resource; in order to derive a use value, a user must be utilizing the resource (Freeman, 2003). The non-use value is derived from the stated preference of the user; a person does not have to have contact with the resource to derive a benefit from it. For example, use values are the benefits from access to farms/ranches and the recreational services they provide; benefits associated with non-use values include cultural and heritage values associated with the lifestyle of agriculture, existence values of wildlife living on agricultural operations, and the scenery generated by agricultural operations (Irwin, Nickerson, and Libby, 2003).

Agricultural land is important for not only producing agricultural outputs but also for maintaining the natural land and environment. According to the USDA, as of 2003, more than 1.3 million acres of agricultural land have been protected from development by conservation mechanisms (USDA, 2006). The significant number of acres protected from non-agricultural development indicates that there is value to both public and private interests in the preservation of agricultural land and the natural environment it creates.

Conserving agricultural land preserves open space and may prevent urban sprawl; it also helps support local farmers and in the long run can aid in food security (Irwin, Nickerson, Libby, 2003). Environmental benefits that often get overlooked include the improvement of water quality, groundwater recharge ability, flood control, and mitigation of air pollution, ozone, and greenhouse gas emissions (USDA, 2006). Through alternative development methods, parks, trails, and wildlife habitats may be created to help preserve these benefits and still provide access for residents.

2.1.2 Benefits of Kentucky's Equine Industry

The equine industry and specifically thoroughbred horse racing, is deeply ingrained in the culture, history, and lifestyle of Kentucky; the Kentucky Derby, the longest running sporting event in the United States, dates back to 1875. The first Saturday in May is not just a sporting event; it's a day of Kentucky tradition, a "celebration of southern culture and a true icon of Americana" (Kentucky Derby History, 2015).

The equine industry's presence, especially in the Lexington area, creates a unique blend of urban and rural landscape. A short drive from the city center, visitors and residents alike are immersed in the culture and history of the city and the horses that helped build it. Equine operations encompass the city with white fences, stone walls, and hundreds of acres of bluegrass pastures dedicated to developing strong horses generation after generation. In between horse farms are new areas of residential and commercial development, perfectly positioned to experience the benefits of the rural setting minutes from the conveniences of modern living. The environmental/aesthetic benefit is only one of numerous benefits the presence of the equine industry provides to Kentucky.

Some benefits the equine industry provides, such as equine events, are considered direct economic benefits and may be directly measured as dollars generated from tourism or dollars generated from the sale of goods/services. Other benefits, such as the recreational, environmental or aesthetic benefits, may be considered indirect benefits, non-market benefits, or positive externalities generated by the presence of the equine industry. As discussed previously, non-market benefits can be broken down into use and non-use values. A person must be on or near a horse farm to enjoy the aesthetic benefits it provides; in this case a person derives a use value. A person who values the existence of the horse industry but does not actively participate in the industry derives a non-use value or non-use benefit. In either scenario, there is no cost associated with the values or benefits derived. Therefore, the existence of the equine industry could be considered a public good – a good that no one is excluded from using and whose availability is not diminished by the use of others (Ready, 1990).

Non-market benefits can be of equal significance to direct economic benefits; it is important to estimate the value of these non-market benefits to better understand their impact and measure the value of the amenity they create. The value of non-market benefits cannot be directly measured; however, the value may be estimated through the combined use of market research tools and the valuation method known as contingent valuation. The contingent valuation method may be used to elicit a person's willingness to pay -- the "maximum amount of income a person will pay in exchange for an improvement in circumstances, or the maximum amount a person will pay to avoid a decline in circumstances" (Haab and McConnell, 2002).

2.2 Method of Willingness to Pay Elicitation

Two market research tools used to identify how consumers value the characteristics of products and services are the revealed preference technique and the stated preference technique. The revealed preference technique identifies how consumers value the characteristics of products and services through direct observation of their purchasing habits or via a survey asking about their actual purchasing habits. The stated preference technique uses surveys, interviews, or questionnaires directing respondents to "rank, rate or choose between different hypothetical product/service scenarios that are made up of different attribute mixes"; the data collected are then analyzed and used to identify how individuals value the characteristics of the products and services (Abley, 2000).

One major criticism of the stated preferences approach is the lack of follow up to the hypothetical scenario; respondents do not have to actually pay the sum of money like they would in real life. This may lead to discrepancies between the individual's stated behavior and their behavior in real life (Abley, 2000). However, an advantage of the stated preference technique is the ability to control the information provided to respondents -- this includes the amount of information and the kind of information provided -- unlike the revealed preference approach where information is provided by the marketplace. A drawback of either approach is that some steps in the decision making process may be unclear or go unobserved all together. For the purposes of this study we will focus on how to elicit a consumer's willingness to pay for a product or service using the stated preference technique because we do not have access to revealed preference data because the steps were unobserved.

2.2.1 Contingent Valuation

The contingent valuation method is used to capture the monetary value of non-market goods (Hanemann, 1994). Through the use of surveys and questionnaires, a hypothetical marketplace is established in which respondents have the opportunity to “buy” the non-market good and state their individual maximum willingness to pay for the good or resource in question (Mitchell and Carson, 1989). The value of the good may then be estimated using econometric modeling.

The contingent valuation method took root in the 1940s with the first known use of public opinion surveys by H.R. Bowen and S.V. Ciriacy-Wantrup to value what Bowen termed “social goods” and Ciriacy-Wantrup termed “collective, extra market goods” (Carson and Hanneman 2005). Surveys of this type continued to be used throughout the 1950s and 1960s; however, it was not until 1963, that the first empirical contingent valuation survey was implemented by R.K. Davis (Carson and Hanneman, 2005). Throughout the 1960s and 1970s, contingent valuation studies focused on the value of various recreational amenities. Brown and Hammock (1973) determined the value of a waterfowl kill and estimated the benefits of habitat purchases. Darling (1973) compared estimates of willingness to pay for the amenities of three urban parks in California to estimates derived from a property value model (Brown and Hammock, 1972, Darling, 1973). The use of the contingent valuation method steadily grew throughout the 1970s and 1980s; the literature expanded beyond the valuation of recreational amenities to encompass studies on the valuation of the quality of natural resources, the valuation of health, and the valuation of transportation. Table 2.1 is a selection of contingent valuation studies conducted throughout the 1970s and 1980s chosen to exemplify the diverse nature of the CV method.

Table 2.1 Contingent Valuation Studies Performed in the 1970s and 1980s

| Year | Author | Title | Topic |
|------|---|--|---------------------------|
| 1973 | J.P. Acton | "Evaluating public progress to save lives: the case of heart attacks" | Health and transportation |
| 1977 | K.E. McConnell | “Congestion and willingness to pay: a study of beach use”. | Outdoor recreation |
| 1978 | W.M. Hanneman | A methodological and empirical study of the recreation benefits from water quality improvement | Water quality |
| 1978 | A. Randall, O. Grunewald, A. Pagoulatos, R. Ausness, S. Johnson | “Reclaiming coal surface mines in central Appalachia: a case study of the benefits and costs”. | Natural resource |
| 1979 | J.M. Conrad and D. LeBlanc | “The supply of development rights: results from a survey in Hadley, Massachusetts” | Development rights |
| 1979 | D.G. Devine and B.W. Marion | “The influence of consumer price information on retail pricing and consumer behavior" | Consumer behavior |
| 1981 | M.A. Thayer | “Contingent valuation techniques for assessing environmental impacts: further evidence” | Environmental impact |
| 1983 | C. Garbacz and M.A. Thayer | “An experiment in valuing senior companion program services” | Health |

Table 2.1 (continued)

| | | | |
|------|--|---|--------------------|
| 1984 | C.D.Throsby | “The measurement of willingness to pay for mixed goods”. | Arts |
| 1985 | K.C. Samples, J.A.Dixon, M.M. Gower | “Information disclosure and endangered species valuation”. | Endangered species |
| 1985 | R.G. Walsh, L.D. Sander, and J.B. Loomis | Wild and scenic river economics: recreation use and preservation values. | Natural resources |
| 1986 | R.C. Mitchell and R.T. Carson | “The use of contingent valuation data for benefit–cost analysis in water pollution control” | Water quality |
| 1986 | G.S. Tolley, A. Randall, G.C. Blomquist, R.G. Fabian, G. Fishelson, A. Frankel, J.P. Hoehn, R. Krumm, E. Mensah | Establishing and valuing the effects of improved visibility in the Eastern United States. | Air quality |

In 1979, the contingent valuation method was recognized by the United States Water Resource Council as one of three recommended valuation techniques acceptable for use in determining project benefits (Bateman et al., 1999). At this point in time, the contingent valuation method was considered an experimental methodology, with no standards or guidelines in effect for researchers using the valuation method. In 1989, a book was published by Mitchell and Carson outlining the theoretical framework of the contingent valuation method, the different types of values associated with public goods, and guidelines for survey design and administration (Carson and Hanneman, 2005). In 1993, the National Oceanic and Atmospheric Administration (NOAA) assembled a panel of economic experts to evaluate the use of the contingent valuation method for determining passive use values of environmental goods and services. The NOAA produced a report that set forth guidelines and recommendations for contingent valuation survey design, administration, techniques to capture the best results, and recommendations for future research (Arrow et al., 1993).

The take home message from this report was that researchers must invest time and resources into the development of the survey instrument so that the survey may reveal how “respondents are sensitive to significant and substantive differences in the public good” (Haab and McConnell, 2002). It is important for researchers to recognize that surveys do not always need to fulfill every element of these guidelines because some guidelines should only be used for specific research studies. Normally, surveys that do meet these guidelines assure reliability and usefulness in the information obtained (Arrow et al, 1993).

2.2.2 Consumer Willingness to Pay for Preservation of Ag Land

The contingent valuation method is one of several methods used to estimate the value of agricultural land; other methods include hedonic price analysis, a combined travel cost method/contingent behavior approach, and a broader method category defined as choice experiments (Bergstrom and Ready, 2009). Value estimation of agricultural land is a small subsection of the vast library of contingent valuation literature.

Table 2.2 lists thirteen contingent valuation studies performed in the last thirty years focusing on the value estimation of agricultural land.

| Table 2.2 Contingent Valuation Studies Focused on Estimating the Value of Agricultural Land | | |
|--|--|--|
| Year | Title | Author |
| 1984 | Measuring the Nonmarket Value of Massachusetts Agricultural Land: A Case Study | John M. Halstead |
| 1985 | Public Environmental Amenity Benefits of Private Land: The Case of Prime Agricultural Land | John C. Bergstrom, B.L. Dillman, and John R. Stoll |
| 1986 | Amenity Values of Urban Fringe Farmland: A Contingent Valuation Approach | S. Beasley, W.G. Workman, N.A. Williams |
| 1990 | Willingness to Pay for Farmland Preservation | D.G. Waddington |
| 1990 | The Value to Kentuckians of the Kentucky Equine Industry: A Contingent Valuation Study | Richard C. Ready |
| 1993 | Valuing Landscape: A Contingent Valuation Approach* | K.G. Willis and G.D. Garrod |
| 1994 | Estimation of the Non-Market Benefits of Agricultural Land Retention in Eastern Canada | J.M. Bowker and D.D. Didychuk |
| 1997 | Measuring Amenity Benefits from Farmland: Hedonic Pricing vs. Contingent Valuation | Richard C. Ready, Mark C. Berger, and Glenn C. Blomquist |
| 1997 | Non Market Value of Western Valley Ranchland Using Contingent Valuation | Randall S. Rosenberger and Richard G. Walsh |
| 1999 | Saving Open Spaces: Public Support for Farmland Protection | D.J. Krieger |
| 2002 | Preserving Agricultural Land via Property Assessment Policy and the Willingness to Pay for Land Preservation | R. Kashian and M. Skidmore |
| 2002 | Sheridan Land Use and Planning Survey Results | D. McLeod, K. Inman, R. Coupal, and J. Gates |
| 2006 | Moffat County Land Use and Planning Survey Results | A. Bittner, D. McLeod, R. Coupal, A. Seidl, and K. Inman |

2.2.3 Factors affecting Consumer WTP

There are many factors that determine the value of agricultural land including the characteristics of the land itself, alternative uses of the land, the surrounding landscape, and the socio-demographic characteristics of individual survey respondents (Bergstrom and Ready, 2009). Included in Table 2.3 are six studies examining the willingness to pay for the preservation of agricultural land; the studies were chosen for their focus on agricultural land preservation and the different econometric analyses used. The table includes the authors, econometric analysis used in the willingness to pay analysis, and the significant factors found to affect the respondent's willingness to pay for preservation of agricultural land.

Table 2.3 Contingent Valuation Studies Focused on Estimating the Value of Agricultural Land

| Year | Authors | Econometric Analysis | Significant Factors Affecting Willingness to Pay for Preservation of Agricultural Land |
|------|--|------------------------|--|
| 1985 | John C. Bergstrom, B.L. Dillman, and John R. Stoll | Ordinary Least Squares | <ul style="list-style-type: none"> - Number of acres protected - Family Income - Age of respondent - Education level of respondent - Amount of benefit information provided to respondent |
| 1986 | S. Beasley, W.G. Workman, N.A. Williams | Ordinary Least Squares | <ul style="list-style-type: none"> - Respondent's community of residence - Respondent is head of the household - Previous knowledge of proposed government programs to purchase development rights of agricultural land - Age of respondent - Hypothetical level of increased development of local farmland |
| 1990 | Richard C. Ready | Logistic Regression | <ul style="list-style-type: none"> - Number of responses available to respondent - Income level of respondent - Previous Employment in the equine industry - Number of horse farms in the county - County respondent resides in |
| 1994 | J.M. Bowker and D.D. Didychuk | Ordinary Least Squares | <ul style="list-style-type: none"> - Amount of farmland to be preserved - Affiliation with conservation type organizations - Distance to nearest parcel of farm land - Household size - Previous exposure or visit to farmland |
| 1997 | Richard C. Ready, Mark C. Berger, and Glenn C. Blomquist | Logistic Regression | <ul style="list-style-type: none"> - Proposed number of farms lost - Bid amounts - Interaction between the bid amount and the percent of farms that would be lost |

Table 2.3 (continued)

| | | | |
|------|---|------------------------|---|
| 1997 | Randall S. Rosenberger and Richard G. Walsh | Ordinary Least Squares | - Respondent's attitude about the resource relative to other environmental issues in the county - Household size - Household income |
|------|---|------------------------|---|

Common variables among some of the studies that significantly affect the respondent's willingness to pay are the income level, household size, age of respondent, and the community location/county the respondent resides. Rosenberger and Walsh found that the respondent's attitude towards the resource relative to other environmental issues in the county significantly affected their willingness to pay for the preservation of agricultural land; the authors agreed that attitudes and beliefs are as important in explaining the magnitude of responses as are behavioral and descriptive variables (Rosenberger and Walsh, 1997). It is interesting to note that income is not always significant in contingent valuation studies. While this violates economic theory, Beasley, et al, (1986) suggests that since money does not change hands in contingent valuation surveys, poor people may be as "profligate" as rich people and this may affect the willingness to pay and in turn the income variable in contingent valuation studies.

2.2.4 Contingent Valuation Studies focusing on equine

Since the study examines the Kentucky Equine industry, Richard Ready's 1990 study and the 1997 study conducted by Ready, Berger, and Blomquist are of particular interest. Ready's 1990 study used a two stage analysis to first evaluate factors influencing household value – the value a household places on the existence of the equine industry- and then calculated average values per household for each county in Kentucky. Significant factors affecting household value included the number of responses available, the household income level, previous/current employment in the equine industry, the county respondent's resided in, and the number of farms located in the county. As the loss of farms increased from 25% to 50% and 50% to 75%, the average value a household places on the existence of the equine industry increased; however, the average household value decreased with an increased loss from 75% to 100%. It was believed that a loss level of 100% was unrealistic and therefore rejected by respondents (Ready, Berger, and Blomquist, 1997). The 1997 study estimated the value of horse farm land to Kentucky residents using both the contingent valuation method and the hedonic pricing method. The study utilized the data/results presented in Ready's 1990 study and compared the values estimated to that of the hedonic model. The authors concluded that while the hedonic estimate was 12% smaller than the contingent valuation estimate, the difference between the estimates was not statistically significant and the difference could be attributed to the non-use benefits captured by the contingent valuation method (Ready, Berger, and Blomquist, 1997).

2.2.5 Criticisms of the Contingent Valuation Method

Several criticisms of the contingent valuation method continue to be discussed within the literature today. Carson examines two main concerns involving the actions of survey respondents; these concerns have been widely discussed since the development of the contingent valuation method. The first concern is that survey respondents may not take a hypothetical survey question seriously without money changing hands; the second concern is that people will act strategically and not reveal their true preferences for public goods (Carson, 2012). Other criticisms involve the hypothetical response bias that leads contingent valuation methods to overstate the value, the

large differences between willingness to pay and willingness to accept, as well as the embedding problem which encompasses scope problems (Hausman, 2012)

2.2.6 Elicitation Methods for Deriving Willingness to Pay

There are four methods for deriving an individual's willingness to pay: the open ended valuation method, the bidding game method, the payment card method, and the dichotomous or discrete choice method. The open ended method asks individuals the maximum amount they are willing to pay for a good or service. An advantage of the open ended method is that it yields an estimate of the value the individual places on the good or service; a disadvantage of the method is that it may be too difficult for respondents to accurately answer the question because they may not be able to come up with an exact dollar figure for the value they place on the good or service (Ready, 1990).

The bidding game method is similar to an auction; individuals are asked whether they would be willing to pay a certain bid amount and depending on the individual's answer, the bid amount is then raised or lowered until "the highest possible response is recorded" (Mitchell and Carson, 1989). Two advantages of the bidding game method are: the individual's true willingness to pay may be drawn out through the use of multiple questions and there is a decreased need to use a large sample size; a disadvantage of the method is that it may be prone to starting point bias (Phillips, 1998).

The payment card method asks individuals to choose the maximum dollar amount they would be willing to pay based upon a range of values pre-determined by researchers. There are two advantages of the payment card method: it is less expensive to implement than other methods, and it mimics real life by allowing individuals to "shop around" for the value which is the most they would pay. The disadvantage of the method is that the individual's willingness to pay is represented by a range of values instead of an exact dollar figure, leading to range and center biases (Donaldson et al., 1997).

Finally, the dichotomous choice method has two formats: single-bounded or double-bounded dichotomous choice. The single bounded dichotomous choice asks the individual whether they would be willing to pay a single amount; the double bounded dichotomous choice asks a follow up question with a higher or lower bid amount based upon the individual's response to the initial question. The advantage of the dichotomous choice method is that it encourages truth-telling and facilitates respondents to complete the valuation process. The disadvantages of the method are that it may not elicit the individual's true willingness to pay, only the maximum willingness to pay, and it can be expensive to implement (Pearce, 2002; Venkatachalam, 2003).

Chapter 3: Research Methodology

This chapter discusses the research methodology of the study in two parts. Section 3.1 details the survey methodology including the survey design and implementation. Section 3.2 details the empirical framework of the study including the logit model, the tobit model and the willingness to pay analysis.

3.1 Survey Design and Implementation

3.1.1 Context of the Survey

In 2012, the University of Kentucky's Ag Equine Programs, the Kentucky Horse Council, and the National Agricultural Statistics Service (NASS), teamed together to conduct a comprehensive study of the Kentucky equine industry in two phases. Phase I of the comprehensive study inventoried the number of horses in the state by breed and use while Phase II focused on the economic impact of the equine industry in Kentucky; however, the value of the equine industry is not completely captured by transactions in the market place or tourism impacts. The equine community and the many equine operations in Kentucky-- Lexington and the Bluegrass area especially-- create a unique blend of urban and rural landscape that is aesthetically pleasing to both residents and visitors to the community. This aesthetic value provides many benefits to the community; these benefits have both use and non-use values associated with them that can be difficult to calculate. An essential component of the economic impact is calculating the value that residents place upon the presence of the equine industry in the community.

The writing and administration of the survey was conducted in four parts. First, for comparison purposes, a preliminary draft of the survey was created to closely replicate the survey used in Richard Ready's 1990 study "The Value to Kentuckians of the Kentucky Equine Industry: A Contingent Valuation Study." A comparable survey will allow for comparisons between the two studies. Second, a focus group was conducted to examine the effectiveness, clarity, and navigability of the survey instrument. Third, the final draft of the survey was prepared; approximately six thousand surveys were compiled and mailed to eight counties in the Bluegrass Region of Kentucky. Finally, a second mailing of the survey instruments was re-distributed to the eight Bluegrass counties along with an additional two thousand surveys distributed throughout the state of Kentucky.

3.1.2 Survey Design

A preliminary draft of the survey was created using the survey methodology section and body of the paper "The Value to Kentuckians of the Kentucky Equine Industry: A Contingent Valuation Study" (Ready, 1990). To allow for comparability of the two studies, the explanation of the 1990 contingent valuation survey (found in the body of the paper) was used to replicate the original survey as closely as possible. This paper was only available in hard copy form and the draft of the contingent valuation survey could not be located by the author.

Five versions of the survey were generated, each presenting a different proposed decrease in size of the equine industry. The five decreases in size were set at 5%, 10%, 20%, 30%, and 40% of the current size of the equine industry; these percentage decreases in size were different from the original four decreases of 25%, 50%, 75%, and 100% found in the 1990 survey. The possible percentage decreases in size were changed to accurately depict the potential threat to the equine industry in real terms. Throughout the discussion of the percentage amounts, it was found that a 100% decline in the size of the horse industry was extremely unlikely; therefore, it was eliminated. Bid amounts were retained from the original survey.

One focus group was held at Southside Christian Church of Lexington, KY, on August 29, 2012. The focus group was conducted to examine the effectiveness, clarity, and navigability of the survey instrument.

An announcement was placed in the church bulletin at Southside Christian Church one week before the Focus Group was conducted. An announcement was made at the end of bible study on the established date seeking volunteers. Eight volunteers from the Wednesday night bible study class participated in the focus group. Refreshments were provided for participants to encourage participation.

The goals of the focus group were to:

1. Explore the survey design, clarity of instructions, and navigability of the survey instrument.
2. Discuss the hypothetical choice scenario, gauge participants' interpretation of the "size" of the equine industry, and establish four appropriate percentage amounts for the decline.
3. Explore the magnitude of the size of the industry reductions, choice amounts, and the discuss participants' reasoning for supporting or not supporting the scenario.

Focus group participants had limited knowledge and involvement in the horse industry. Participants admitted mixed opinion regarding the implementation of a Horse Preservation Program, expressing a strong opinion to have more information about the funding source-- the "grant" -- backing the program. Due to the political nature of the choice scenario and the low percentage decreases in the equine industry, six of the eight participants' chose not to support the Horse Preservation Program. Participants believed larger choice amounts would cause respondents to truly consider the implications of the action and be more effective; respondents agreed percentage decreases of 15%, 30%, 45%, and 60% would be reasonable. Due to the current economic climate, participants felt that a tax increase of \$500 or more would be infeasible and highly unlikely for an individual to select. Participants also expressed concern regarding the hypothetical tax increase due to the current economic climate and the upcoming political elections. Participants who did not support the program stated that they "cared about horse farms and think they should be preserved due to the culture, heritage, and historical aspects, however, financial resources are scarce right now."

3.1.3 Survey Administration

The final survey was approved by the University of Kentucky Internal Review Board and was distributed throughout the state of Kentucky in two separate mailings. Survey distribution was determined by the population in each county; a total of 8,1eight thousand one hundred seventy-six surveys were distributed. Table 3.11 describes the distribution of surveys by county.

The initial objective of the study was to examine the value residents of the Bluegrass Region of Kentucky place upon the equine industry. With this objective in mind, six thousand one hundred surveys were sent out to residents in Fayette and eight surrounding counties. Two thousand four hundred eighty-eight were distributed to Fayette county residents; Fayette county respondents were randomly selected from a database obtained from the Fayette County Property Valuation Administrator. The data obtained from the Fayette County PVA, contained information regarding specific property characteristics including addresses and property values; the data did not reveal the property owner's identity. In order to examine the relationship between Fayette County individual's responses and the corresponding property value, the data were sorted by the property value and divided into five quintiles; each quintile was coded to a specific color of paper used in the distribution of the survey.

A follow up postcard was mailed ten days after the first round of surveys were distributed.

A second mailing was sent out approximately eight weeks later to the original addresses (minus the returned or “bad” addresses) to help improve the response rate. Since the Kentucky Equine Survey was a state wide initiative, it was decided that residents beyond the Bluegrass Region should be included in the study. Part of the second mailing included an additional two thousand surveys sent throughout the state of Kentucky. The addresses for Bluegrass and non-Bluegrass county respondents, excluding Fayette County were obtained from the company USA Data- a resource for data and tools to conduct research.

The final survey was made available in two formats: online and paper copy. All respondents were sent a paper copy of the survey which included a web address and survey code to indicate the version of the survey they received. Respondents then had the choice of filling out the paper copy and sending the survey back via mail or completing the survey online.

Table 3.1 presents the survey distribution by county; Table 3.2 breakdown of the property value quartiles and Table 3.3 presents the response rate for the survey.

Table 3.1 Survey Distribution by County

| County | Surveys Distributed | County | Surveys Distributed | County | Surveys Distributed |
|-------------------|---------------------|-----------------|---------------------|-----------------|---------------------|
| Adair (NB) | 12 | Grant (NB) | 12 | Mason (NB) | 9 |
| Allen (NB) | 10 | Graves (NB) | 21 | Meade (NB) | 15 |
| Anderson (NB) | 12 | Grayson (NB) | 15 | Menifee (NB) | 3 |
| Ballard (NB) | 5 | Green (NB) | 7 | Mercer (NB) | 12 |
| Barren (NB) | 24 | Greenup (NB) | 22 | Metcalf (NB) | 6 |
| Bath (NB) | 6 | Hancock (NB) | 5 | Monroe (NB) | 6 |
| Bell (NB) | 14 | Hardin (NB) | 54 | Montgomery (NB) | 14 |
| Boone (NB) | 62 | Harlan (NB) | 15 | Morgan (NB) | 6 |
| Bourbon (NB) | 216 | Harrison (NB) | 203 | Muhlenberg (NB) | 16 |
| Boyd (NB) | 27 | Hart (NB) | 10 | Nelson (NB) | 23 |
| Boyle (NB) | 16 | Henderson (NB) | 24 | Nicholas (NB) | 4 |
| Bracken (NB) | 5 | Henry (NB) | 8 | Ohio (NB) | 12 |
| Breathitt (NB) | 9 | Hickman (NB) | 3 | Oldham (NB) | 29 |
| Breckinridge (NB) | 10 | Hopkins (NB) | 25 | Owen (NB) | 5 |
| Bullitt (NB) | 41 | Jackson (NB) | 7 | Owsley (NB) | 0 |
| Butler (NB) | 7 | Jefferson (NB) | 423 | Pendleton (NB) | 7 |
| Caldwell (NB) | 7 | Jessamine (NB) | 524 | Perry (NB) | 15 |
| Calloway (NB) | 19 | Johnson (NB) | 13 | Pike (NB) | 36 |
| Campbell (NB) | 48 | Kenton (NB) | 85 | Powell (NB) | 7 |
| Carlisle (NB) | 3 | Knott (NB) | 8 | Pulaski (NB) | 35 |
| Carroll (NB) | 6 | Knox (NB) | 16 | Robertson (NB) | 1 |
| Carter (NB) | 15 | Larue (NB) | 8 | Rockcastle (NB) | 8 |
| Casey (NB) | 9 | Laurel (NB) | 32 | Rowan (NB) | 12 |
| Christian (NB) | 32 | Lawrence (NB) | 9 | Russell (NB) | 10 |
| Clark (NB) | 384 | Lee (NB) | 4 | Scott (NB) | 509 |
| Clay (NB) | 10 | Leslie (NB) | 6 | Shelby (NB) | 21 |
| Clinton (NB) | 5 | Letcher (NB) | 13 | Simpson (NB) | 10 |
| Crittenden (NB) | 5 | Lewis (NB) | 6 | Spencer (NB) | 9 |
| Cumberland (NB) | 4 | Lincoln (NB) | 13 | Taylor (NB) | 14 |
| Daviess (NB) | 52 | Livingston (NB) | 6 | Todd (NB) | 6 |
| Edmonson (NB) | 6 | Logan (NB) | 15 | Trigg (NB) | 8 |
| Elliott (NB) | 2 | Lyon (NB) | 4 | Trimble (NB) | 5 |
| Estill (NB) | 8 | Madison (NB) | 895 | Union (NB) | 8 |
| Fayette (NB) | 3176 | McCracken (NB) | 37 | Warren (NB) | 55 |
| Fleming (NB) | 8 | McCreary (NB) | 8 | Washington (NB) | 6 |
| Floyd (NB) | 21 | McLean (NB) | 5 | Wayne (NB) | 10 |
| Franklin (NB) | 27 | Magoffin (NB) | 6 | Webster (NB) | 7 |
| Fulton (NB) | 4 | Marion (NB) | 10 | Whitley (NB) | 19 |
| Gallatin (NB) | 4 | Marshall (NB) | 18 | Wolfe (NB) | 4 |
| Garrard (NB) | 9 | Martin (NB) | 5 | Woodford (NB) | 269 |

B: Bluegrass County

NB: Non-Bluegrass County

| Survey Color | Housing Quartiles | Number of Surveys Mailed | Number of Surveys Completed and Received | Response Rate |
|---|-------------------------|--------------------------|--|---------------|
| Pink | \$75,000 - \$127,700 | 772 | 167 | 21.63% |
| Yellow | \$127,900 - \$160,000 | 777 | 196 | 25.23% |
| Blue | \$160,175 - \$226,284 | 764 | 201 | 26.31% |
| Green | \$227,000 - \$906,100 | 763 | 219 | 28.70% |
| Lavender | \$942,301 - \$2,600,000 | 100 | 31 | 31.00% |
| Total Response Rate for Fayette County: | | | | 25.63% |

| County Distinction | Number of Surveys Mailed | Number of Returned Surveys due to "bad addresses" | Number of Surveys Mailed Successfully | Number of Surveys Completed and Received | Response Rate |
|--|--------------------------|---|---------------------------------------|--|---------------|
| Bluegrass | 6176 | 340 | 5836 | 1556 | 26.67% |
| Non-Bluegrass | 2015 | 94 | 1921 | 202 | 10.51% |
| Total Number of Surveys Completed and Received: | | | | 1758 | |
| Total Number of Survey Successfully Distributed: | | | | 7757 | |
| Total Response Rate for Survey: | | | | 22.66% | |

The survey instrument was formatted into five sections, A through E. Section A, began with eight attitude statements revised from the original survey (Ready, 1990). The eight attitude statements reflected both positive and negative views of the equine industry and respondents were asked to what extent they agreed or disagreed with the statements. The statements were designed to gauge respondents' attitudes and preferences towards the equine industry. The attitude statements help us understand the impact of the respondents' preferences towards the equine industry on their decision to support the preservation of horse farm land and on the value they place on the equine industry. The statements also serve as a "warm up," helping prepare the respondent for the hypothetical scenario found in Section B.

Figure 3.1 Attitude Statements

Section A (to what extent do you agree or disagree with the following statements)

| Statement | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree | Do not know |
|---|-------------------|----------|---------|-------|----------------|-------------|
| I think horse farms are nice to look at... | | | | | | |
| I think the number of horse farms in Kentucky is declining... | | | | | | |
| I think that horse farms make Kentucky a nicer place to live... | | | | | | |
| I would like to live near a horse farm... | | | | | | |
| I think land currently used for horse farms is needed for other uses... | | | | | | |
| I think operating horse farms is less profitable now than 10 years ago... | | | | | | |
| I think the horse industry helps local economies... | | | | | | |
| I would like to see the Kentucky horse industry remain the same size... | | | | | | |

Section B introduced the hypothetical situation of a horse farm preservation program. When developing the hypothetical scenario, it was important to present respondents with a clear and concise scenario they would believe plausible. The funding source -- the “grant” -- of the program was left purposefully vague so as not to play into the political territory that is private versus public funding. The goal in this section is to make respondents consider the validity and likelihood of the scenario without the added pressure of supporting the program monetarily.

Figure 3.2 Choice Scenario

Section B

Please consider the following scenario:

The state of Kentucky is in danger of losing part of its equine industry to new commercial and residential development. It might be possible to preserve the horse industry at its present size by adopting a Horse Farm Preservation Program. This program would be funded by a grant specifically designed to preserve horse farm land in the state; Kentucky residents would not have to pay for it.

Please select the option you most prefer:

Option 1

Action: **The Horse Farm Preservation Program is implemented.**

Outcome: The equine industry in Kentucky is preserved at its present size.

Option 2

Action: **No Action is taken by the state; residential and commercial development of horse farms occurs.**

Outcome: The equine industry in Kentucky will decrease in size by ___ over the next ten years. (15%, 30%, 45%, 60%)

If you chose Option 1 → Please go to Section C

If you chose Option 2 → Please go to Section D

Section C then asks those respondents who supported the program, whether they would be willing to financially back the program, and if so, how much they would be willing to pay annually to ensure the preservation of horse farm land. The survey instrument utilizes a payment card instead of the dichotomous choice method used in the Ready 1990 study. The payment card method was chosen for two reasons. One was the size and scale of the survey distribution; using the dichotomous choice model and four different percentage declines in the equine industry would have meant creating more than four different versions of the survey. The distribution of the survey would have been more complicated and it would have cost more both in terms of time and money. A second reason was to encourage respondents to think carefully and evaluate each of the values presented. We wanted respondents to see the face value of each of the options and choose the value which they were willing to pay and could most closely afford.

The payment card intervals were replicated from Ready's 1990 study; the only value excluded was the highest value of \$500, believed infeasible by participants of the focus group due to the current economic climate.

Figure 3.3 Payment Card

Section C (Complete only if Option 1 was selected)

Please consider the following scenario:

If the Horse Farm Preservation Program were implemented, there would be significantly less commercial and residential development of agricultural land. This would result in less tax revenue than if horse farms were developed. Without this additional tax revenue, the state and local governments might have to raise the state income tax rate to improve existing services.

Would you still be in favor of the Horse Farm Preservation Program?

Yes No

IF NO —————→ *Please go to Section D*

IF YES, what would be the largest annual tax increase you would be willing to tolerate to fund the improvement of existing services that would have otherwise been provided by residential and commercial development of horse farm land?

\$5 \$15 \$30 \$50 \$80 \$135 \$200

In "Section C continued", respondents were presented with nine statements reflecting why they would be willing to tolerate an annual tax increase to preserve horse farm land. In Section D, respondents were presented with eight statements reflecting why they would not be willing to tolerate an annual tax increase to preserve horse farm land. In both sections, instead of asking respondents to only select one statement, respondents were asked to rank the top three statements which best reflect their reasoning for supporting or not supporting the proposed program and tax increase. In the focus group, participants found it difficult to only choose one statement which most accurately represented their stance; as a result, we chose to use the ranking system which allowed respondents to decide which statements were the most accurate and least accurate to them.

Figure 3.4 Choice Statements

Section C continued (Complete only if Option 1 in Section B was selected and you selected YES)

Please **SELECT THE THREE STATEMENTS** which most accurately reflect why you would be willing to tolerate an annual tax increase to preserve horse farm land.

Most Accurate _____ Second Most Accurate _____ Third Most Accurate _____

| Statement |
|--|
| A. "Horses are a signature part of Kentucky's culture, heritage, and history." |
| B. "I value the race meets, horse shows, and equine sales that the horse industry brings to Kentucky." |
| C. "The horse industry has a positive impact on the Kentucky economy." |
| D. "Horse farms make Kentucky a nicer, more beautiful place to live." |
| E. "The horse industry is in danger of disappearing from Kentucky, and we need to preserve it." |
| F. "Horse farm owners are struggling financially and need assistance from government programs." |
| G. "I am employed in the horse industry and would like to see the industry preserved." |
| H. "A reduction in the horse industry would have a negative impact on the Kentucky economy." |
| I. "The horse industry is a unique part of Kentucky's culture and draws tourists." |

Section D (Complete only if Option 2 was selected in Section B or if you selected NO in Section C)

Please **SELECT THE THREE STATEMENTS** which most accurately reflect why you would not be in favor of the implementation of the Horse Farm Preservation Program.

Most Accurate _____ Second Most Accurate _____ Third Most Accurate _____

| Statement |
|---|
| J. "Horse farms should not receive subsidies, grants, or any form of government funding." |
| K. "I do not care about the horse industry." |
| L. "I care about the horse industry, but I should not have to pay to preserve it." |
| M. "If the horse industry is declining, then the state should not intervene and let market forces work." |
| N. "Horse farm owners are well off financially and do not need money from government programs." |
| O. "Horse farms have a negative impact on the economy." |
| P. "The horse industry is not in danger of disappearing from Kentucky; we do not need a Horse Farm Preservation Program." |
| Q. "I care about horse farms and think they should be preserved; however, financial resources are scarce right now." |

In Section E respondents were asked a question regarding the likeliness of the survey to affect future equine policy in the state; the question was employed to measure respondents' perceived consequentiality of the survey and their own responses. Respondents were also asked to provide standard demographic information such as age, gender, household income, number of children in the household and educational attainment level. Due to the nature of the survey, several questions regarding the respondent's lifestyle or exposure to the equine industry were asked, including whether the respondent was employed in the equine industry, if the respondent had owned a horse in the last five years, if the respondent lived on a horse farm, and if the respondent had attended an equine event in the last year and if yes, what type of event. The entire survey is provided in Appendix A.

3.2 Choice Models

The data collected from the survey were used to estimate the effect of different factors on respondent's willingness to support the preservation of horse farm land and respondent's WTP for the preservation of horse farm land.

3.2.1 Dichotomous Choice

The logit model, estimated using the maximum likelihood method, was used to estimate the effect of different factors on the willingness to support the implementation of the horse farm preservation program. The general form for the logit model is

$$p = \text{pr} [y=1|x] = F(x\beta),$$

where the dependent variable has a binary outcome. In this case, $y = 0$ if the respondent does not support the implementation of the horse farm preservation program and $y = 1$ if the respondent supports the implementation of the horse farm preservation program. The probability of a respondent supporting the implementation of the horse farm preservation program is a function of the independent variables included in the choice model.

The functional form of the logit model is:

$$F(x\beta) = \frac{\exp(x\beta)}{1+\exp(x\beta)} = \Lambda(x\beta)$$

where the sign of the resulting coefficients can be interpreted as more or less likely to affect the outcome, or in this case, more or less likely to affect respondents' willingness to support the implementation of the horse farm preservation program. The marginal effects are calculated by taking the derivative of the functional form equation with respect to the variable of choice, x_i :

$$\frac{\partial p}{\partial x_i} = \Lambda(x\beta)[1 - \Lambda(x\beta)]\beta_i = \frac{\exp(x\beta)}{(1+\exp(x\beta))^2} \beta_i.$$

where the index i refers to the i^{th} independent variable included in the choice model. Marginal effects tell the magnitude of the change in the outcome with a one unit change in the specified independent variable. The marginal effects for this study are reported as average marginal effects. Average marginal effects are estimated as the average of the individual marginal effects and yield results that are similar if not almost identical to the marginal effects taken at the mean.

$$\frac{\partial p}{\partial x_i} = \frac{\Sigma F'(x\beta)}{n} \beta_i$$

Positive marginal effects suggest that an increase in an independent variable increases the likelihood of the respondent supporting the implementation of the horse farm preservation program. Similarly, negative marginal effects indicate that an increase in an independent variable decreases the likelihood of the respondent supporting the implementation of the horse farm preservation program.

3.2.2 Payment Card

The OLS model was initially used to estimate the effects of different factors on respondent's WTP for the preservation of horse farm land. The OLS model is a linear regression model whose functional form is expressed as:

$$y_i = x_i\beta + e_i \quad i = 1, 2, \dots, n$$

The linear regression model explains how y_i , a vector of dependent variable values, is related to x_i , a matrix of independent variable values, and β , the vector of unknown parameters to be estimated. The error term e is distributed by the standard logistic distribution.

When utilizing the payment card method, it is important to note that the respondent's true willingness to pay may not be the value selected on the payment card by the respondent. The respondent's true willingness to pay may lie between the selected value and the next available option. For example, the true willingness to pay for a respondent, who stated they would be willing to tolerate an annual tax increase of \$5 would be no less than \$5 but less than the next available value of \$15. One way of handling these intervals is to use the midpoint of these two values as approximations of the true values; the midpoints can then be used as the dependent variable in an OLS regression. A concern or drawback of the "midpoint method" is that it may result in a "biased average valuation or biased regression coefficients" (Cameron and Huppert, 1989).

The dependent variable (the WTP for the preservation of horse farm land) has a lower limit of "0" which corresponds to respondents who supported the implementation of the horse farm preservation program when it was "free" but not when an annual tax was associated with it. The WTP of these respondents may range from a negative dollar amount to five dollars. The true willingness to pay of respondents who selected \$200 is unknown. Therefore, a model that can account for the existence of a lower limit and an upper limit in the data is needed. The Tobit model is a censored normal regression model with such capabilities.

$$y_i^* = x_i\beta + e_i \quad i = 1, 2, \dots, n$$

In the Tobit model, β is a $K \times 1$ column vector of unknown parameters, x_i is an $n \times K$ matrix of explanatory variable values, and ε_i are residuals that are independently and normally distributed with zero mean and a common variance σ^2 (Fahs et al, 2001).

The dependent variable (WTP for preservation of horse farm land) is censored from below at zero and censored from above at 200.

The likelihood function for the tobit model is:

$$L = \prod_{y_i=0} [1 - F\left(\frac{x_i\beta}{\sigma}\right)] \prod_{y_i>0} [\sigma^{-1}f\left(\frac{y_i - x_i\beta}{\sigma}\right)]$$

where F and f are the cumulative distribution and the cumulative density functions of the standard normal distributions, respectively.

There are three types of marginal effects which may be measured for the tobit model:

- a.) Marginal effects for the latent variable

b.) Marginal effects for the truncated sample

c.) Marginal effects for the censored sample.

3.3 Hypotheses

We have formulated several hypotheses regarding the factors that may affect the respondent's WTP for the preservation of horse farm land (the horse industry). The hypotheses are presented below.

- 1) Previous exposure to and knowledge of the equine industry will have positive impact on respondents' willingness to support the preservation of horse farm land and their WTP for the preservation of horse farm land.
- 2) Respondents' beliefs and perceptions of the horse industry have an impact on their decision to support the preservation of horse farm land and also their WTP.
 - a. If the respondent believes the horse industry has a positive impact on the community, he/she will be willing to pay more to preserve horse farm land.
 - b. If the respondent believes the horse industry contributes positively to the local economy, he/she will be willing to pay more to preserve horse farm land.
 - c. If the respondent believes the horse industry is an integral part of Kentucky's culture, heritage, and history, he/she will be willing to pay more to preserve horse farm land.
- 3) Respondents' involvement in the equine industry has an impact on their willingness to support the preservation of horse farm land and their WTP for the preservation of horse farm land.
 - a. If the respondent has owned a horse in the last 5 years, they are more likely to support the preservation of horse farm land and would be more likely to be willing to pay to help preserve it.
 - b. If the respondent has attended an equine event in the last year, they are more likely to support the preservation of horse farm land and would be more likely to be willing to pay to help preserve it.
 - c. If the respondent was employed in the horse industry, they are more likely to support the preservation of horse farm land and would be more likely to be willing to pay to help preserve it.
 - d. If the respondent resides on a horse farm, they are more likely to support the preservation of horse farm land and would be more likely to be willing to pay to help preserve it.
- 4) Demographic characteristics will have an impact on respondents' willingness to support the preservation of horse farm land and their WTP for the preservation of horse farm land. Consumers who have a higher income, higher level of educational attainment, and reside in a Bluegrass county will be willing to pay a higher annual tax to preserve horse farm land.
- 5) Respondents' perceived consequentiality of the survey will impact their decision to support the preservation of horse farm land and their WTP for the preservation of horse farm land.
 - a. If the respondent believes the survey is very likely to affect future policy, they are more likely to support the horse farm preservation.
 - b. If the respondent believes the survey is somewhat likely to affect future policy, they are more likely to support the horse farm preservation.

Chapter 4: Data Description

Section one of Chapter 4 presents a description of variables and a comparison of the sample to the state population. Section 2 presents descriptive statistics of the sample.

4.1 Description of Variables and Demographic Characteristics of the Representative Sample

Descriptive statistics for the survey sample are reported in Table 4.1 along with comparisons to the 2012 American Community Survey (U.S. Census Bureau, 2012.) Examination of the results suggests that our sample under-represented male residents and over-represented female residents rather equally in both Bluegrass and Non-bluegrass counties. The sample failed to accurately represent the age distribution of Kentucky's population. Respondents in the youngest age category of the sample were highly under-represented in both Bluegrass and Non-bluegrass counties while respondents in the three older age categories were over-represented in the sample. Respondents in the 25-44 age category are most closely represented by the sample. The sample's average education is slightly higher than the Kentucky state average. Breaking the average down into five levels of educational attainment, respondents who have an education level of high school and lower were highly under-represented in the sample, and respondents with a higher educational attainment were over-represented in the sample. This may be explained by the distribution of the survey. The first round of the survey was distributed to Fayette and the seven surrounding counties; these eight bluegrass counties received approximately 75% of the total surveys distributed. Approximately 51% of the first round surveys were distributed to Fayette County, an urban area populated by more than five institutes for higher education; Fayette County received approximately 38% of the total surveys distributed throughout the state of Kentucky. Due to the nature of the income intervals employed in the survey, it is difficult to accurately compare the sample income characteristics to that of the state of Kentucky; this said, respondents with income levels less than \$20,000 appear to be slightly underrepresented in the sample. Still, we judge the sample to be a reasonable representation of the population of the state of Kentucky.

| Table 4.1 Demographic Characteristics of the Representative Sample | | | | | |
|---|-----------|---------------|-----------|-----------------|-------------------|
| Variable | Bluegrass | Non-Bluegrass | Sample | Kentucky State | |
| % Male | 40.61% | 40.91% | 40.76% | 49.20% | |
| % Female | 59.39% | 59.09% | 59.24% | 50.80% | |
| Age | | | | 38.4 yrs | |
| 18 - 24 years old | 1.95% | 1% | 1.48% | 8.60% | |
| 25 - 44 years old | 37.09% | 19% | 28.05% | 25.79% | |
| 45 - 64 years old | 40.66% | 54.50% | 47.58% | 27.22% | |
| 65 years or older | 20.30% | 25.50% | 22.90% | 14.01% | |
| Average Education | 15.68 yrs | 15.13 yrs | 15.41 yrs | 13.14 yrs | |
| Some high school or less | 1.30% | 3.02% | 1.50% | 16.06% | |
| High School graduate | 10.65% | 14.07% | 11.04% | 34.24% | |
| Some college or trade school | 25.19% | 35.18% | 26.34% | 29.86% | |
| Bachelor's degree | 28.38% | 19.10% | 27.31% | 12.17% | |
| Some graduate or graduate degree | 34.48% | 28.64% | 33.81% | 8.90% | |
| Average Number in Household | 2.61 | 2.54 | 2.58 | 2.49 | |
| Annual Household Income | | | | \$56,738 (mean) | \$41,724 (median) |
| Less than \$20,000 | 6.40% | 9.19% | 7.80% | | |
| \$20,000-\$40,000 | 14.26% | 18.38% | 16.32% | | |
| \$40,001 - \$60,000 | 17.25% | 18.38% | 17.82% | | |
| \$60,001 - \$80,000 | 16.34% | 17.30% | 16.82% | | |
| \$80,001 - \$100,000 | 14.88% | 9.73% | 12.31% | | |
| \$100,001 - \$120,000 | 11.13% | 10.81% | 10.97% | | |
| Greater than \$120,000 | 19.75% | 16.22% | 17.99% | | |
| <p><i>Note 1: State population statistics on gender, age, education and average number in household are based on the 1- year estimates of the 2012 American Community Survey (U.S. Census Bureau)</i></p> <p><i>Note 2: State statistic on average education is based on 5-years estimates from the 2007-2011 American Community Survey (U.S. Census Bureau)</i></p> <p><i>Note 3: Based upon the income ranges chosen, there are no comparative data for the state of Kentucky</i></p> | | | | | |

| Table 4.2 Description of Variables | |
|---|---|
| Variable | Definition |
| L15 | Dummy variable: L15 = 1 if the survey predicted a 15% decrease in the size of the equine industry. |
| L30 | Dummy variable: L30 = 1 if the survey predicted a 30% decrease in the size of the equine industry. |
| L45 | Dummy variable: L45 = 1 if the survey predicted a 45% decrease in the size of the equine industry. |
| L60 | Dummy variable: L60 = 1 if the survey predicted a 60% decrease in the size of the equine industry. |
| Likeliness | |
| - likeliness1 | Factor variable: Respondent answered it is very likely the survey will shape the direction of future policy for Kentucky's equine industry. |
| - likeliness2 | Factor variable: Respondent answered it is somewhat likely the survey will shape the direction of future policy for Kentucky's equine industry. |
| - likeliness4 | Factor variable: Respondent answered it is unlikely the survey will shape the direction of future policy for Kentucky's equine industry. |
| - likeliness5 | Factor variable: Respondent answered "I don't know" if the survey will shape the direction of future policy for Kentucky's equine industry. |
| aesthetics | Factor analysis: Includes attitude statements 1, 3, 4, 7, and 8. |
| industry | Factor analysis: Includes attitude statements 5 and 6. |
| gender | Dummy variable: male=1. |
| Age | |
| - age1 | Factor variable: Respondent's age falls between 18-24 years old. |
| - age2 | Factor variable: Respondent's age falls between 25-44 years old. |
| - age3 | Factor variable: Respondent's age falls between 45-64 years old. |
| - age4 | Factor variable: Respondent's age is 65 years or older. |
| AVEducation | Continuous variable: Average number of years of education. |
| Income | |
| - income1 | Factor variable: Respondent's annual income is less than \$20,000. |
| - income2 | Factor variable: Respondent's annual income falls between \$20,000 - \$40,000. |
| - income3 | Factor variable: Respondent's annual income falls between \$40,001 - \$60,000. |
| - income4 | Factor variable: Respondent's annual income falls between \$60,001 - \$80,000. |
| - income5 | Factor variable: Respondent's annual income falls between \$80,001 - \$100,000. |
| - income6 | Factor variable: Respondent's annual income falls between \$100,001 - \$120,000. |
| - income7 | Factor variable: Respondent's annual income is greater than \$120,000. |
| household | Continuous variable: Number of individuals currently living in the household. |

| Table 4.2 (continued) | |
|--|---|
| proximity | Continuous variable: Approximate distance in miles to the nearest horse farm from respondent's current residence. |
| history | Dummy variable: history = 1 if someone in the respondent's household had owned a horse in the last 5 years. |
| employment | Dummy variable: employment = 1 if the respondent is currently employed in the horse industry. |
| event | Dummy variable: event = 1 if the respondent has attended an equine event in the last year. |
| BG | Dummy variable: BG = 1 if the respondent lives in a Bluegrass county. |
| popdensity | Continuous variable: 2010 population density (number/ sq miles). ¹ |
| numhorses | Continuous variable: Number of horses in the county in 2012. ² |
| <p><i>Note 1: Population density statistics are based on population density estimates of the 2010 U.S. Census (U.S. Census Bureau)</i></p> <p><i>Note 2: County statistics of the number of horses is derived from the 2012 KY Equine Survey NASS Data</i></p> | |

| Variable | Unit | Mean | Stand. Dev. | Min | Max |
|--|--------------|-------|-------------|-----|-----|
| Area | Category | 1.11 | 0.32 | 1 | 2 |
| Mailing | Category | 1.33 | 0.47 | 1 | 2 |
| Version | Category | 2.54 | 1.12 | 1 | 4 |
| Color | Category | 2.23 | 1.54 | 1 | 6 |
| I think horses are nice to look at... | Likert Scale | 4.75 | 0.59 | 1 | 6 |
| I think the number of horse farms in Kentucky is declining... | Likert Scale | 4.47 | 1.12 | 1 | 6 |
| I think that horse farms make Kentucky a nicer place to live... | Likert Scale | 4.5 | 0.81 | 1 | 6 |
| I would like to live near a horse farm... | Likert Scale | 4.05 | 1.04 | 1 | 6 |
| I think land currently used for horse farms is needed for other uses... | Likert Scale | 2.01 | 1.19 | 1 | 6 |
| I think operating horse farms is less profitable now than 10 years ago... | Likert Scale | 4.45 | 1.28 | 1 | 6 |
| I think the horse industry helps local economies... | Likert Scale | 4.35 | 0.88 | 1 | 6 |
| I would like to see the Kentucky horse industry remain the same size... | Likert Scale | 3.87 | 1.16 | 1 | 6 |
| Would you support the implementation of a horse farm preservation program to prevent a decrease in the size of the equine industry if Kentucky residents did not have to pay for it? | Yes/No | 0.87 | 0.33 | 0 | 1 |
| Would you still be in favor of the Horse Farm Preservation Program if the state raised income taxes to improve of existing services? | Yes/No | 0.82 | 0.38 | 0 | 1 |
| Willingness to pay for Horse Farm Preservation Program | dollars | 71.75 | 68.26 | 5 | 200 |
| Most accurate statement reflecting why the respondent would be willing to tolerate an annual tax to preserve horse farm land. | Category | 3.31 | 2.91 | 1 | 9 |
| Second most accurate statement reflecting why the respondent would be willing to tolerate an annual tax to preserve horse farm land. | Category | 4.84 | 2.92 | 1 | 9 |
| Third most accurate statement reflecting why the respondent would be willing to tolerate an annual tax to preserve horse farm land. | Category | 5.37 | 2.98 | 1 | 9 |
| First most accurate statement reflecting why the respondent would not be willing to tolerate an annual tax to preserve horse farm land. | Category | 3.94 | 2.68 | 1 | 8 |

| Table 4.3 (continued) | | | | | |
|--|--------------|-------|-------|---|-----|
| Second most accurate statement reflecting why the respondent would not be willing to tolerate an annual tax to preserve horse farm land. | Category | 4.23 | 2.19 | 1 | 8 |
| Third most accurate statement reflecting why the respondent would not be willing to tolerate an annual tax to preserve horse farm land. | Category | 4.49 | 2.36 | 1 | 8 |
| Likelihood of the results to shape the direction of future policy for Kentucky's equine industry. | Likert Scale | 2.88 | 0.89 | 1 | 4 |
| County | Category | 7.63 | 11.38 | 1 | 76 |
| Live on a horse farm/horse operation | Yes/No | 0.03 | 0.18 | 0 | 1 |
| Approximate distance to the nearest horse farm/horse operation from current residence | Miles | 21.57 | 35.75 | 0 | 250 |
| Owned a horse in the last five years | Yes/No | 0.16 | 0.37 | 0 | 1 |
| Number of adults in the household over the age of 18 | Quantity | 2.6 | 1.27 | 1 | 12 |
| Number of children in the household under the age of 18 | Quantity | 0.64 | 0.99 | 0 | 8 |
| Income | Category | 4.28 | 1.9 | 1 | 7 |
| Currently employed in the horse industry | Yes/No | 0.05 | 0.21 | 0 | 1 |
| Attended an equine event in the last year | Yes/No | 0.55 | 0.5 | 0 | 1 |
| Attended a horseshow in the last year | Yes/No | 0.2 | 0.4 | 0 | 1 |
| Attended a race meet in the last year | Yes/No | 0.43 | 0.49 | 0 | 1 |
| Attended an equine sale in the last year | Yes/No | 0.08 | 0.27 | 0 | 1 |
| Attended an equine educational event in the last year | Yes/No | 0.05 | 0.23 | 0 | 1 |
| Attended another type of equine event | Yes/No | 0.05 | 0.22 | 0 | 1 |
| Age | Category | 2.82 | 0.78 | 1 | 4 |
| Education | Category | 3.81 | 1.07 | 1 | 5 |
| Male | Yes/No | 0.41 | 0.49 | 0 | 1 |

4.2 Descriptive Statistics

The average age of the sample is 51 years old and the average household income is \$66,675. Education levels ranged from high school education to graduate and/or professional degrees; the average number of years for education was 15.14 years. Respondents were asked about their history or involvement in the horse industry: 5% of respondents were currently employed in the horse industry, 55% of respondents had attended an equine event in the last year, 16% of respondents had owned a horse in the last five years, and 3% of respondents currently resided on a horse farm or horse operation. Respondents who did not reside on a horse farm or horse operation self-reported that they lived approximately 22 miles from the closest horse farm or

horse operation in their area of the state. The survey sampled residents from urban, suburban, and rural areas of the bluegrass and non-bluegrass regions.

Additional details of the sample are presented in Table 4.4, Table 4.5, and Table 4.6. Table 4.4 contains percent frequencies describing respondents' attitudes/preferences towards the equine industry. Most respondents displayed a positive attitude towards the equine industry, agreeing that horse farms make Kentucky a nicer place to live and add value to the area aesthetically and economically. More than 60% of respondents recognized that the equine industry has decreased in size in recent years; respondents agreed they would like to see the equine industry either remain the same or grow in size.

Table 4.5 contains percent frequencies describing respondents' willingness to pay for horse farm land preservation. The annual tax increases ranged from \$5 to \$200 and, on average, respondents were willing to pay \$71.75 to support the implementation of the horse farm preservation program to preserve horse farm land.

Table 4.6 and Table 4.7 contain percent frequencies pertaining to respondents' reasoning for and against the implementation of a horse farm preservation program to preserve horse farm land. Respondents were asked to rank the top three reasons for why they would or would not support the implementation of the horse farm preservation program. Support for the hypothetical program centered on Kentucky's unique culture and history which directly involves the equine industry. Many respondents who did not support the hypothetical program stated they did care about the horse industry; however, they did not think horse farms should be regulated or funded by the government or they felt their own financial resources were too scarce to contribute.

Table 4.8 presents the percent frequencies describing the consequentiality measure employed. Respondents were asked how likely they thought it would be that the results of the survey would shape the future direction of policy for Kentucky's equine industry. Interestingly, there was not a significant difference between the number of respondents who thought it was somewhat likely (32.43%), unlikely (33.53%), or did not know (29.48%) if future equine policy in Kentucky would be shaped by the survey.

| Table 4.4 Percent Frequencies of Respondent's Attitude Towards the Equine Industry | | |
|---|-----------|-------------------|
| Attitude Statement | Frequency | Percent Frequency |
| I think horse farms are nice to look at... | | |
| Agree | 1698 | 97.08 |
| Disagree | 18 | 1.03 |
| Neutral/Do not know | 33 | 1.89 |
| I think the number of horse farms in Kentucky is declining... | | |
| Agree | 1083 | 61.82 |
| Disagree | 79 | 4.51 |
| Neutral/ Do not know | 590 | 33.68 |
| I think that horse farms make Kentucky a nicer place to live... | | |
| Agree | 1543 | 88.73 |
| Disagree | 50 | 2.88 |
| Neutral/ Do not know | 146 | 8.40 |
| I would like to live near a horse farm... | | |
| Agree | 1181 | 67.83 |
| Disagree | 116 | 6.66 |
| Neutral/ Do not know | 444 | 25.50 |
| I think land currently used for horse farms is needed for other uses... | | |
| Agree | 86 | 4.93 |
| Disagree | 1364 | 78.17 |
| Neutral/ Do not know | 295 | 16.91 |
| I think operating horse farms is less profitable now than 10 years ago... | | |
| Agree | 873 | 50.00 |
| Disagree | 118 | 6.76 |
| Neutral/ Do not know | 755 | 43.24 |
| I think the horse industry helps local economies... | | |
| Agree | 1482 | 85.17 |
| Disagree | 71 | 4.08 |
| Neutral/ Do not know | 187 | 10.75 |
| I would like to see the Kentucky horse industry remain the same size... | | |
| Agree | 999 | 57.31 |
| Disagree | 217 | 12.45 |
| Neutral/ Do not know | 527 | 30.13 |

| Tax Amount | Bluegrass Residents | | Non-Bluegrass Residents | | Kentucky Residents | |
|------------|---------------------|-------------------|-------------------------|-------------------|--------------------|-------------------|
| | Frequency | Percent Frequency | Frequency | Percent Frequency | Frequency | Percent Frequency |
| \$5 | 152 | 14.55 | 25 | 18.94 | 177 | 15.04 |
| \$15 | 136 | 13.01 | 21 | 15.91 | 157 | 13.34 |
| \$30 | 119 | 11.39 | 23 | 17.42 | 142 | 12.06 |
| \$50 | 257 | 24.59 | 38 | 28.79 | 295 | 25.06 |
| \$80 | 106 | 10.14 | 9 | 6.82 | 115 | 9.77 |
| \$135 | 76 | 7.27 | 4 | 3.03 | 80 | 6.80 |
| \$200 | 199 | 19.04 | 12 | 9.09 | 211 | 17.93 |

| Statement | Frequency | Percent Frequency |
|---|-----------|-------------------|
| “Horses are a signature part of Kentucky’s culture, heritage, and history.” | 914 | 25.87 |
| “I value the race meets, horse shows, and equine sales that the horse industry brings to Kentucky.” | 220 | 6.23 |
| “The horse industry has a positive impact on the Kentucky economy.” | 502 | 14.21 |
| “Horse farms make Kentucky a nicer, more beautiful place to live.” | 491 | 13.90 |
| “The horse industry is in danger of disappearing from Kentucky, and we need to preserve it.” | 250 | 7.08 |
| “Horse farm owners are struggling financially and need assistance from government programs.” | 63 | 1.78 |
| “I am employed in the horse industry and would like to see the industry preserved.” | 31 | 0.88 |
| “A reduction in the horse industry would have a negative impact on the Kentucky economy.” | 315 | 8.92 |
| “The horse industry is a unique part of Kentucky’s culture and draws tourists.” | 747 | 21.14 |

| Table 4.7 Percent Frequencies of Respondent's Reasons for Not Supporting a Horse Farm Preservation Program | | |
|--|-----------|-------------------|
| Statement | Frequency | Percent Frequency |
| “Horse farms should not receive subsidies, grants, or any form of government funding.” | 270 | 19.90 |
| “I do not care about the horse industry.” | 24 | 1.77 |
| “I care about the horse industry, but I should not have to pay to preserve it.” | 344 | 25.35 |
| “If the horse industry is declining, then the state should not intervene and let market forces work.” | 203 | 14.96 |
| “Horse farm owners are well off financially and do not need money from government programs.” | 155 | 11.42 |
| “Horse farms have a negative impact on the economy.” | 9 | 0.66 |
| “The horse industry is not in danger of disappearing from Kentucky; we do not need a Horse Farm Preservation Program.” | 89 | 6.56 |
| “I care about horse farms and think they should be preserved; however, financial resources are scarce right now.” | 263 | 19.38 |

| Table 4.8 Percent Frequencies of Consequentiality Measure | | | | | | |
|--|-----------|-------------------|---------------|-------------------|-----------|-------------------|
| | Bluegrass | | Non-Bluegrass | | Total | |
| | Frequency | Percent Frequency | Frequency | Percent Frequency | Frequency | Percent Frequency |
| Very Likely | 69 | 4.50 | 10 | 5.10 | 79 | 4.57 |
| Somewhat Likely | 490 | 31.96 | 71 | 36.22 | 561 | 32.43 |
| Unlikely | 516 | 33.66 | 63 | 32.14 | 580 | 33.53 |
| I don't know | 458 | 29.88 | 52 | 26.53 | 510 | 29.48 |

Chapter 5: Empirical Results

The survey results and data analysis are presented in this chapter in three parts. Section 5.1 discusses the variables and the hypotheses. Section 5.2 provides a discussion of Kentucky residents' willingness to support the preservation of horse farm land when the consumer does not have to bear the cost and Kentucky residents' willingness to pay for the preservation of horse farm land. Section 5.3 describes Fayette County residents' willingness to support the preservation of horse farm land when the consumer does not have to bear the cost and Fayette County residents' willingness to pay for the preservation of horse farm land.

5.1 Variables and Hypotheses

Table 5.1 presents the variables included in the choice model and their corresponding hypotheses for preservation of horse farm land.

| Table 5.1 Variables representing hypotheses about respondent's WTP to preserve horse farm land | |
|---|---------------|
| Variable | Expected Sign |
| Demographic Factors | |
| Gender | ? |
| Average Education | + |
| Household | - |
| Age | |
| 25 - 44 years old | ? |
| 45 - 64 years old | ? |
| 65 years or older | ? |
| Income | |
| \$20,000 - \$40,000 | + |
| \$40,001 - \$60,000 | + |
| \$60,001 - \$80,000 | + |
| \$80,001 - \$100,000 | + |
| \$100,001 - \$120,000 | + |
| Greater than \$120,000 | + |
| Knowledge of Equine Industry | |
| Aesthetics | + |
| Industry | - |
| History | + |
| Employment | + |
| Event | + |
| Lifestyle Characteristics | |
| Proximity | - |
| Bluegrass County | + |
| Population Density | - |

| Table 5.1 (continued) | |
|------------------------------|---|
| Number of Horses | + |
| Hypothetical | |
| Loss in Equine industry | |
| 30% Loss | + |
| 45% Loss | + |
| 60% Loss | + |
| Policy Implication | |
| Very Likely | + |
| Somewhat Likely | + |
| I don't know | - |

5.2 Kentucky Residents Analysis

5.2.1 Willingness to Support the Preservation of Horse Farm Land

The coefficients, standard error, z-value and marginal effects of different factors affecting willingness to support the preservation of horse farm land are presented in Table 5.2. Among the demographic characteristics, the variables male, average education and the income level \$60,001 - \$80,000 are significant. Males are 66.04% less likely to support the preservation of horse farm land even when consumers do not bear the financial cost. With every additional year of education, an individual is willing to pay 0.87% less for the preservation of horse farm land when consumers do not bear the financial cost of the program. An interesting finding is the significance of the income level \$60,001- \$80,000; respondents whose household income lies in this range are 6.26% less likely to support the preservation of a horse farm preservation program. Respondents in this income category do not behave “normally.” The coefficient for each income category, while not significant, becomes increasingly more negative as income increases to the significant level of \$60,001 - \$80,000; however, the coefficients of the income levels beyond the significant income level, become slightly less negative (but not significant) before becoming increasingly negative again. An explanation may be the possible presence of hypothetical bias or sample selection bias.

Among variables pertaining to the individual’s knowledge of and exposure to the equine industry, aesthetics, history, and having recently attended an event are significant. Individuals who believe the equine industry provides positive benefits to Kentucky are 31.14% more likely to support the proposed horse farm preservation program. Individuals who have owned a horse in the last five years are 6.32% more likely to support the horse farm preservation program. Individuals who attended an equine event in the last year are 2.97% more likely to support the preservation of horse farm land. The signs of these three variables suggest that an increased knowledge and exposure to Kentucky’s equine is positively correlated with a respondent’s likeliness to help preserve the equine industry at its present state.

Lifestyle characteristics associated with respondents proved to be insignificant; however, five hypothetical factors pertaining to the survey are significant and include the proposed loss of 45%, the proposed loss of 60%, and the likeliness of the policy outcome. The proposed loss in the equine industry is positively correlated with support for the horse farm land preservation program. Individuals whose survey projected a 45% loss in the size of the equine industry are 3.5% more likely to support the horse farm preservation program, while individuals whose survey

projected a 60% loss in the size of the equine industry are 6.62% more likely to support the horse farm preservation program. We expect support for the preservation program to increase as the projected loss in size of the equine industry increases; many respondents' stated they believed that the equine industry was an integral component of Kentucky's culture and economy that they would not like to see diminish in size. If the individual's belief is that the survey is very likely to affect future policy, they are 16.82% more likely to support the horse farm preservation program, and individuals who believe the survey is somewhat likely to affect future policy are 9.32% more likely to support the horse farm preservation. Individuals who were not certain or did not know how the survey would affect future policy were only 4.96% more likely to support the horse farm preservation program.

| Variable | Logistic Regression | | | Average Marginal Effects | | |
|-------------------------------------|---------------------|----------------|----------|--------------------------|----------------|---------|
| | Coeff. | Standard Error | z-value | Coeff. | Standard Error | z-value |
| constant | 0.7402 | 1.3806 | 0.54 | --- | --- | --- |
| Demographic Factors | | | | | | |
| Male | -0.9473 | 0.2183 | -4.34*** | -0.6604 | 0.0151 | -4.39 |
| Average Education | -0.1255 | 0.0586 | -2.14** | -0.0087 | 0.0041 | -2.14 |
| Household | -0.1305 | 0.0938 | -1.39 | -0.0091 | 0.0065 | -1.39 |
| Age | | | | | | |
| 25 - 44 years old | 0.8816 | 0.8530 | 1.03 | 0.0670 | 0.0784 | 0.85 |
| 45 - 64 years old | 0.4011 | 0.8558 | 0.47 | 0.0341 | 0.0792 | 0.43 |
| 65 years or older | 0.4183 | 0.8767 | 0.48 | 0.0355 | 0.0805 | 0.44 |
| Income | | | | | | |
| \$20,000 - \$40,000 | -0.6403 | 0.6026 | -1.06 | -0.0355 | 0.0320 | -1.11 |
| \$40,001 - \$60,000 | -0.7578 | 0.5614 | -1.35 | -0.0434 | 0.0288 | -1.51 |
| \$60,001 - \$80,000 | -1.0161 | 0.5594 | -1.82* | -0.0626 | 0.0299 | -2.10 |
| \$80,001 - \$100,000 | -0.7881 | 0.5781 | -1.36 | -0.0456 | 0.0303 | -1.50 |
| \$100,001 - \$120,000 | -0.8332 | 0.6023 | -1.38 | -0.0488 | 0.0326 | -1.50 |
| Greater than \$120,000 | -0.7002 | 0.5837 | -1.20 | -0.0395 | 0.0298 | -1.32 |
| Knowledge of Equine Industry | | | | | | |
| Aesthetics | 4.4667 | 0.4222 | 10.58*** | 0.3114 | 0.0260 | 11.99 |
| Industry | -0.6274 | 0.3869 | -1.62 | -0.0437 | 0.0269 | -1.63 |
| History | 0.9063 | 0.3895 | 2.33** | 0.0632 | 0.0271 | 2.33 |
| Employment | -0.2817 | 0.6016 | -0.47 | -0.0196 | 0.0419 | -0.47 |
| Event | 0.4258 | 0.2307 | 1.85* | 0.0297 | 0.0160 | 1.85 |

| Table 5.2 (continued) | | | | | | |
|--|---------|--------|---------|---------|--------|-------|
| Lifestyle Characteristics | | | | | | |
| Proximity | 0.0025 | 0.0033 | 0.75 | 0.0002 | 0.0002 | 0.75 |
| Bluegrass County | -0.1745 | 0.4716 | -0.37 | -0.0122 | 0.0329 | -0.37 |
| Population Density | 0.0000 | 0.0004 | 0.12 | 0.0000 | 0.0000 | 0.12 |
| Number of horses | 0.0000 | 0.0000 | 0.34 | 0.0000 | 0.0000 | 0.34 |
| Hypothetical | | | | | | |
| Loss in Equine industry | | | | | | |
| 30% Loss | 0.1127 | 0.2837 | 0.40 | 0.0079 | 0.0198 | 0.40 |
| 45% Loss | 0.5016 | 0.2830 | 1.77* | 0.0350 | 0.0197 | 1.78 |
| 60% Loss | 0.9492 | 0.3059 | 3.1*** | 0.0662 | 0.0212 | 3.12 |
| Policy Implication | | | | | | |
| Very Likely | 2.4132 | 1.0658 | 2.26** | 0.1682 | 0.0743 | 2.26 |
| Somewhat Likely | 1.3369 | 0.2902 | 4.61*** | 0.0932 | 0.0201 | 4.63 |
| I don't know | 0.7119 | 0.2472 | 2.88*** | 0.0496 | 0.0171 | 2.89 |
| *** significance on 1% level; ** significance on 5% level; * significance on 10% level | | | | | | |

5.2.2 Willingness to Pay for Horse Farm Land Preservation

The coefficients, standard error, and t-value of different factors of WTP for horse farm land preservation are presented in Table 5.3; results are reported for both the OLS regression and the Tobit regression. Six demographic variables are significant, including average education, all three age ranges, and the two highest income levels. With each additional year of education an individual is willing to pay an average of \$3.97 more to preserve horse farm land. Individuals between 25 – 44 years of age are willing to pay an average of \$42.26 more to preserve horse farm land. Individuals between 45-64 years of age are willing to pay an average of \$52.19 more to preserve horse farm land and individuals who are 65 years or older are willing to pay an average of \$59.68 more to preserve horse farm land. We may infer that older individuals place a higher value on horse farms and the land they occupy; this may be explained by an older individual's exposure to the equine industry and the benefits it provides to the community. Respondents with an income between \$100,001 - \$120,000 are willing to pay an average of \$30.67 more to preserve horse farm land and respondents with an income greater than \$120,000 are willing to pay an average of \$59.50 more to preserve horse farm land.

An individual's knowledge of and exposure to the equine industry prove to be a significant factor affecting his/her willingness to pay; significant variables include aesthetics, history, employment, and event. People who have attended an equine event in the last year, owned a horse in the last five years, or are employed in the equine industry share a stake in horse industry and enjoy the benefits it provides. A decline in the size of the equine industry could negatively affect the well-being of these individuals; as a result, their willingness to pay for horse farm preservation is positive. Individuals, who believe the equine industry provides benefits to Kentucky are willing to pay an additional \$73.36 to preserve horse farm land, while individuals who have owned a horse in the last five years are willing to pay an additional \$23.38. If an individual attended an

equine event in the last year, they are willing to pay \$10.13 more to preserve horse farm land and individuals who are employed in the equine industry are willing to pay an additional \$57.10.

One lifestyle characteristic, proximity, is significant; for each additional mile an individual lives from a horse farm, they are willing to pay \$0.14 less to preserve horse farm land. This may be explained by some individuals' preferences for urban living or due to reduced exposure to the environmental amenities horse farms provide.

| Table 5.3 Willingness to Pay for Horse Farm Land Preservation: OLS and Tobit Estimation Results | | | | | | |
|--|------------------------|----------------|---------|--------------------------|----------------|---------|
| | OLS Regression Results | | | Tobit Regression Results | | |
| Variable | Coefficient | Standard Error | t-value | Coefficient | Standard Error | t-value |
| constant | -92.4023 | 22.9713 | -4.02 | -156.6576 | 33.2698 | -4.71 |
| Demographic Factors | | | | | | |
| Male | -1.7717 | 3.8864 | -0.46 | -0.2878 | 5.4239 | -0.05 |
| Average Education | 3.1585 | 1.0271 | 3.08*** | 3.9668 | 1.4119 | 2.81*** |
| Household | -1.2056 | 1.5889 | -0.76 | -1.8188 | 2.1839 | -0.83 |
| Age | | | | | | |
| 25 - 44 years old | 25.5165 | 13.2784 | 1.92* | 42.2622 | 19.1871 | 2.2** |
| 45 - 64 years old | 33.4247 | 13.4232 | 2.49** | 52.1913 | 19.4001 | 2.69*** |
| 65 years or older | 39.8019 | 13.9275 | 2.86*** | 59.6810 | 20.0722 | 2.97*** |
| Income | | | | | | |
| \$20,000 - \$40,000 | -3.0249 | 8.9559 | -0.34 | -4.4567 | 12.5683 | -0.35 |
| \$40,001 - \$60,000 | -0.3178 | 9.0172 | -0.04 | -0.4325 | 12.5601 | -0.03 |
| \$60,001 - \$80,000 | 11.9457 | 9.1484 | 1.31 | 18.9386 | 12.7162 | 1.49 |
| \$80,001 - \$100,000 | 11.1240 | 9.6084 | 1.16 | 14.0896 | 13.3250 | 1.06 |
| \$100,001 - \$120,000 | 24.5053 | 10.0176 | 2.45** | 30.6710 | 13.8885 | 2.21** |
| Greater than \$120,000 | 42.8590 | 9.6904 | 4.42*** | 59.5035 | 13.4918 | 4.41*** |
| Knowledge of Equine Industry | | | | | | |
| Aesthetics | 50.3879 | 9.9157 | 5.08*** | 73.3593 | 14.3499 | 5.11*** |
| Industry | 4.4413 | 7.2142 | 0.62 | 4.7013 | 10.0807 | 0.47 |
| History | 13.9576 | 5.1903 | 2.69*** | 23.3833 | 7.1860 | 3.25*** |
| Employment | 39.4159 | 9.1402 | 4.31*** | 57.0690 | 12.7981 | 4.46*** |
| Event | 9.0932 | 4.2055 | 2.16** | 10.1307 | 5.8138 | 1.74* |

| | | | | | | |
|--|---------|--------|--------|---------|---------|--------|
| Lifestyle Characteristics | | | | | | |
| Proximity | -0.0849 | 0.0582 | -1.46 | -0.1407 | 0.0815 | -1.73* |
| Bluegrass County | 10.6679 | 8.0623 | 1.32 | 7.7074 | 11.6089 | 0.66 |
| Population Density | 0.0084 | 0.0074 | 1.14 | 0.0090 | 0.0101 | 0.89 |
| Number of Horses | 0.0003 | 0.0004 | 0.69 | 0.0005 | 0.0005 | 0.96 |
| Hypothetical Loss in Equine industry | | | | | | |
| 30% Loss | -5.7304 | 5.4189 | -1.06 | -5.5381 | 7.5158 | -0.74 |
| 45% Loss | -4.6836 | 5.3150 | -0.88 | -6.4930 | 7.3824 | -0.88 |
| 60% Loss | -2.2848 | 5.2250 | -0.44 | -0.4150 | 7.2491 | -0.06 |
| Policy Implication | | | | | | |
| Very Likely | 22.9292 | 9.1013 | 2.52** | 26.6665 | 12.2827 | 2.17** |
| Somewhat Likely | 9.9390 | 4.6302 | 2.15** | 8.0710 | 6.4613 | 1.25 |
| I don't know | 2.1186 | 4.7884 | 0.44 | 1.6864 | 6.7070 | 0.25 |
| *** significance on 1% level; ** significance on 5% level; * significance on 10% level | | | | | | |

5.3 Fayette County Residents Analysis

5.3.1 Willingness to Support the Preservation of Horse Farm Land

The coefficients, standard errors, z-values and marginal effects of different factors affecting residents of Fayette County's willingness to support the preservation of horse farm land are presented in Table 5.4. Among the demographic characteristics, the variables male and household are significant. Males residing in Fayette County are 7.35% less likely to support the horse farm preservation program. For each additional person living in a household, respondents are 1.61% less likely to support the horse farm preservation program.

Among variables pertaining to the individual's knowledge of the equine industry, aesthetics, history, and employment are significant. Fayette county residents who believe the equine industry provides positive benefits to Kentucky are 25.92% more likely to support the horse farm land preservation program. Individuals who have owned a horse in the last five years are 7.76% more likely to support the horse farm land preservation program and people who are employed in the equine industry are 0.02% more likely to support the horse farm land preservation program.

For Fayette County, surveys were distributed using addresses attained from the Fayette County PVA; the paper color of the survey was used to identify the housing quartile of the respondent's property value. Variables for each of the five housing quintiles are significant. If the respondent's property is valued in the range \$127,900 - \$160,000, the respondent is 5.1% more likely to support the horse farm preservation program. If the respondent's property is valued in the range \$160,000 - \$226,284, the respondent is 5.92% more likely to support the horse farm preservation program. If the respondent's property is valued in the range \$227,000 - \$906,100, the respondent is 6.19% more likely to support the horse farm preservation program. If the respondent's property is valued in the range \$942,301 - \$2,600,000, the respondent is 16.13% more likely to support the horse farm preservation program. Notice the increasingly positive magnitude between the property value and support of the horse farm preservation program. Housing quartiles may be

considered an alternative measure of “wealth” or household income. Notice that as “wealth” increases, support for horse farm preservation increases, this may be due to individuals’ knowledge of the horse industry, their own perceptions or exposure to the industry, the area of Fayette county individual’s live (proximity to hard farms) and their exposure to the rural environment horse farms create.

Three hypothetical factors pertaining to the survey are significant and include the proposed loss of 45%, the proposed loss of 60%, and one likeliness factor. Again we see the proposed loss in the equine industry is positively correlated with support for the horse farm land preservation program. Individuals’ whose survey projected a 45% loss in the size of the equine industry are 4.86% more likely to support the horse farm preservation program while individuals’ whose survey projected a 60% loss in the size of the equine industry are 11.65% more likely to support the horse farm preservation program. We expect support for the preservation program in Fayette County to increase as the projected loss in size of the equine industry increases due to residents’ high exposure to the industry and respondents’ belief that that the equine industry was an integral component of Kentucky’s culture and economy. If the individual’s belief is that the survey is somewhat likely to affect future policy, they are 8.24% more likely to support the horse farm preservation program. The coefficient of “very likely” is zero and the standard error, z-value, and marginal effects are omitted. In this regression, the variable “very likely” predicts success perfectly and was dropped from the regression; hence, the variable “very likely” is collinear with another explanatory variable. To remedy the issue of collinearity, the variable “very likely” is omitted.

Table 5.4 Factors Affecting Fayette County Resident's Willingness to Support Horse Farm Land Preservation: Model I A Logit Estimation

| Variable | Logit Regression | | | Marginal Effects | | |
|-------------------------------------|------------------|----------------|---------|------------------|----------------|---------|
| | Coeff. | Standard Error | z-value | Coeff. | Standard Error | z-value |
| constant | 1.2694 | 2.0929 | 0.61 | --- | --- | --- |
| Demographic Factors | | | | | | |
| Male | -1.0636 | 0.3235 | 3.29*** | -0.0735 | 0.0221 | -3.33 |
| Average Education | -0.1439 | 0.0980 | -1.47 | -0.0099 | 0.0068 | -1.47 |
| Household | -0.2333 | 0.1376 | -1.7* | -0.0161 | 0.0095 | -1.7 |
| Age | | | | | | |
| 25 - 44 years old | 1.2962 | 0.9209 | 1.41 | 0.1042 | 0.0949 | 1.1 |
| 45 - 64 years old | 0.4955 | 0.9340 | 0.53 | 0.0475 | 0.0975 | 0.49 |
| 65 years or older | 0.6286 | 0.9868 | 0.64 | 0.0586 | 0.1000 | 0.59 |
| Income | | | | | | |
| \$20,000 - \$40,000 | -0.9535 | 1.3339 | -0.71 | -0.0401 | 0.0506 | -0.79 |
| \$40,001 - \$60,000 | -1.8847 | 1.2301 | -1.53 | -0.1065 | 0.0466 | -2.28 |
| \$60,001 - \$80,000 | -1.7933 | 1.2305 | -1.46 | -0.0986 | 0.0467 | -2.11 |
| \$80,001 - \$100,000 | -1.3657 | 1.2619 | -1.08 | -0.0656 | 0.0466 | -1.41 |
| \$100,001 - \$120,000 | -1.1499 | 1.2550 | -0.92 | -0.0515 | 0.0439 | -1.17 |
| Greater than \$120,000 | -1.1125 | 1.2448 | -0.89 | -0.0493 | 0.0423 | -1.16 |
| Knowledge of Equine Industry | | | | | | |
| Aesthetics | 4.2692 | 0.6486 | 6.58*** | 0.2952 | 0.0406 | 7.28 |
| Industry | -0.4823 | 0.5694 | -0.85 | -0.0333 | 0.0393 | -0.85 |
| History | 1.1223 | 0.6518 | 1.72* | 0.0776 | 0.0450 | 1.73 |
| Employment | 0.0033 | 0.9740 | 0*** | 0.0002 | 0.0673 | 0 |
| Event | 0.4196 | 0.3366 | 1.25 | 0.0290 | 0.0232 | 1.25 |
| Lifestyle Characteristics | | | | | | |
| Proximity | -0.0004 | 0.0049 | -0.08 | 0.0000 | 0.0003 | -0.08 |
| Housing Quartile | | | | | | |
| \$127,900 - \$160,000 | 0.7379 | 0.4231 | 1.74* | 0.0510 | 0.0292 | 1.75 |
| \$160,175 - \$226,284 | 0.8568 | 0.4550 | 1.88* | 0.0592 | 0.0314 | 1.89 |
| \$227,000 - \$906,100 | 0.8946 | 0.4323 | 2.07** | 0.0619 | 0.0297 | 2.08 |
| \$942,301 - \$2,600,000 | 2.3323 | 1.3075 | 1.78* | 0.1613 | 0.0903 | 1.79 |

| | | | | | | | |
|--|--------|--------|---------|--------|--------|------|--|
| Hypothetical Loss in Equine industry | | | | | | | |
| 30% Loss | 0.0319 | 0.3916 | 0.08 | 0.0022 | 0.0271 | 0.08 | |
| 45% Loss | 0.7032 | 0.4019 | 1.75* | 0.0486 | 0.0276 | 1.76 | |
| 60% Loss | 1.6855 | 0.5448 | 3.09*** | 0.1165 | 0.0373 | 3.12 | |
| Policy Implication | | | | | | | |
| Very Likely | 0.0000 | --- | --- | --- | --- | --- | |
| Somewhat Likely | 1.1918 | 0.4281 | 2.78*** | 0.0824 | 0.0294 | 2.81 | |
| I don't know | 0.4770 | 0.3458 | 1.38 | 0.0330 | 0.0238 | 1.38 | |
| *** significance on 1% level; ** significance on 5% level; * significance on 10% level | | | | | | | |

The previous model from Table 5.4 was adjusted to account for collinearity; the two variables “very likely” and “somewhat likely” were excluded and the variable “unlikely” was added to the regression. Table 5.5 presents the adjusted regression results for Fayette County’s willingness to support the preservation of horse farm land; the table includes the coefficients, standard error, z-value and marginal effects. Among the demographic characteristics, the variables male and household are significant. Males residing in Fayette County are 7.55% less likely to support the horse farm preservation program. For each additional person living in a household, respondents are 1.56 percent less likely to support the horse farm preservation program.

Among variables pertaining to the individual’s knowledge of the equine industry, aesthetics and history are significant. Fayette County residents who believe the equine industry provides positive benefits to Kentucky are 28.30% more likely to support the horse farm land preservation program and individuals who have owned a horse in the last five years are 7.55% more likely to support the horse farm land preservation program

Variables for each of the five housing quintiles are significant. If the respondent’s property is valued in the range \$127,900 - \$160,000, the respondent is 4.87% more likely to support the horse farm preservation program. If the respondent’s property is valued in the range \$160,000 - \$226,284, the respondent is 5.50% more likely to support the horse farm preservation program. If the respondent’s property is valued in the range \$227,000 - \$906,100, the respondent is 6.20% more likely to support the horse farm preservation program. If the respondent’s property is valued in the range \$942,301 - \$2,600,000, the respondent is 15.47% more likely to support the horse farm preservation program.

Three hypothetical factors pertaining to the survey are significant and include the proposed loss of 60% and the two policy likeliness factors. Individuals whose survey projected a 60% loss in the size of the equine industry are 11.08% more likely to support the horse farm preservation program. If the individual’s belief is that the survey is unlikely to affect future policy, they are 9.22% less likely to support the horse farm preservation program and if the individual does not know how the survey will affect future policy, they are 5.95% less likely to support the horse farm preservation program.

Table 5.5 Factors Affecting Fayette County Resident's Willingness to Support Horse Farm Land Preservation: Model II A Logit Estimation

| Variable | Logit Regression | | | Marginal Effects | | |
|-------------------------------------|------------------|----------------|---------|------------------|----------------|---------|
| | Coeff. | Standard Error | z-value | Coeff. | Standard Error | z-value |
| constant | 2.6341 | 2.1381 | 1.23 | --- | --- | --- |
| Demographic Factors | | | | | | |
| Male | -1.0733 | 0.3232 | 3.32*** | -0.0724 | 0.0215 | -3.36 |
| Average Education | -0.1414 | 0.0975 | -1.45 | -0.0095 | 0.0067 | -1.45 |
| Household | -0.2319 | 0.1374 | -1.69* | -0.0156 | 0.0093 | -1.69 |
| Age | | | | | | |
| 25 - 44 years old | 1.3365 | 0.9222 | 1.45 | 0.0902 | 0.0621 | 1.45 |
| 45 - 64 years old | 0.5472 | 0.9352 | 0.59 | 0.0369 | 0.0631 | 0.59 |
| 65 years or older | 0.6460 | 0.9872 | 0.65 | 0.0436 | 0.0666 | 0.65 |
| Income | | | | | | |
| \$20,000 - \$40,000 | -0.9346 | 1.3311 | -0.70 | -0.0631 | 0.0897 | -0.70 |
| \$40,001 - \$60,000 | -1.8324 | 1.2273 | -1.49 | -0.1236 | 0.0825 | -1.50 |
| \$60,001 - \$80,000 | -1.7696 | 1.2283 | -1.44 | -0.1194 | 0.0825 | -1.45 |
| \$80,001 - \$100,000 | -1.2764 | 1.2570 | -1.02 | -0.0861 | 0.0846 | -1.02 |
| \$100,001 - \$120,000 | -1.1667 | 1.2528 | -0.93 | -0.0787 | 0.0843 | -0.93 |
| Greater than \$120,000 | -1.0860 | 1.2430 | -0.87 | -0.0733 | 0.0837 | -0.88 |
| Knowledge of Equine Industry | | | | | | |
| Aesthetics | 4.1644 | 0.6309 | 6.60*** | 0.2810 | 0.0386 | 7.28 |
| Industry | -0.5111 | 0.5683 | -0.90 | -0.0345 | 0.0382 | -0.90 |
| History | 1.1184 | 0.6513 | 1.72* | 0.0755 | 0.0439 | 1.72 |
| Employment | 0.0093 | 0.9625 | 0.01 | 0.0006 | 0.0649 | 0.01 |
| Event | 0.4215 | 0.3351 | 1.26 | 0.0284 | 0.0226 | 1.26 |
| Lifestyle Characteristics | | | | | | |
| Proximity | -0.0005 | 0.0049 | -0.10 | -0.00003 | 0.0003 | -0.10 |
| Housing Quartile | | | | | | |
| \$127,900 - \$160,000 | 0.7221 | 0.4206 | 1.72* | 0.0487 | 0.0283 | 1.72 |
| \$160,175 - \$226,284 | 0.8149 | 0.4500 | 1.81* | 0.0550 | 0.0303 | 1.82 |
| \$227,000 - \$906,100 | 0.9186 | 0.4326 | 2.12** | 0.0620 | 0.0290 | 2.13 |
| \$942,301 - \$2,600,000 | 2.2932 | 1.2934 | 1.77* | 0.1547 | 0.0871 | 1.78 |

| | | | | | | | |
|--|---------|--------|----------|---------|---------|-------|--|
| Hypothetical Loss in Equine industry | | | | | | | |
| 30% Loss | -0.0019 | 0.3909 | -0.00 | -0.0001 | 0.0264 | -0.00 | |
| 45% Loss | 0.6371 | 0.4012 | 1.59 | 0.0430 | 0.0270 | 1.59 | |
| 60% Loss | 1.6418 | 0.5442 | 3.02*** | 0.1108 | 0.0364 | 3.04 | |
| Policy Implication | | | | | | | |
| Unlikely | -1.3663 | 0.4276 | -3.20*** | -0.0922 | 0.02857 | -3.23 | |
| I don't know | -0.8823 | 0.4433 | -1.99** | -0.595 | 0.0298 | -2.00 | |
| *** significance on 1% level; ** significance on 5% level; * significance on 10% level | | | | | | | |

5.3.2 Willingness to Pay for Horse Farm Land Preservation

The coefficients, standard error, and t-value of different factors of WTP for horse farm land preservation are presented in Table 5.6; results are reported for both the OLS regression and the Tobit regression. Four demographic variables are significant including all three age ranges and the highest income level. Individuals between 25 – 44 years of age are willing to pay \$52.54 more to preserve horse farm land. Individuals between 45-64 years of age are willing to pay \$68.54 more to preserve horse farm land and individuals who are 65 years or older are willing to pay \$74.82 more to preserve horse farm land. Individuals with an income greater than \$120,000 are willing to pay \$55.66 more to preserve horse farm land.

Significant variables pertaining to an individual's knowledge of and exposure to the equine industry include aesthetics and history. Individuals living in Fayette County, who believe the equine industry provides benefits to Kentucky, are willing to pay an additional \$92.82 to preserve horse farm land while individuals who have owned a horse in the last five years are willing to pay an additional \$30.95.

Two housing quintiles are significant; if the value of an individual's home falls into the range \$160,175 - \$226,284, they are willing to pay \$23.85 more to preserve horse farm land, while an individual whose home falls into the most expensive range \$942,301 - \$2,600,000 is willing to pay \$46.89. While not significant, individual's whose home falls into the second highest range \$227,000 - \$906,100, are willing to pay \$16.50 less than individuals whose home lies in the range just below theirs. This is an unanticipated result; we expect willingness to pay to increase as the housing value increases. One hypothetical factor, the proposed loss of 45%, was significant; individuals whose survey projected a 45% loss in the equine industry were willing to pay \$23.90 less to preserve horse farm land.

| Table 5.6 Fayette County Willingness to Pay for Horse Farm Land Preservation: OLS and Tobit Estimation Results | | | | | | |
|---|------------------------|----------------|---------|--------------------------|----------------|---------|
| | OLS Regression Results | | | Tobit Regression Results | | |
| Variable | Coefficient | Standard Error | t-value | Coefficient | Standard Error | t-value |
| constant | -51.7313 | 33.7974 | -1.53 | -107.9748 | 49.1917 | -2.19 |
| Demographic Factors | | | | | | |
| Male | -1.5634 | 5.8200 | -0.27 | -0.7296 | 8.1803 | -0.09 |
| Average Education | 2.2554 | 1.6677 | 1.35 | 2.1370 | 2.3003 | 0.93 |
| Household | -3.1062 | 2.4136 | -1.29 | -4.1034 | 3.3686 | -1.22 |
| Age | | | | | | |
| 25 - 44 years old | 32.1076 | 16.4938 | 1.95* | 52.5427 | 24.3781 | 2.16** |
| 45 - 64 years old | 44.5445 | 16.8972 | 2.64*** | 68.5416 | 25.0045 | 2.74*** |
| 65 years or older | 51.4839 | 18.2650 | 2.82*** | 74.8230 | 26.8436 | 2.79*** |
| Income | | | | | | |
| \$20,000 - \$40,000 | -12.0478 | 17.4635 | -0.69 | -6.9171 | 24.8530 | -0.28 |
| \$40,001 - \$60,000 | -15.2801 | 16.9684 | -0.69 | -16.6047 | 23.9365 | -0.69 |
| \$60,001 - \$80,000 | -1.2318 | 17.2070 | -0.07 | 9.5725 | 24.2389 | 0.39 |
| \$80,001 - \$100,000 | 4.9373 | 17.6374 | 0.28 | 13.9927 | 24.4274 | 0.57 |
| \$100,001 - \$120,000 | 15.5481 | 17.6374 | 0.88 | 29.2682 | 24.7546 | 1.18 |
| Greater than \$120,000 | 33.0694 | 17.3628 | 1.90* | 55.6573 | 24.4472 | 2.28** |
| Knowledge of Equine Industry | | | | | | |
| Aesthetics | 65.2727 | 14.5171 | 4.50*** | 92.8202 | 21.3865 | 4.34*** |
| Industry | 4.1292 | 11.0163 | 0.37 | 5.5307 | 15.6628 | 0.35 |
| History | 16.5979 | 8.3565 | 1.99** | 30.9518 | 11.8139 | 2.62*** |
| Employment | 20.1447 | 14.5558 | 1.38 | 27.0263 | 20.7025 | 1.31 |
| Event | 10.3939 | 6.4217 | 1.62 | 12.8794 | 9.0172 | 1.43 |
| Lifestyle Characteristics | | | | | | |
| Proximity | -0.1316 | 0.0930 | -1.41 | -0.2092 | 0.1309 | -1.60 |
| Housing Quartile | | | | | | |
| \$127,900 - \$160,000 | 7.8553 | 8.0237 | 0.98 | 4.2301 | 11.2744 | 0.38 |
| \$160,175 - \$226,284 | 19.8772 | 8.2273 | 2.42** | 23.8540 | 11.4268 | 2.09** |
| \$227,000 - \$906,100 | 7.9227 | 8.1242 | 0.98 | 7.3517 | 11.4027 | 0.64 |
| \$942,301 - \$2,600,000 | 29.6763 | 16.1852 | 1.83* | 46.8936 | 24.0807 | 1.95* |

| Table 5.6 (continued) | | | | | | |
|--|----------|--------|--------|----------|---------|---------|
| Hypothetical | | | | | | |
| Loss in Equine industry | | | | | | |
| 30% Loss | -13.9105 | 8.0345 | -1.73* | -16.4915 | 11.1324 | -1.48 |
| 45% Loss | -14.3985 | 7.9466 | -1.81* | -23.9032 | 11.0585 | -2.16** |
| 60% Loss | -10.1343 | 7.7414 | -1.31 | -10.1571 | 10.9012 | -0.93 |
| Policy Implication | | | | | | |
| Unlikely | -2.9558 | 6.8138 | -0.43 | -2.6880 | 9.5728 | -0.28 |
| I don't know | -8.4443 | 6.5942 | -1.28 | -6.9419 | 9.2966 | -0.75 |
| *** significance on 1% level; ** significance on 5% level; * significance on 10% level | | | | | | |

5.4 Kentucky Willingness to Pay Dollar Values

Table 5.7 presents the statewide average value to households of a 15%, 30%, 45%, and 60% loss in the Kentucky equine industry. The statewide average household value for all four loss levels was calculated using the sample means obtained from the contingent valuation study.

| Table 5.7 Average Household Value of the Equine Industry for the State of Kentucky | | | | |
|---|----------|----------|----------|----------|
| | 15% Loss | 30% Loss | 45% Loss | 60% Loss |
| Overall | \$54.73 | \$49.19 | \$48.23 | \$54.31 |

Interestingly, the average household value is highest for a 15% projected loss in the equine industry; however, the numbers are not significantly different across all levels. Residents may not view a 30%, 45%, or 60% loss in the equine industry as likely or even possible due to the size and magnitude of the equine industry in Kentucky or due to their own professed value of the industry.

Many respondents indicated their value for the equine industry stems from the industry's dynamic role in Kentucky's own culture, heritage, and history. Other respondents believed that the equine industry, specifically horse farms, not only make Kentucky a nicer, more beautiful place to live but also have a positive impact on the Kentucky economy.

Another potential explanation may be that individuals willing to support the horse farm preservation program are only willing to pay one amount no matter the size or scope of the issue. To those individuals, their willingness to pay will not change even if the hypothetical loss in the equine industry increases or decreases. Follow up questions regarding an individual's willingness to contribute could be used to capture this effect.

Chapter 6: Conclusions and Recommendations

6.1 Conclusion

This thesis examines how Kentucky residents value the Kentucky equine industry. Many previous studies have focused on the willingness to pay for preservation of agricultural land or recreational land; only a handful of known studies have focused on the willingness to pay for preservation of equine or horse farm land. The first part of the study focuses on Kentucky residents' willingness to preserve horse farm land when residents do not have to monetarily support it and subsequently, their willingness to pay for horse farm land preservation. The second part of the study examines these topics on the county level, using housing quintiles and data collected from Fayette County. The payment card method is used to study the willingness to pay of residents for preservation of equine land.

The study indicates there is value to preserving equine land and that Kentucky residents place a positive value on the presence and existence of the horse industry in Kentucky. Empirical results show that a person's belief or perception of the equine industry plays a significant role in their attitude towards horse farm land preservation. Individuals who believe the equine industry provides positive benefits to the state of Kentucky are more likely to support equine land preservation and are willing to pay a positive amount to preserve the equine industry at its present size. Involvement in the equine industry by means of employment, equine ownership, or equine event attendance has a positive effect on an individual's willingness to pay. The size of the hypothetical loss played a significant role in an individual's willingness to support the preservation of horse farm land; however, it did not significantly affect the individual's willingness to pay for horse farm land preservation. Age and education are significant factors in determining an individual's willingness to pay, older individuals and individuals with higher levels of education are willing to pay more for horse farm land preservation. An individual's view of how public policy will be affected by the results of this survey significantly affects their willingness to pay; individuals who feel the survey is very likely or somewhat likely to affect future policy are more likely to support equine land preservation and are also willing to pay more to preserve horse farm land than an individual who believes the survey is unlikely to affect future equine policy.

6.2 Research Impacts

The equine industry is more than just horses; the equine industry is a community of people, businesses, farms, racetracks, among other entities that call Kentucky home. It is this community that makes Kentucky the "Horse Capital of the World." This study in conjunction with the other components of the 2012 Kentucky Equine Survey provides valuable information to the public and lawmakers alike. The information presented in this study may assist in the public's understanding of the non-market impacts of Kentucky's horse industry. The study highlights the important, prominent position of the equine industry in the state; it also reveals the value added from the aesthetic and recreational benefits it provides. The non-market impacts can easily lead to important market impacts, which in turn generate economic dollars.

Aesthetic and recreational benefits are currently showcased in marketing and advertising campaigns for the state and employee recruitment. Continued marketing and advertisement may draw new equine events to the area and/or expand existing equine events, boosting tourism and hospitality dollars. Equine events attract participants from all over the world; participants visit not only the equine establishments in the area but also retail, dining, hospitality, and historical venues, etc. A visit to Lexington may start with an intended purpose of visiting an equine event but quickly turns into a Kentucky experience.

It is important for business owners and lawmakers to be aware of the significance and effects of the equine industry in order to capitalize on the opportunities it provides. Equine events expose visitors to not only the equine industry; it exposes visitors to Kentucky. Part of Kentucky is the aesthetic benefits of the industry; which may draw new residents to the area, growing the local community and economy.

Residents of the state should be aware of the affects the equine industry has upon real estate values and quality of life. Real estate values in the Bluegrass Region, especially Fayette County, are significantly affected by the presence of horse farms and the benefits the industry provides to the surrounding community. Fayette County in particular is known for its beautiful landscape and unique city center surrounded by horse farms. Many residents are drawn to Lexington and the surrounding area because of the benefits it provides.

Ultimately, the information presented in this study may aid in the preservation or enhancement of the equine industry and horse farm land. Legislators may use this information as a reference when addressing issues pertaining to economic and environmental issues. The equine industry is an important part of the state's agricultural industry; it is important for these individuals to understand that Kentucky's uniqueness and cultural identity is tied to agriculture and the equine industry. The information provided may be used to identify new opportunities or potential areas of growth. It may also be used to emphasize the significance of the equine industry to the residents of the state. Residents have a stake in the equine industry whether or not they actively participate in it; value to every resident may not be recognize but is often derived from the social, cultural, economic, recreational, and aesthetic benefits the equine industry provides. It is vital that this be recognized and understood.

6.3 Limitations and Further Research

The most important component of any study is the survey instrument itself. Since the survey was a mail survey, sent to random residents of the state who had not agreed to take the survey ahead of the time, one of our goals was to keep the survey short to encourage participation. A drawback of this was the space available to explain the choice scenario and present all of the information necessary for respondents to successfully participate in the survey. One limitation of the survey was the choice scenario; the choice scenario was left purposefully vague, allowing readers to read between the lines and infer their own information from what was not on the page. A traditional contingent valuation survey provides a detailed choice scenario; the reader is given the necessary information to answer unspoken questions and limit confusion. It is important to provide detailed information to answer the readers' questions, to limit bias and reveal their true preferences.

A second limitation of the study was the range of the payment card. The \$500 choice was excluded from the payment card due to the opinion that it was an infeasible amount. In reality the payment card should have been expanded to include a higher upper bound amount to capture outliers who place a higher value on the equine industry and ultimately make respondents think about their true willingness to pay.

Some critics may say a third limitation of the study was the valuation method. Since the individuals involved did not have to actually pay any money, there is an argument to be made that the values stated may be inflated to make individuals feel better about their choices. Another debated limitation is the payment card itself; the payment card method does not actually derive an exact value for the respondent's willingness to pay; it identifies a range of values that the individual's true willingness to pay lies between.

An improvement to the survey that could have been made was the addition of the question regarding consequentiality. A follow up question that could have been asked was the reasoning behind why the individual felt the survey may or may not have been consequential to glean more information from the respondent for evaluation. An important addition to the survey would have been to ask a question regarding the respondent's certainty of their willingness to pay.

An opportunity for further research would be to develop and present the survey in a different manner. A new study could take a more traditional approach, presenting the reader with a more detailed choice scenario outlining a current issue faced by Kentucky's equine industry; for example, a historical farm that has filed for bankruptcy that is being sold for development purposes. The study could utilize both the payment card method and the dichotomous choice method; different groups of respondents could be presented with each method and the results could be compared. The payment card could be expanded and multiple dichotomous choices could be asked. A drawback of these types of surveys is the time it takes to create them, attention to detail needed, and the cost of implementing the survey.

APPENDICES

Appendix A: Kentucky Equine Survey Contingent Valuation Study

Kentucky Equine Survey

This survey is being conducted as part of the Kentucky Equine Survey in order to measure the impact of the equine industry in Kentucky. The study is sponsored by the University of Kentucky, the Kentucky Horse Council, and the Kentucky Agricultural Development Fund. Participation is voluntary, but your cooperation will be extremely valuable to the future success and sustainability of the industry. The survey should take approximately 10 minutes to complete. **All information that you provide will be kept confidential.** Thank you for your participation.

If you would prefer to complete this survey online, please visit <http://www.equinecvsurvey.com> and select the code KYCV2.

Section A (to what extent do you agree or disagree with the following statements)

| Statement | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree | Do not know |
|---|-------------------|----------|---------|-------|----------------|-------------|
| I think horse farms are nice to look at... | | | | | | |
| I think the number of horse farms in Kentucky is declining... | | | | | | |
| I think that horse farms make Kentucky a nicer place to live... | | | | | | |
| I would like to live near a horse farm... | | | | | | |
| I think land currently used for horse farms is needed for other uses... | | | | | | |
| I think operating horse farms is less profitable now than 10 years ago... | | | | | | |
| I think the horse industry helps local economies... | | | | | | |
| I would like to see the Kentucky horse industry remain the same size... | | | | | | |

Section B

Please consider the following scenario:

The state of Kentucky is in danger of losing part of its equine industry to new commercial and residential development. It might be possible to preserve the horse industry at its present size by adopting a Horse Farm Preservation Program. This program would be funded by a grant specifically designed to preserve horse farm land in the state; Kentucky residents would not have to pay for it.

Please select the option you most prefer:

| Option 1 | Option 2 |
|---|---|
| <p><i>Action:</i> The Horse Farm Preservation Program is implemented.</p> <p><i>Outcome:</i> The equine industry in Kentucky is preserved at its present size.</p> <p style="text-align: center;"><input type="checkbox"/></p> | <p><i>Action:</i> No Action is taken by the state; residential and commercial development of horse farms occurs.</p> <p><i>Outcome:</i> The equine industry in Kentucky will decrease in size by ___ over the next ten years. (15%, 30%, 45%, 60%)</p> <p style="text-align: center;"><input type="checkbox"/></p> |

If you chose Option 1 \longrightarrow *Please go to Section C*

If you chose Option 2 \longrightarrow *Please go to Section D*

Section C (Complete only if Option 1 was selected)

Please consider the following scenario:

If the Horse Farm Preservation Program were implemented, there would be significantly less commercial and residential development of agricultural land. This would result in less tax revenue than if horse farms were developed. Without this additional tax revenue, the state and local governments might have to raise the state income tax rate to improve existing services.

Would you still be in favor of the Horse Farm Preservation Program?

• Yes No **IF NO** \longrightarrow *Please go to Section D*

IF YES, what would be the largest annual tax increase you would be willing to tolerate to fund the improvement of existing services that would have otherwise been provided by residential and commercial development of horse farm land?

- \$5 \$15 \$30 \$50 \$80 \$135 \$200

Section C continued (Complete only if Option 1 in Section B was selected and you selected YES)

Please **SELECT THE THREE STATEMENTS** which most accurately reflect why you would be willing to tolerate an annual tax increase to preserve horse farm land.

Most Accurate ____ **Second Most Accurate** ____ **Third Most Accurate** ____

| Statement | |
|------------------|---|
| A. | “Horses are a signature part of Kentucky’s culture, heritage, and history.” |
| B. | “I value the race meets, horse shows, and equine sales that the horse industry brings to Kentucky.” |
| C. | “The horse industry has a positive impact on the Kentucky economy.” |
| D. | “Horse farms make Kentucky a nicer, more beautiful place to live.” |
| E. | “The horse industry is in danger of disappearing from Kentucky, and we need to preserve it.” |
| F. | “Horse farm owners are struggling financially and need assistance from government programs.” |
| G. | “I am employed in the horse industry and would like to see the industry preserved.” |
| H. | “A reduction in the horse industry would have a negative impact on the Kentucky economy.” |
| I. | “The horse industry is a unique part of Kentucky’s culture and draws tourists.” |

Section D (Complete only if Option 2 was selected in Section B or if you selected NO in Section C)

Please **SELECT THE THREE STATEMENTS** which most accurately reflect why you would not be in favor of the implementation of the Horse Farm Preservation Program.

Most Accurate ____ **Second Most Accurate** ____ **Third Most Accurate** ____

| Statement | |
|------------------|--|
| J. | “Horse farms should not receive subsidies, grants, or any form of government funding.” |
| K. | “I do not care about the horse industry.” |
| L. | “I care about the horse industry, but I should not have to pay to preserve it.” |
| M. | “If the horse industry is declining, then the state should not intervene and let market forces work.” |
| N. | “Horse farm owners are well off financially and do not need money from government programs.” |
| O. | “Horse farms have a negative impact on the economy.” |
| P. | “The horse industry is not in danger of disappearing from Kentucky; we do not need a Horse Farm Preservation Program.” |
| Q. | “I care about horse farms and think they should be preserved; however, financial resources are scarce right now.” |

Section E

1. How likely do you think it is that the results of this survey will shape the direction of future policy for Kentucky's equine industry?

- Very likely Somewhat likely Unlikely I don't know

2. What county do you live in? _____

3. Do you currently live on a horse farm/horse operation? Yes No

IF NO, what is the approximate distance (in miles) to the nearest horse farm from your current residence? _____ miles I don't know

4. Have you or someone in your current household owned a horse in the last 5 years?

- Yes No

5. Including yourself, how many individuals currently reside in your household?

How many of these individuals are under the age of 18? _____

6. What is your approximate annual household income?

- | | |
|---|---|
| <input type="checkbox"/> Less than \$20,000 | <input type="checkbox"/> \$80,001 to \$100,000 |
| <input type="checkbox"/> \$20,000 to \$40,000 | <input type="checkbox"/> \$100,001 to \$120,000 |
| <input type="checkbox"/> \$40,001 to \$60,000 | <input type="checkbox"/> Greater than \$120,000 |
| <input type="checkbox"/> \$60,001 to \$80,000 | |

7. Are you currently employed in the horse industry? Yes No

8. Have you attended an equine event in the past year? Yes No

IF YES, what type of equine event did you attend (please select all that apply)?

- | | |
|-------------------------------------|--|
| <input type="checkbox"/> Horse Show | <input type="checkbox"/> Equine Sale/Auction |
| <input type="checkbox"/> Race Meet | <input type="checkbox"/> Educational Event or Conference |

Other (Please Specify) _____

9. Age of respondent:

- | | |
|--|--|
| <input type="checkbox"/> 18-24 years old | <input type="checkbox"/> 45-64 years old |
| <input type="checkbox"/> 25-44 years old | <input type="checkbox"/> 65 years old or older |

10. Education level of respondent:

- | | |
|---|---|
| <input type="checkbox"/> Some high school or less | <input type="checkbox"/> Bachelor's degree |
| <input type="checkbox"/> High school graduate | <input type="checkbox"/> Some graduate or graduate degree |
| <input type="checkbox"/> Some college or trade school | |

11. Gender: Male Female

12. Comments _____

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