The Impact of Consumer Heterogeneity and Surrounding Amenities in Determining Traveler Behavior: A Choice Experiment on Agritourism

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Based on concerns about rural areas lagging in terms of employment opportunities and subsequent aging populations, the United States Department of Agriculture (USDA) has put an emphasis on developing strategies and programs to stimulate rural economic growth, particularly job creation and entrepreneurship. One of these strategies that is particularly germane to the rural West is diversifying agricultural economies and farm-based businesses through agritourism. Agritourism is any recreational or educational activity on a working farm or ranch that consumers pay to participate in, and is linked in the literature to several community development benefits including; increased employment opportunities, agricultural businesses that are more resilient to market fluctuations, an economic tool to mitigate and gain economic benefits from urban sprawl, and spillover benefits to surrounding rural communities from tourism, an export industry (Nickerson et al. 2001, Philip et al. 2010, Tew and Barbieri 2012, McGehee and Kim 2004). These potential benefits, and the ability to incorporate an agritourism venture into a diverse set of agricultural businesses across multiple regions are driving this dynamic sector. The percent of farms and ranches reporting some agritourism offerings grew in number by over 48% in the last decade (USDA, 2014).

While agritourism is still a budding industry with potential for further stimulating rural economic and community development, we are not aware of any research identifying how consumer behavior and willingness to pay (WTP) varies across space and traveler preferences in the context of agritourism. Exploring how consumer behavior influences the value placed on an agritourism site's attributes and its surrounding amenities will better inform industry stakeholders in assessing the practicality of using agritourism as a rural development tool by identifying potential markets. We aim to explore how heterogeneity in consumer preferences is influenced by the consumers' location of origin, and on the supply side, how WTP for specific agritourism qualities differs across the location of the agritourism activity. Using this information, we hope to assist in the identification of potential markets for agritourism spurring rural development and another financial alternative for farms, ranches and ag-dependent regions.

Many agritourists are multi-destination visitors, implying that trip qualities most likely extend beyond the agritourism enterprise itself, and may include nearby scenic landscapes and access to other amenities or recreation opportunities. Travel cost models have attempted to estimate some of the values consumers place on agritourism sites, but are also sensitive to bias from multi-destination visitors (Carpio et al. 2008, Hill et al. 2014). As an alternative, choice experiments may be better suited to identify the value potential visitors place on scenic landscapes and surrounding amenities when planning a trip by controlling for different combinations of trip attributes. In addition, rather than determining the value

agritourists place on existing agritourism establishments, stated preference models have the benefit of observing demand from a broader spectrum of consumers based on a hypothetical agritourism experience better enabling the researcher to identify markets that are not yet developed and where there may currently be excess demand. To our knowledge, no studies of this kind have been conducted to explore the value visitors place on agritourism site qualities and the impact the surrounding area may have on trip decisions.

After a brief review of the literature on agritourism and discrete choice modeling, we provide a theoretical framework using a random utility model as well as a review of the online survey data generated through a "simulated" travel website interface. Given agritourism differs greatly across space depending on climate, culture, and proximities to markets, we have no reason to believe consumers' preferences are homogeneous and therefore adopt a latent class logit model to capture differences in consumers' WTP. We expand on this empirical exercise by performing a spatial interpolation of differences in WTP values across locales not observed in our sample using a geostatistical method called Empirical Bayesian Kriging (EBK). This two-step approach allows us to not only examine consumer behavior and WTP for various agritourism site qualities, but also enables us to identify rural communities with untapped market potential that lie outside our survey sample. Preliminary results show that a respondent's exposure to agritourism along with their residential origin's surrounding natural amenities and income per capita influence the value consumers place on different agritourism attributes. These results may be of interest to farm and ranch operators seeking more effective marketing strategies, as well as economic development and tourism practitioners in assessing the practicality of using agritourism as a development tool in a particular region of interest.

Literature Review

Increasing global competition in agricultural commodity markets have motivated many farms and ranches to seek diversification opportunities to stay financially viable (Veeck et al. 2006). As the reader can probably deduce from the definition presented in the previous section, agritourism can take many different forms such as wineries, corn mazes, food preparation/preservation classes, hunting, photography classes, farm dinners, and farm and ranch heritage experiences. It is this generality and the ability to cater an agritourism enterprise to the farm or ranch's historical or amenity assets and other strengths that makes agritourism a promising diversification tool for agricultural operators.

Beyond potential for diversification and supplementing farm level financial returns, agritourism can serve as a rural development tool (Bagi and Reeder, 2012). Not only does agritourism create

employment opportunities for the farm's family or community members through direct employment in the operation, but it also has the potential to stimulate surrounding rural economies through spillover benefits that arise from the export-like tourism spending bringing dollars into the region. It is this aspect of agritourism as an entrepreneurial activity creating long term growth and employment opportunities that makes it a particularly attractive rural development tool when compared to other farm and ranch diversification strategies (Bagi and Reeder, 2012). Despite data showing that the portion of farms with agritourism operations grew over 42% between the 2007 and 2012 USDA Censuses of Agriculture, there are still only 1.5% of all US farms and ranches involved in agritourism offerings, and many of these operations are clustered in specific regions of the United States (Bagi and Reeder (b), 2012). While previous studies have explored agritourists' WTP using revealed preference models (Carpio et al, 2008; Hill et al, 20014), motivations to adopt (see citations in introduction), and spatial hot spots of agritourism incidence (Van Sandt and Thilmany, 2017), this study is intended to explore areas for potential agritourism industry growth while also accounting for consumer and location heterogeneity.

Discrete choice experiments have been applied for decades to elicit consumers' willingness to pay and study their choice making behavior using a random utility framework developed by McFadden, 1974. Within the tourism literature, choice experiments have been used frequently to examine and forecast consumers' behavior given destination amenities, prices, and other qualities specific to the research topic. Morley (1994) examines the effect that price changes in transportation, hotel tariffs, and exchange rates have on tourists from Kuala Lumpur to eight different international cities. Morley (1994) find that changes in transportation prices have the largest effect on consumers' choice to travel perhaps implying that travel distances and the potential for multi-destination trips may be significant drivers of consumers' choice to visit an agritourism site. In another study by Juutinen et al. (2011), management policies in Finnish national parks are analyzed, and they find consumers experienced welfare gains from greater biodiversity and less manmade structures on the trails. These studies provide some context of how to approach the US agritourism sector, but a more targeted look at issues of key interest to the sector are warranted. For example, if these international travelers place value on scenic qualities for ecotourism then we may also be able to infer and hypothesize that, for US agritourism, more remote areas with more rustic lodging and outdoor activities could elicit a higher WTP for some subsets of consumers.

Methodology

Survey Data

This study uses survey data collected in April of 2015 through Taylor Nelson Sofres' (TNS), an online survey company, using their pre-recruited panels. The sample contains a total of 1,501 respondents from all over the United States. Of these 1,501 respondents from across the US, 1,001 visited an agritourism site in the western U.S. during the previous twelve months (with 5% incidence in the broader sample), while the other 500 did not participate in an agritourism activity but had traveled out of the state in the past twelve months (with 50% incidence in the broader sample). The choice to administer the survey online through a research company is appropriate for two reasons. First, internet survey companies that offer incentives to a pre-recruited sample tend to have higher response rates, and second, a greater sense of authenticity may be developed if the individuals, who select a tourism destination through a simulated travel website called Trip Guru, actually make their decisions online in front of a computer.

The survey instrument was designed to be used for multiple projects, hence the split sample. The project and this survey were sponsored by a USDA Agriculture Food Research Initiative grant titled "Place-Based Innovation: An Integrated Look at Agritourism in the Western US" #2014-68006-21824. The survey contained questions regarding travel behavior, hobbies and interests, experience with agriculture, and questions pertinent to travel cost models. The choice experiment questions occurred at the end of the survey and consisted of two different experiments (a day trip and a "ranch stay") that were randomly and evenly divided in each subsample (regional and national). Using a stated choice software, Ngene, we adopted a sequential orthogonal design for the choice experiment. Each choice experiment was divided into four randomly assigned blocks with nine choice situations in each block and two alternatives per choice situation. The entire survey was estimated to take approximately 15 minutes to complete. As the reader can deduce, the sample is somewhat Western biased given 66% of the sample visited an agritourism site in the Western U.S. so results should be interpreted with this framing in mind.

The attributes included in the sets differed depending on which alternative the individual was assigned to and each attribute took different levels across choice situations. Varying attributes for the ranch stay, defined as a five night package for two people, were price, estimated travel cost from home, lodging options, a "star-rating" from previous travelers' online reviews, activities included in the package, attributes of the surrounding area, and distance to a national park. The day trip travel listing was for one individual and included the following attributes: price, distance from home, rating from online reviews, and activities included in the package. In both alternatives the price attribute levels were less uniformly distributed at the endpoints and were the only attribute that was not completely uniformly distributed.

Theory and Empirical Model

A random utility framework was adopted to model the travelers' behavior in choosing one agritourism site over another. Under the assumption that individuals are utility maximizing agents, an individual n will select agritourism alternative i over j alternatives only if alternative i offers them the most utility relative to alternative j. (1)

$$U_{ni} > U_{nj}$$

Given any choice situation, the researcher only observes information on the alternatives' attributes z_{nj} and some information about the individual themselves r_n, resulting in an observed portion of the individual's utility function $V_{ni}(z_{ni}, r_n)$, and an unobserved portion ε_{ni}. The probability an individual chooses alternative i over j alternatives, denoted P_{ni}, then becomes:

$$P_{ni} = Prob(U_{ni} > U_{nj}) \tag{2}$$

$$P_{ni} = Prob(V_{ni} + \varepsilon_{ni} > V_{nj} + \varepsilon_{nj})$$

$$P_{ni} = Prob(V_{ni} - V_{nj} > \varepsilon_{nj} - \varepsilon_{ni})$$

Where the probability that an individual chooses i is the probability that the difference between the observed portions of utility is greater than the difference between the unobserved components. The cumulative probability is the integral over the density of the unobserved portion of utility, $f(\varepsilon_n)$:

$$P_{ni} = \int_{\varepsilon} I\left(\varepsilon_{nj} - \varepsilon_{ni} < V_{ni} - V_{nj} \;\; \forall j \neq i\right) f(\varepsilon_n)\, d\varepsilon_n \tag{3}$$

If we assume the errors are independent from irrelevant alternatives (iia) and that the unobserved component of the respondent's utility function is Gumbel distributed then Train 2007 shows that a logit choice probability can be obtained from this cumulative distribution:

$$P_{ni} = \frac{\exp(\beta' z_{ni})}{\sum_j \exp(\beta' z_{nj})} \tag{4}$$

where the probability of individual n choosing alternative i is a function of z independent variables observed by the researcher with preference parameters β to be estimated.

While limited dependent empirical models such as the multinomial logit are popular due to their ease of interpretation and closed form, the strong assumption of the individuals' errors being iia~~,~~ has led to some researchers choosing more flexible forms such as the mixed-logit that allows the researcher to specify continuous joint distributions for the unobserved errors (Train, 2007).

Unlike the models described above, the latent class logit model assumes that consumers can be classified into a discrete number of market segments, or classes ($s = 1, \dots, S$) based on their preference similarities and differences, allowing the model to endogenously describe consumer heterogeneity rather than it being assumed to follow some distribution specified by the researcher. Since we have no reason to believe that agritourists behave similarly across the U.S., we adopt the latent class logit model over the alternatives to avoid biased estimates that may arise from the assumption of homogeneity across consumers. One last reason we chose the latent class logit over model alternatives was the greater flexibility it offered given the main effects design of our choice experiment.

Given some number of classes S set by the researcher, the probability that individual n is observed in class s is:

$$\gamma_{ns}(\varphi_s) = \frac{\exp(\varphi_s x_n)}{1 + \sum_{s=1}^{S-1} \exp(\varphi_s x_n)} \tag{5}$$

where φ are coefficients of individual specific covariates x_n that determine class membership, and class S is dropped for identification (Pacifico and Yoo, 2013). The probability of individual n choosing alternative i over alternative j with T choice occasions, is the sum of each class membership probability multiplied by the conditional probabilities of individual n choosing alternative i conditional on being in class s across all alternatives and choice occasions:

$$P_n(J = i|z_n) = \sum_{s=1}^{S} \gamma_{ns}(\varphi_s) \prod_{t=1}^{T} \prod_{i=1}^{J} \left(\frac{\exp(\beta_s' z_{ni})}{\sum_j \exp(\beta_s' z_{nj})} \right)^{C_{nit}} \tag{6}$$

where C is an indicator function that takes on a value of one if individual n selects alternative i on occasion t and zero if otherwise (Pacifico and Yoo, 2013). Note the conditional probability that individual n chooses alternative i given they are in class s, the right hand term in parentheses, is simply the multinomial logit specification for a respondent in class s (Shen, 2009). To summarize, our objective is to estimate coefficients β and φ given each alternative's attributes z and individuals' characteristics x. This information will allow us to control for individual heterogeneity while determining the influence location has on individuals' choice behavior and WTP for each attribute across classes.

Given difficulties in empirically estimating the log likelihood function with the standard Newton Raphson search algorithm, the Expectation-Maximization (EM) method has been proposed and found to be superior in run time and allows for more flexible approximations of the parameter distributions (Bhat, 1997; Train, 2008). We estimate our latent class logit model in STATA following Pacifico and Yoo's

(2013) command *lclogit* that makes use of the EM method, and then use STATA's *gllamm* to estimate the standard errors of the parameters.

Several previous studies perform various tests to determine the number of latent classes that captures the bulk of consumer heterogeneity without overfitting the model. While studies such as Nylund et al. (2007) find bootstrapping methods to be superior in determining class enumeration, the Bayesian Information Criterion (BIC) seems to be more commonly used (or at least traditionally used) due to its comparable results and relative simplicity. We chose to use the BIC option in determining class enumeration, selecting the model with the smallest BIC.

Latent class models have been used extensively in the literature to calculate WTP values across market segments (see Hidrue et al, 2011; Hensher and Greene, 2010; Wen and Lai, 2010; and others), but few studies have taken advantage of the latent class model's preference heterogeneity across individuals to examine preference heterogeneity across space. One study that follows methods similar to our own is Brouwer et al. (2010) where the authors model preference heterogeneity for water quality throughout a river basin in southern Spain. The authors include each respondent's residence of origin as a covariate in determining class membership to examine preference heterogeneity across space and find that economic welfare measures change across space depending on environmental conditions and socioeconomic demographics where they reside (Brouwer et al, 2010). Similar to this study we include a set of five covariates to determine class membership, all of which are measures based on the respondent's county of origin. The hypothesis here is that an individual's choices are partly driven by their daily environment. For example, a respondent from the Rocky Mountains may have different recreation preferences than someone from the Northern Plains states due to their revealed preference to live in a region where natural amenities are readily available. The explanatory variables we included to determine class membership, x_n in equation 5, were agritourism revenue, per capita income, minutes to a population center of at least 50,000 people, the USDA's natural amenities index, and the respondent's age which was compared to the county's median age during the spatial interpolation process. Since these measures are available for most counties, we are able to estimate each county's WTP by first estimating each county's class membership probability and weighting the WTP estimates within classes to capture the heterogeneity of preferences within the county. Essentially, we are using the respondents to determine market segments and then plug in the counties' characteristics to estimate the WTP for an average consumer in each county where data is available. This method allows us to identify areas where WTP for an activity may be significantly high, but no agritourism sector currently exists.

Spatial Interpolation

In order to complete our map of how agritourism WTP varies by area and activity, we adopt a geostatistical method called Empirical Bayesian Kriging that exploits the spatial autocorrelation between estimates to interpolate values in between points. One issue with using counties to determine spatial autocorrelation is the fact that counties are larger in average size in the western US. To address this potential modelling issue, we use each county's population centroid as the point of information, and rely on the kriging to interpolate the values in-between points. While there are other methods for interpolating values based on spatial autocorrelation, such as inverse distance weighting and splining, EBK includes additional information on the spatial arrangement of points and uses an iterative process to determine the nature of the spatial distribution of points rather than just the distance between points.

The major difference between kriging and other methods of spatial interpolation is the use of the data's semivariogram, a function of variance between two point's z-scores and distance between points, to capture changes in spatial autocorrelation as distance increases rather than assuming a constant lag. Anselin and Gallo (2006) compare several spatial interpolation techniques to model air quality's effect on housing prices in Southern California and find kriging provides the best model fit and interpretation. While Campbell et al. (2007) take a very similar approach to ours, estimating a mixed logit and kriging to predict WTP for rural landscape improvements in the Republic of Ireland, we differ in our treatment of preference heterogeneity. While Campbell et al. (2007) use a mixed logit, we capture consumer heterogeneity using a latent class logit model using origin specific information to determine the differences in WTP across space. Further, we also use the county level information to determine the weighted average WTP of an area rather than the individual respondents' WTP. Given the geographical scope of our study, the contiguous US, and our project's objectives, we believe our methods of basing an area's WTP on aggregate county data rather than the characteristics of a single respondent to be more appropriate.

Empirical Results

Using the BIC we determined that four latent classes captured the majority of consumer heterogeneity. The model converged after 67 iterations using the EM method and had an average max posterior probability of 88%, indicating that our model was reasonably successful in modeling the heterogeneity of consumers' preferences. As a reminder, when we discuss the significance and sign of the class membership coefficients in the following paragraphs, these interpretations are relative differences when compared to the reference group, Class 4. The latent class model estimates can be found in table 1.

Given the WTP estimates and class membership coefficients that were statistically significant at the 10% level (or greater), we labeled the four classes: Comfort Tourists (24.7%), Adventurers (33.8%), Road Trippers (20.7%), and Urbanites (20.8%). Class 4, the Urbanites, were the reference group for identifying class membership coefficients. Comfort tourists likely came from counties with relatively high incomes per capita, are relatively price sensitive, and prefer more upscale lodging options like the ranch house option ($185.77). The Adventurers had a strong preference for tent lodging ($1,316.33) and horseback riding ($1,136.17), and likely came from counties with relatively high agritourism activity, a high income per capita, high natural amenities, and as individuals, are relatively younger. The Road Trippers tended to be older and from areas with fewer natural amenities. The Road Trippers preferred more upscale lodging options (cabin: $3,695.72), historical excursions ($513.93, a close proximity a small town ($1,826.90), and close proximities to National Parks (-$496.20 per 30 min.). Finally, the Urbanites were relatively price sensitive and had a strong preference for urban amenities ($2,624.39), quality lodging (cabin: $185.51), and historical excursions ($1,449.97) instead of horseback riding.

Surprisingly, the travel time (in minutes) to an urban area, a city with a population of at least 50,000 did not significantly influence how a consumer was categorized into a class for this study. While this variable may still have an effect on some consumers' preferences, it does not appear that it had explanatory power in parsing out consumer preference heterogeneity in this sample. Both the Road Trippers and the Urbanites had comparably strong preferences for ranch stay agritourism sites that were also nearby urban or small town amenities, but these characteristics were insignificant for the Comfort Tourists and Adventurers. This may be a signal to producers located near urban areas and who are interested in agritourism diversification, that they may be more successful in offering agritourism activities in line with the Road Trippers' and Urbanites' preferences. Put another way, producers in more rural areas surrounded by a higher incidence of these two urban-centered classes may want to consider other diversification strategies.

As hypothesized, the natural amenities index had an inverse relationship with classes preferring more upscale lodging options and outdoor activities, thereby indicating that a respondent's surrounding environment can impact their recreation preferences. The Adventurers were from relatively more natural amenity rich areas and valued camping and horseback riding. In contrast, the Road Trippers who were from areas with fewer natural amenities, had comparatively stronger preferences for more upscale lodging and historical excursions. Surprisingly the Adventurers did not have a significant preference for being close to National Park entrances but the Road Trippers and Urbanites did value this attribute of agritourism sites. This may indicate that while the Adventurers prefer outdoor lodging and activities, they are more often primary purpose travelers than the Road Trippers and Urbanites who would rather make

agritourism one stop on a multi-destination trip that includes venues such as National Parks. Since we did not include a neither option in the choice experiment design, this may also indicate that the Road Trippers and Urbanites see ranch stays as a substitute good to other outdoor attractions like National Parks. Not surprisingly, these findings provide evidence that producers in natural amenity rich areas may have more success with agritourism models that integrate outdoor activities, especially if they are near National Park entrances where they have the opportunity to attract the travelers who are similar to the Road Trippers and Urbanites identified in this study.

It appears that coming from counties with higher incomes per capita had less of an effect on consumers' price sensitivity when compared to the relative amount of agritourism activity in the respondent's home county. Both the Comfort Tourists and Adventurers came from relatively wealthy areas, but the Comfort Tourists were much more price sensitive than the Adventurers who had relatively high WTP values. However, the Adventurers and Road Trippers who are both from counties more agritourism activity were relatively less price sensitive than the Comfort Tourists and Urbanites, and both of those groups had less agritourism activity around their residence of origin. This may be an indication that consumers who are less familiar with agritourism are not willing to pay as much for ranch stays than consumers who are more familiar with these activities. Producers should interpret this result carefully. A dearth of agritourism activity in a county may be correlated with lower WTP values for agritourism activities, but the classes that were more likely from these areas still had higher WTP values for some specific activities that producers can still take advantage of. These results are somewhat echoed in Van Sandt and Thilmany (b) (2017) where the authors find evidence of agglomeration economies in the U.S. agritourism industry resulting from information sharing or decreased marginal travel costs for multi-destination agritourists.

The Adventurers, who are younger and assumedly more tech savvy, put the highest value on an additional star rating from the simulated travel site. Yet, Road Trippers, who are decidedly older than the Adventurers, also placed a relatively high value on better online ratings. Due to the fact that both of these classes are surrounded by relatively high levels of agritourism activity, these respondents may be more familiar with agritourism and seeking well-reviewed agritourism experiences to complement what is available to them in their home region. While consumers who are more familiar with agritourism appear to be more discriminating of the value of an online star rating, producers should be aware the Comfort Tourists and Urbanites also value higher ratings, underlining the somewhat obvious importance of providing an enjoyable experience for visitors so that their reviews and online reputation can be one way to differentiate their operation.

Spatial Interpolation

Given the significance and magnitude of some of the class membership covariates, it seems that one's location of origin has a significant impact on consumers' choice behavior. However, there still does not seem to be a clear narrative on how agritourism preferences vary across space, or where potential and untapped agritourism markets may exist. To expand on this we use Empirical Bayesian Kriging (EBK) to interpolate the values across space given county attributes. EBK allows the researcher to relax assumptions about some of the semivariogram features, such as the nugget, sill, and lag, by using an iterative process to find the best fit of the semivariogram that can then be used to better explain the spatial relationships between known points. Rather than mapping the predicted WTP values, we map the percent difference from the class weighted mean WTP for each county population centroid and each agritourism attribute.

Figures 1 through 7 show maps of spatially distributed differences in WTP estimates for specific attributes weighted across a county's predicted class membership shares. Predicted class membership shares were calculated using the class membership variables and county level data to calculate the log odds and eventually the class shares of consumers in that county. WTP values were then weighted by these class shares in an attempt to model the average traveler's preference in that county. Once again, to enhance the spatial interpolation method's validity, we used each county's population centroid as the point of information.

At first glance, it appears that the activities and lodging maps are practically mirror images of each other. This should not be surprising since they essentially represent opposite experiences for those attributes. For example, horseback riding is much more popular in the West, Florida, and on the North East coast. These first two regions immediately make sense since both of these areas have a long heritage surrounding cowboy and horse culture, and relative to the Midwest, all of these regions have more natural amenities presumably enhancing participants' utility derived from outdoor activities. One spot of interest is the Sonoma and Napa wine region in central California where the relative WTP for horseback riding is notably less than on the rest of the Pacific coast. However, this area also has a relatively low WTP for historical activities. This result is most likely due to the region's agritourism being heavily centered on wine experiences, meaning that an operator considering outdoor or historical activities in this region may not be as successful than if they were to offer an activity that is a complement to wine-centered agritourism (such as food courses). In contrast, it appears the Southern U.S. states have preference for both horseback and historical agritourism activities.

The WTP spatial distributions for ranch stay agritourism experiences near urban amenities and national park entrances shown in figures 3 and 4 tell a more complex narrative highlighting why visuals showing spatial patterns are important in exploring potential markets. The reason we compare these two

maps to one another is the notion that National Parks tend to be located in more rural areas giving us an idea of consumer preferences for ranch stay agritourism experiences. It seems across the entire contiguous U.S., there are large cities whose citizens have a preference for agritourism experiences close to national parks such as San Francisco, Los Angeles, Austin, Boston, New York City, and to some extent pockets around Minneapolis and Chicago, but the first two of these cities also value urban amenities while the others do not. Similarly, residents of some rural areas prefer agritourism experiences close to National Parks, including NW Nevada, SW Wyoming, NW Colorado, and some areas in Arizona and New Mexico. However, many rural areas in the Midwest have distinctly opposite preferences, and instead, prefer city amenities over proximities to National Parks. A few other areas of interest in figures 3 and 4 include: 1) wine country in Central CA where close proximity to a National Park entrance and urban amenities are both important; 2) other wine areas like the Finger Lakes region in NY that do not seem to value urban amenities or proximity to national parks; and 3) consumers near National Parks in the West seem to place a relatively high value on participating in agritourism experiences near National Park entrances highlighting their preferences for locating near areas with significant natural assets.

Essentially, the spatial distributions seem to show some consumers prefer the familiarity of their residence of origin while other pockets of consumers prefer more unique surrounding areas compared to their own. This may mean that while rural does not clearly explain consumer choice behavior heterogeneity in determining market segments (classes), the success of a ranch stay agritourism enterprise may still be contingent on the rurality of an area depending on what region the farm or ranch is located in.

Conclusion

Many agricultural producers and economic development practitioners in rural areas are exploring opportunities to diversify farm- and ranch-based businesses and keep rural economies viable. Clearly these motivations to diversify an agricultural business and rural economy must have a strong grounding in where a farm or ranch is located and what they produce. Agritourism is a particularly attractive diversification strategy because activities can vary widely and take advantage of farms or ranches' assets, location and other strengths such as unique crops and livestock or proximity to markets. In addition agritourism has been identified as an underutilized strategy for rural development by the USDA.

Given the important differentiation potential an agritourism enterprise can leverage based on their location, this study explores how a consumers' place of origin affected their choice behavior and used this information to identify spatial patterns in consumer preferences and potential agritourism markets. Using a choice experiment with varying qualities for a ranch stay agritourism experience and a random utility

framework, we estimated consumers' WTP for said qualities while capturing preference heterogeneity using a latent class logit model. We established four classes that captured the bulk of the respondent heterogeneity and labeled these classes as Comfort Tourists, Adventurers, Road Trippers, and Urbanites. As indicated by the class names, particularly large differences in preferences existed related to a traveler's urban surroundings and interest in outdoor activities. More so than the per capita income of the respondent's origin, existing agritourism activity had a large impact on the respondent's price sensitivity, implying that those familiar with agritourism are more likely willing to pay more for agritourism than someone who has had less exposure to the industry and its offerings.

Taking the information gleaned from the latent class analysis, we utilized the class membership covariates to determine the class shares for each county and used these to weight the WTP estimates for various attributes in the choice experiment. These points of information were then used in an Empirical Bayesian Kriging analysis where the spatial relationships between points were used to interpolate relative differences in WTP values across the contiguous U.S. The spatial patterns of WTP differences most notably showed a stronger preference for outdoor activities and more rustic lodging options in the Western U.S., Florida, and on the NE coast. While urbanization of the respondent's origin did not significantly parse out differences in choice behavior, the spatial patterns show regions that strongly prefer, or did not prefer, urban amenities and the distance to a National Park entrance. Considering distances traveled can be interpreted as a cost to consumers, it is reasonable to believe that for many agritourism establishments the preferences of consumers in nearby areas play a greater role in the success of the enterprises than those same preferences averaged across the country.

By accounting for consumer heterogeneity, estimating WTP for certain "ranch stay" agritourism qualities for counties with available data, and creating maps from interpolated WTP differences across the U.S., we have identified interesting relationships and spatial patterns between respondents' location of origin and their choice behavior, as well as providing a tool for future agritourism sector development. One caveat of this work is the fact that the survey instrument was designed for several other objectives within an umbrella projects which required our sample to be weighted toward Western and agritourist samples, and thus, not entirely representative of the population. We recommend a few areas for future research. First, future studies should continue to explore the heterogeneity and relationships between the characteristics of one's surrounding area of origin and their choice behaviors, particularly the differences between rural and urban choice behavior. Secondly, as mentioned agritourism is an extremely heterogeneous industry with many unique experiences and we have only explored a small subset of agritourism qualities. Finally, this research only considers one sector of the broader recreation market and future studies should explore the how consumer heterogeneity across space may differ for other markets

of importance. As this is a working paper, we will continue to address the noted caveats and explore the areas for future research.

References

Anselin, L., & Le Gallo, J. (2006). Interpolation of air quality measures in hedonic house price models: spatial aspects. *Spatial Economic Analysis*, *1*(1), 31-52.

Bagi, F., & Reeder, R. (2012). Farm activities associated with rural development initiatives.

Bagi, F. S., & Reeder, R. J. (b) (2012). Factors affecting farmer participation in agritourism. *Agricultural and Resource Economics Review*, *41*(2), 189.

Bhat, C. R. (1997). An endogenous segmentation mode choice model with an application to intercity travel. *Transportation science*, *31*(1), 34-48.

Brouwer, R., Martin-Ortega, J., & Berbel, J. (2010). Spatial preference heterogeneity: a choice experiment. *Land Economics*, *86*(3), 552-568.

Campbell, D. (2007). Willingness to Pay for Rural Landscape Improvements: Combining Mixed Logit and Random-Effects Models. *Journal of agricultural economics*, *58*(3), 467-483.

Carpio, C., Wohlgenant, M., and Boonsaeng, T. (2008), 'The demand for agritourism in the United States', *Journal of Agricultural and Resource Economics*, Vol 33, No 2, pp 254–269.

Che, D., Veeck, A., & Veeck, G. (2005). Sustaining production and strengthening the agritourism product: Linkages among Michigan agritourism destinations. *Agriculture and Human values*, *22*(2), 225-234.

Hensher, D. A., & Greene, W. H. (2010). Non-attendance and dual processing of common-metric attributes in choice analysis: a latent class specification. *Empirical economics*, *39*(2), 413-426.

Hidrue, M. K., Parsons, G. R., Kempton, W., & Gardner, M. P. (2011). Willingness to pay for electric vehicles and their attributes. *Resource and Energy Economics*, *33*(3), 686-705.

Hill, R., Loomis, J., Thilmany, D., & Sullins, M. (2014). Economic values of agritourism to visitors: a multi-destination hurdle travel cost model of demand. *Tourism Economics*, *20*(5), 1047-1065.

Juutinen, A., Mitani, Y., Mäntymaa, E., Shoji, Y., Siikamäki, P., & Svento, R. (2011). Combining ecological and recreational aspects in national park management: A choice experiment application. *Ecological economics*, *70*(6), 1231-1239.

McFadden, D. (1974). The measurement of urban travel demand. *Journal of public economics*, *3*(4), 303-328.

McGehee, N. G., & Kim, K. (2004). Motivation for agri-tourism entrepreneurship. *Journal of travel research*, *43*(2), 161-170.

Nickerson, N. P., Black, R. J., & McCool, S. F. (2001). Agritourism: Motivations behind farm/ranch business diversification. *Journal of Travel research*, *40*(1), 19-26.

Nylund, K. L., Asparouhov, T., & Muthén, B. O. (2007). Deciding on the number of classes in latent class analysis and growth mixture modeling: A Monte Carlo simulation study. *Structural equation modeling*, *14*(4), 535-569.

Pacifico, D., & Yoo, H. (2013). lclogit: a Stata command for fitting latent-class conditional logit models via the expectation-maximization algorithm. *Stata journal.*, *13*(3), 625-639.

Shen, J. (2009). Latent class model or mixed logit model? A comparison by transport mode choice data. *Applied Economics*, *41*(22), 2915-2924.

Tew, C., & Barbieri, C. (2012). The perceived benefits of agritourism: The provider's perspective. *Tourism Management*, *33*(1), 215-224.

Train, K. E. (2008). EM algorithms for nonparametric estimation of mixing distributions. *Journal of Choice Modelling*, *1*(1), 40-69.

United States Department of Agriculture. (2014). Ag census: desktop data query tool [Data file]. Retrieved from: http://www.agcensus.usda.gov/Publications/2012/

Van Sandt, A., & Thilmany, D. (2017). A Spatial Analysis of Agritourism in the U.S.: What's Driving Clusters of Enterprises? A Working Paper.

Van Sandt, A., & Thilmany, D. (b) (2017). Place Based Factors and the Success of Farm Level Agritourism: A Spatial Interaction Model of Agritourism in the U.S. A Working Paper.

Veeck, G., Che, D., & Veeck, A. (2006). America's Changing Farmscape: A Study of Agricultural Tourism in Michigan*. *The Professional Geographer*, 58(3), 235-248.

Wen, C. H., & Lai, S. C. (2010). Latent class models of international air carrier choice. *Transportation Research Part E: Logistics and Transportation Review*, *46*(2), 211-221.

Figure 1.

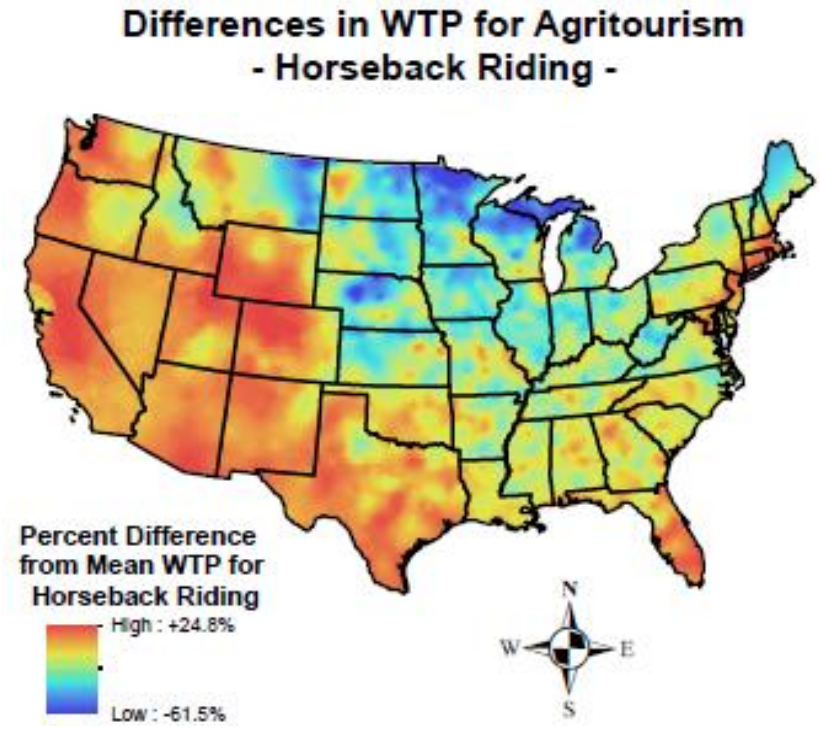


Figure 2.

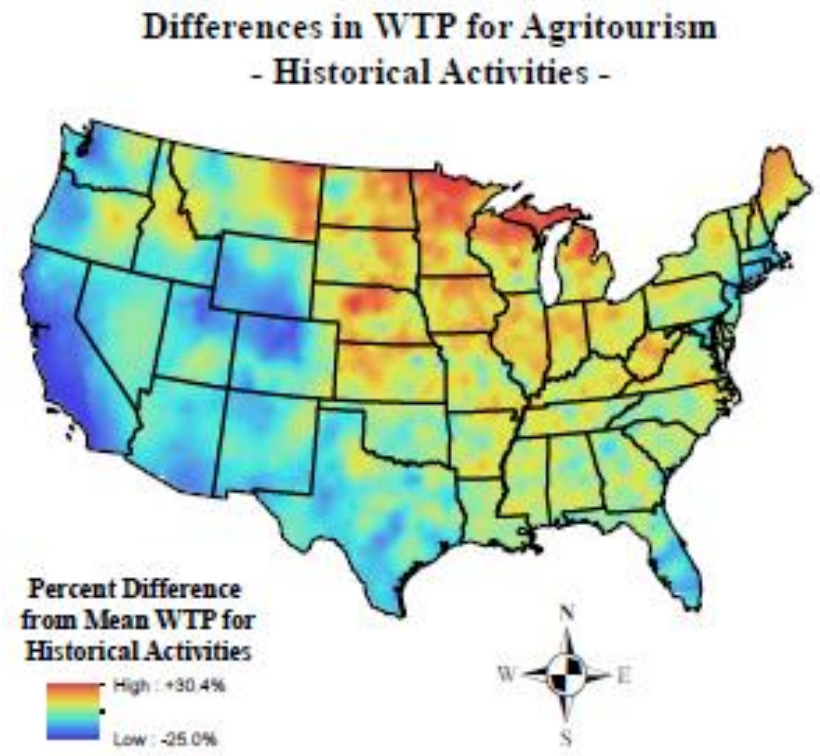


Figure 3.

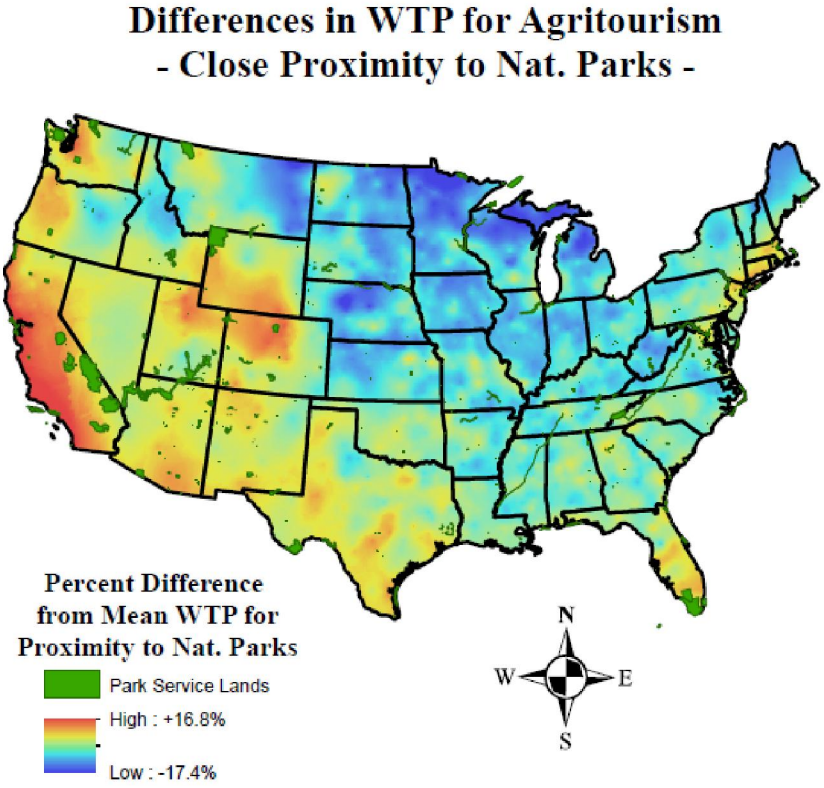
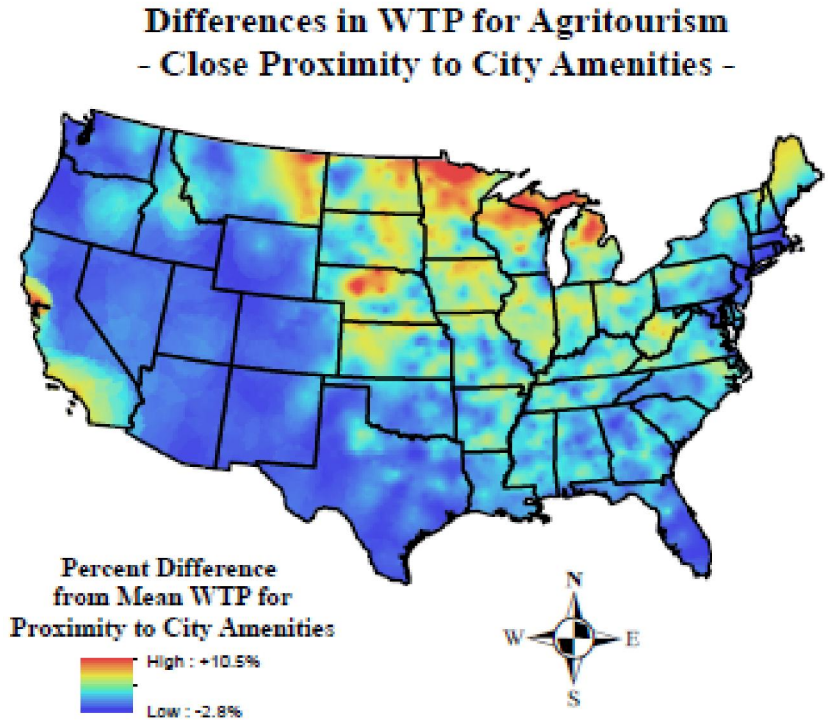


Figure 4.



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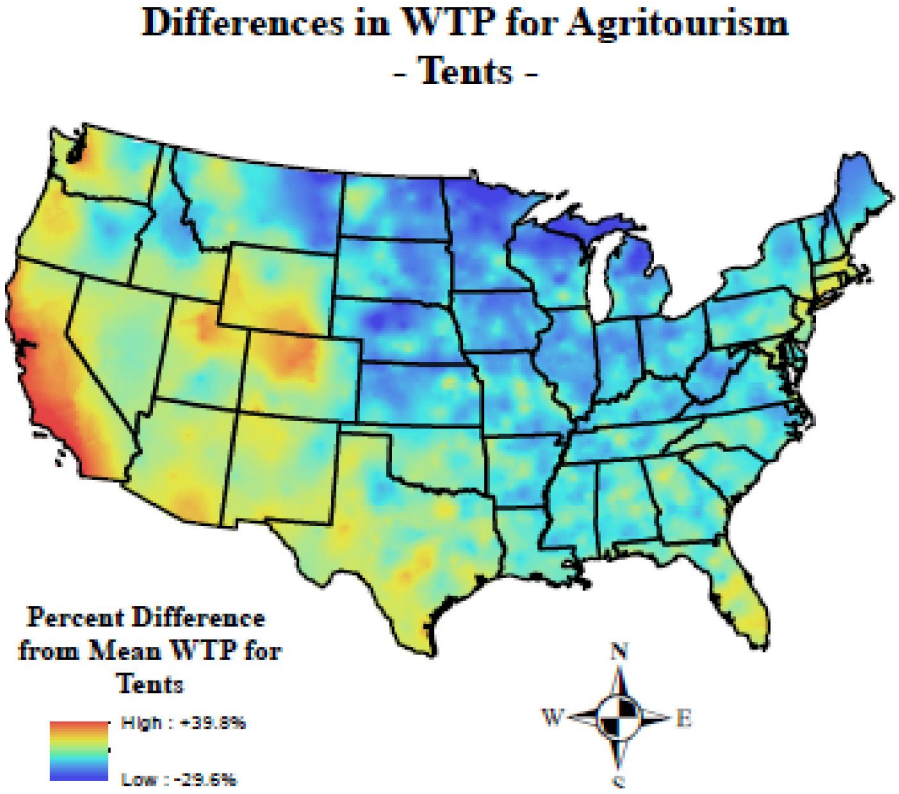

Figure 6.

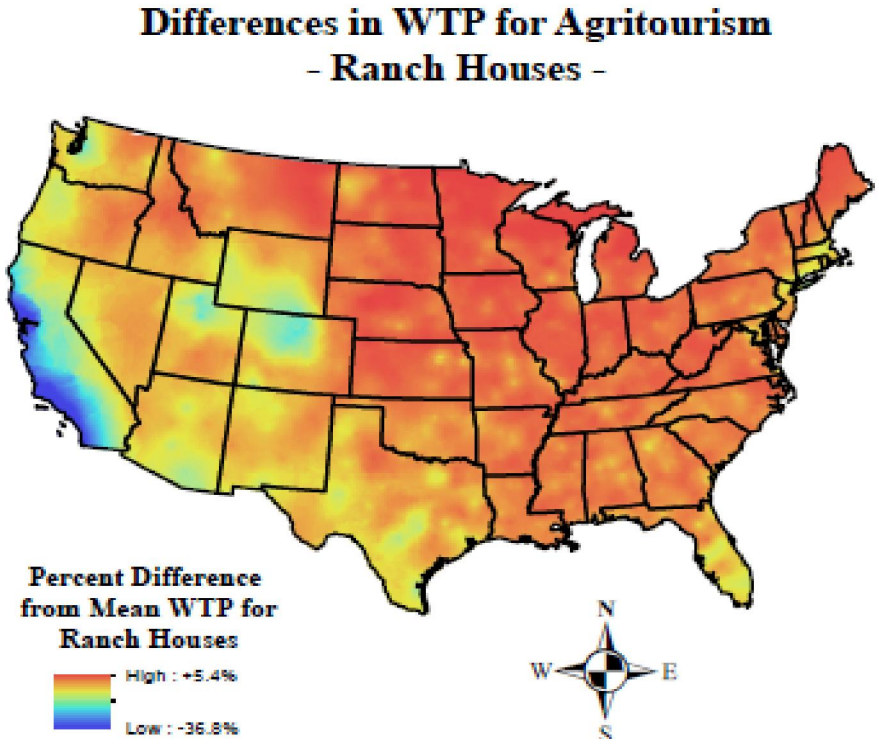

Table 1. Latent Class Logit		Class 1		Class 2		Class 3		Class 4	
Class shares		24.7%		33.8%		20.7%		20.8%	
	Variables	**Comfort Tourists**		**Adventurers**		**Road Trippers**		**Urbanites**	
		$\hat{\beta}$	$\widehat{WTP}$	$\hat{\beta}$	$\widehat{WTP}$	$\hat{\beta}$	$\widehat{WTP}$	$\hat{\beta}$	$\widehat{WTP}$
	Price	-0.0028***	-	-0.0002***	-	-0.0007***	-	-0.0029***	-
	Rating	0.2527*	$ 89.34	0.2290*	$ 1,254.58	0.3060***	$ 454.08	0.6704***	$ 231.97
Lodging	Tent	-0.1103	$ -39.00	0.2402	$ 1,316.33	-2.1001***	$ -3,116.31	-7.2454***	$ -2,507.16
Lodging	Ranch House	0.5254***	$ 185.77	0.0999	$ 547.51	1.9278***	$ 2,860.73	-2.4342***	$ -842.31
Lodging	Cabin	0.1593	$ 56.31	0.1019	$ 558.42	2.4905***	$ 3,695.72	0.5361	$ 185.51
Lodging	Bed and Breakfast	-	-	-	-	-	-	-	-
Act.	Historical Excursion	0.6282	$ 222.11	-0.1012	$ -554.53	0.3463**	$ 513.93	4.1903***	$ 1,449.97
Act.	Horseback	0.4287	$ 151.58	0.2074*	$ 1,136.17	0.3134	$ 465.07	-7.9613***	$ -2,754.86
Act.	City	-0.3617	$ -127.91	0.0220	$ 120.78	0.5845***	$ 867.40	7.5842***	$ 2.62
Act.	Quaint Town	0.1401	$ 49.53	-0.1069	$ -585.91	1.2311***	$ 1,826.90	0.1170	$ 0.04
Surr. Area	Remote	-	-	-	-	-	-	-	-
Surr. Area	Distance to Nat. Park	-0.0462	$ -16.33	0.0126	$ 68.96	-0.3344***	$ -496.20	-1.5887***	$ -0.55
Class Membership	Agritourism Revenue	0.2146		0.2970**		0.2681*		-	
Class Membership	Ln(income/capita)	0.6411***		1.0627***		0.2245		-	
Class Membership	Age	0.0036		-0.0286***		0.0361***		-	
Class Membership	Natural Amenities Scale	-0.0397		0.0740*		-0.1365***		-	

Minutes to Urban Area	0.0041	0.0026	-0.0015	-
Constant	-2.5733***	-3.0390***	-2.3065***	-
*** P-value<1%		Observations: 751		
** P-value<5%		Average Max Posterior Probability: 0.8809		
* P-value<10%				