

## **The Price of Public Land: Elasticity of Demand Analysis of National Parks Entrance Fees**

### **Purpose**

The purpose of this project is to assess the price elasticity of demand of those who attend National Parks. It will use data from the past ten years to measure the consumer response to changes in park entrance fees over this time period. In addition, this project will measure the impact of the existence of entrance fees on the sociodemographic characteristics of park attendees in an effort to estimate the impact of fee changes on low-income families. The information gathered from this research could inform the National Parks Service of potential pricing strategies which could be used to raise revenue and fund park maintenance.

### **Project Importance**

In recent years, attendance at National Parks has skyrocketed to all-time highs. Over the past decade, many parks have seen increases in visitation rates of 20 to 25 percent. In 2015, NPS sites welcomed a record-high of 307 million visitors.<sup>1</sup> However, this record was soon broken with the 331 million visits which occurred in 2016 and again in 2017.

While the number of visits is quickly increasing, National Parks funding is declining. Last year, President Trump announced plans to cut the park service's budget by 12.9 percent.<sup>2</sup> In response to this budget cut, the Parks System proposed a dramatic increase in entrance fees. Their proposal to raise fees to 70\$ per vehicle at the most popular parks would more-than-double current rates.<sup>3</sup> Their hope was that revenue raised from the fee increase would be used to fund the \$11.3 billion backlog of maintenance needs.

However, this proposal was immediately met with backlash from the public and media. Opponents of the fee change claimed that such a steep price increase would "price out" lower-income families.<sup>4</sup> They argued that these public natural spaces should be available to all Americans, regardless of socioeconomic status. By the contrary, those in support of the entrance fee point out that entrance fees only represent a fraction of the total cost required to attend national parks. Attendance at national parks often requires high travel and equipment costs which far exceed the minimal cost of park entrance.<sup>5</sup> Although an entrance fee increase may limit those who attend national parks, it is important to remember that these people may already be constrained by other barriers. Therefore, it is possible that a fee increase would have little to no effect on park attendance, even among the economically disadvantaged.

Given the debate and clear public controversy regarding the fee proposal, the decision to increase fees was not easy; the parks system deliberated for over five months before finally

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<sup>1</sup> National Park System Sees More Than 330 Million Visits. (2018, February 28). Retrieved April 20, 2018, from <https://www.nps.gov/orgs/1207/02-28-2018-visitation-certified.htm>

<sup>2</sup> Beatrice Dupuy (2017, October 25). The Trump administration wants new high fees at national parks. Retrieved from <http://www.newsweek.com/national-park-service-hikes-prices-692588>

<sup>3</sup> Ibid.

<sup>4</sup> Thomas More & Thomas Stevens (2000). Do user fees exclude low-income people from resource-based recreation? *Journal of Leisure Research* 32(3), 341-357.

<sup>5</sup> Ibid.

reaching a conclusion. Their current plan involves a much more moderate, five-dollar fee increase, which will occur beginning June 1 at the majority of the parks.<sup>6</sup> However, it is unclear how this fee will impact park attendance or if it will generate the amount of revenue required to keep the parks maintained. It is probable that the issue of park funding will be revisited in the coming months and years. As potential solutions are considered, it is important to consider not only the impact that additional entrance fees will have on park attendance, but also the impact that such fees impose on lower-class families and individuals. Economist Margaret Walls of Resources for the Future sheds light on some of the needs for further research in this area:

Figuring out an efficient and fair fee structure will not be easy. It requires detailed data on visitation, for starters, as well as analysis to shed light on price elasticities of demand for different groups of visitors at different locations. This means going beyond simple visitor counts to collection of sociodemographic information. It may also require some experimentation.<sup>7</sup>

As Walls points out, developing an effective fee structure will require detailed economic research into the price elasticities of demand for groups of different socioeconomic backgrounds. Such research does not yet exist. Thus, it is vital that this data be collected and analyzed so that we can better understand ~~how these fee changes affect the demographics of park visitors~~. Further research and experimentation in this area will provide vital information which can be used to ensure that parks continue to serve the entire American public.

great!

### Project Overview

Although recreation is a growing field of study, very little research has been done with specific regard to recreation at national parks. Even less has been done to analyze the impact of national parks entrance fees on visitor demographics. However, several notable studies provide valuable insights into this area of study. The Journal of Leisure Research published an article in 2000, "Do User Fees Exclude Low-income People from Resource-based Recreation?" which specifically examines the varying opinions of different sociodemographic groups with regard to recreation fees. This study was conducted by Thomas Moore of the USDA Forest Service and Thomas Stevens of the Department of Resource Economics at the University of Massachusetts who surveyed households in New Hampshire and Vermont. The results of the survey showed that recreational park entrance fees may substantially reduce participation by those earning less than \$30,000 per year. According to the survey, 23% of low-income respondents indicated that they had either reduced use or gone elsewhere as a result of recent fee increases, while only 11% of high-income users had made such changes. When considering the implementation of a \$5 daily fee for use of public lands, 49% of low-income households reported that this would affect their decision to attend as compared to 33% of high-income respondents.<sup>8</sup> Moore and Stevens

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<sup>6</sup> Entrance Fees by Park (U.S. National Park Service). Retrieved April 25, 2018, from <https://www.nps.gov/aboutus/entrance-fee-prices.htm>

<sup>7</sup> Margaret A. Walls, "Protecting Our National Parks: New Entrance Fees Can Help," *Resources for the Future*, 193, (2016) <http://www.rff.org/research/publications/protecting-our-national-parks-new-entrance-fees-can-help>

<sup>8</sup> Thomas More & Thomas Stevens (2000). Do user fees exclude low-income people from resource-based recreation? *Journal of Leisure Research* 32(3), 341–357.

show powerful evidence to support the claim that increased entrance fees could decrease attendance of the lower-income visitors disproportionately to those of the higher-income bracket. However, their research represents a small, isolated sample, which does not necessarily reflect the attitudes of the greater American public.

A more recent study performed by the same authors analyzed the elasticity of demand for national parks from 1993 to 2010.<sup>9</sup> This study found that entrance fees have a statistically significant, but minimal impact on attendance at nature-based natural parks. Fluctuations in attendance rates over this time period were more strongly correlated with fuel prices. This indicates that travel costs are a much stronger factor in a visitor's decision to attend a national park than is the entrance fee. It is possible that increasing the entrance fee would only minimally impact the economically disadvantaged. However, it is difficult to make a conclusive argument about the impact of these price increases on visitor demographics. In addition, this study was done during a period in which attendance at national parks was declining. During the past decade, attendance at parks has increased dramatically.

For my research, I propose to use a similar model to the above-mentioned study to assess the elasticity of demand for national parks attendance over the past decade. I will use data made available by the National Parks Service on monthly attendance rates at the top 20 most popular National Parks from 2007-2017. I will combine this data with entrance fee listings at each of these parks over this time period to track responses in park attendance to fluctuations in price. I will control for seasonal effects as well as fuel prices. I will obtain data for fuel prices over the past decade from the US Energy Information Administration, which lists average diesel retail prices in the US for every month since 1996.<sup>10</sup>

The demographic analysis portion of my project will come from a natural experiment that I will conduct, using information about the cars entering national parks as a proxy for the income level of the visitors. I will collect this data by using a webcam recording of the cars as they enter the front entrance gates Arches and Zions National Parks. The feeds for these webcams is publically available online and can be easily recorded. From these recordings, I will identify the car makes and models will use Kelly Blue Book listings to generate a value amount for each car that enters the park. The data I collect will serve as a proxy for the income level of the visitors entering the park. I will collect this data on the National Parks free day, which I will then compare to data collected on a non-free day. I will collect the data on the same day of the week as the free day and on a day with similar weather conditions so as to control for as much variance as possible.

The most difficult part of this process will be identifying the cars once I have collected the video footage. I propose to find a car expert who can assist me in this process. One possible method would be to employ students from the UVU Automotive Technology program who are already very familiar with cars and could easily identify the makes and models. Another

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<sup>9</sup> Thomas More et. Al. Declining National Park Visitation: An Economic Analysis. Journal of Leisure Research, 46, (2014)

<sup>10</sup> US Energy Information Administration. (2018, April 30). Petroleum & Other Liquids. Retrieved May 1, 2018, from [https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=EMD\\_EPD2D\\_PTE\\_NUS\\_DPG&f=M](https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=EMD_EPD2D_PTE_NUS_DPG&f=M)

alternative would be to use the Amazon Mechanical Turk system to employ inexpensive labor. Either of these alternatives would require Honors Program funding to compensate those who assist me in identifying the cars. Once I have obtained and coded all of this data, I should be able to compare the mean car values of visitors at each of these parks on the free and pay days, thus identifying the impact of the existence of an entrance fee on sociodemographic characteristics. I will use a regression discontinuity design to measure the impact of free admission on the type and number of cars entering the parks. This will provide valuable insights into how individuals and families respond differently to admission fees. My hypothesis is that the free day will attract a much higher number of cars, but that the value of these cars will be lower than it is during regular pay days.

### **Qualifications of Thesis Committee**

**Dr. Jocelyn Wikle, Advisor** – Even before agreeing to be my thesis advisor, Dr. Wikle has been a mentor to me. She was the professor who first introduced me to empirical research and econometrics. After I completed her Econ 388 course, Dr. Wikle continued to work with me as my mentor for the Mary Lou Fulton Mentored Student Research Conference. Dr. Wikle's areas of expertise include Public and Labor Economics. Her experience in public policy will be extremely valuable in assessing the impacts of national parks policy. In addition, much of Dr. Wikle's research focuses on family economic decision-making. Her unique specialty in this area will also be useful as this project centers around family demographics.

Recently, Dr. Wikle has worked on a project very similar to mine. Her paper "Every Kid (and Family) in a Park? Free National Parks Admission for Children and Spillovers in Family Recreation" focuses on the impact of national park fees on family recreation. In the paper, she specifically looks at the impact of the park admission fee on socioeconomic and ethnic demographics by comparing recreational outcomes of families who qualify for free national parks admission with those who do not. Her paper seeks to identify the impact of free admission on qualified families. However, she also isolates this impact to specific income and ethnic subpopulations in an effort to identify disparities between these groups. Dr. Wikle's prior knowledge and expertise in the exact area I wish to study will prove invaluable in my research process.

**Dr. Lars Lefgren, Reader** – Dr. Lefgren was my professor for Applied Econometrics. He also mentored me and two other students in the Mary Lou Folton Mentored Student Research Conference this past month. His specialty in applied microeconomics and expertise in empirical research design make him a highly qualified reader. He will be able to provide an objective analysis of my thesis and will offer valuable feedback which will help as I work to refine my research design and econometric models.

**Dr. John Stovall, Honors Coordinator** – Dr. Stovall will provide a unique perspective to my research. Dr. Stovall is different from the other two faculty on my committee in that his areas of interest cover a more theoretical, rather than applied approach. Dr. Stovall's research focus is primarily in microeconomic theory. This will be useful because he will provide new insights and will be able to critique the theoretical approach behind my design and models. Also, his

experience as the Honors Coordinator will allow him to walk me through the process and coordinate my efforts with the Honors Program.

### **Project Timeline**

April 14: Pay Day— Record videos of webcams

April 21: Free Day— Record videos of webcams

May 5: Pay Day—Record videos of webcams

May-June: Identify cars, begin coding data

July: Code data—value each car using Kelly Blue Book, enter data

August-September: Clean up data, develop models, run initial regressions, write first draft

September 24: Submit first draft

October 1: Receive feedback from first draft, begin revisions

October 20: Submit second draft

October 26: Receive feedback on second draft, schedule Thesis defense

*November 2: Last Day to Schedule Thesis Defense*

October 26- November 5: Final edits

November 5: Submit Final

*November 30: Last Day to hold Thesis Defense*

### **Funding**

Request funding through Honors Program. Will fund up to \$1,000.

My main expense will be employing car experts to identify the cars from my webcam feed videos. As mentioned above, I will need to employ either UVU students or Mechanical Turks to help me with car identification. With three days of coverage at two parks, I will have 70 hours of footage. The videos will take slightly longer than real-time to process. Therefore, it will require at least 85 man hours. I don't know the exact rate, but my estimate would be that I would need to pay approximately \$10-12 an hour. This would require \$850-1020 for financial compensation. I hope to keep the expenditure below \$1000, however, if I exceed \$1000, I will fund the remainder with personal funds.

I am requesting \$1,000 from Honors to fund the data collection process.

### **Culminating Experience**

Since I will be studying two parks in the state of Utah, the results of my research will be extremely relevant to local policy. Thus, I hope to share my results with local congressmen. I will contact US Congressman Rob Bishop who currently serves on the House Natural Resources Committee and who represents Utah's first congressional district. I also hope to share my results with the National Parks Service Advisory Board which advises the Department of the Interior on issues relating to national parks. My hope is that my research will promote additional research to better understand price elasticity of demand for national parks in an effort to better inform future policy decisions.