

The overcrowding of Zion National Park: is it a pricing problem?

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Abstract:

In 2017, *The New York Times* sounded the alarm that 'the number of [U.S. national] park visitors have reached an unprecedented level, leaving many tourists frustrated and many environmentalists concerned about the toll of overcrowding.' We address herein the overcrowding issue at Zion National Park in an effort to provide empirical context for upcoming Congressional consideration of entrance fees at national parks under the Federal Lands Recreation Enhancement Act. Zion is the fourth largest of the 63 U.S. national parks encompassing 148 thousand acres and welcoming 4.5 million recreation visits in 2019. We determine from U.S. National Park Service data that severe overcrowding occurs during the summer months of June, July, and August. One way to possibly reduce overcrowding is to increase the price. We estimate that if the entrance fee to Zion was increased from \$35.00 per vehicle to \$70.00 per vehicle during those months, the number of recreation visits would decrease by more than 18 percent and would result in an acceptable number of recreation visits defined to be what is experienced in May.

Keywords: national parks | Zion National Park | Federal Lands Recreation Enhancement Act | elasticity of demand

Article:

1. Introduction

On August 25, 1916, during the administration of President Woodrow Wilson, the National Park Service (NPS) was established within the U.S. Department of Interior through the Act to Establish a National Park Service (Organic Act) (39 Stat. 535):

The [National Park Service] thus established shall promote and regulate the use of the Federal areas known as national parks, monuments, and reservations hereinafter specified by such means and measures as conform to the fundamental purpose of the said parks,

monuments, and reservations, which purpose is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.

However, in recent years U.S. national parks have become overcrowded. On September 27, 2017, Julie Turkewitz published ‘National Parks Struggle with a Mounting Crisis: Too Many Visitors’ in *The New York Times* newspaper in which she sounded an alarm:¹

... the number of park visitors has reached an unprecedented level, leaving many tourists frustrated and many environmentalists concerned about the toll of overcrowding.

The overcrowding of the national parks is not a new issue, in fact, it is an issue that is nearly a century old. Horace Albright, the second Director of the NPS from 1929 to 1933,² wrote in his retirement resignation letter (Albright, Dickenson, and Mott 1978, 51):

Park usefulness and popularity should not be measured in terms of mere numbers of visitors. Some precious park areas can easily be destroyed by the concentration of too many visitors. We should be interested in the quality of park patronage, not by the quantity. The parks, while theoretically are for everyone to use and enjoy, should be so managed that only those number of visitors that can enjoy them while at the same time not overuse and harm them would be admitted at a given time. *We must keep elements of our crowded civilization to a minimum in our parks* [emphasis added]. Certain comforts, such as safe roads, sanitary facilities, water, food and modest lodging should be available. Also extra care must be taken for the children, the elderly and the incapacitated to enjoy the beauty of the parks.

In 2019,³ U.S. national parks welcomed nearly 320 million recreation visits.⁴ In that year, over 12.5 million visits were recorded at the Great Smoky Mountains National Park. It is the largest of the Nation’s 63 national parks encompassing about 522 thousand acres.⁵ The entrance fee to the Great Smoky Mountains National Park is \$0.

In this paper, we address overcrowding in one U.S. national park, Zion National Park, in an effort to provide empirical context for upcoming Congressional consideration of entrance fees at national parks under the Federal Lands Recreation Enhancement Act. Zion is the fourth largest national park encompassing about 148 thousand acres and welcoming nearly 4.5 million recreation visits in 2019. The entrance fee to Zion is currently \$35 per vehicle. On July 31, 2017,

¹ See <https://www.nytimes.com/2017/09/27/us/national-parks-overcrowding.html>.

² The first director of the National Park Service, from 1917 to 1929, was Stephen T. Mather.

³ We reference 2019 here and below because it is the full year prior to the COVID-19 pandemic. For an informed discussion about the post COVID-19 exacerbated overcrowded conditions at the national parks in Utah, USA, see Templeton, Goonan, and Fyall (2021).

⁴ We thank an anonymous reviewer for emphasizing to us that a visitor to a national park can generate more than one visit to the park under the same entrance fee. An entrance fee to Zion National Park is valid for 7 days, so a visitor can visit the park multiple times, and each visit is recorded in the data.

⁵ See <https://www.nationalparks.org/connect/blog/how-many-national-parks-are-there>.

Jim Robbins published ‘How a Surge in Visitors Is Overwhelming America’s National Parks’ in *Yale Environment 360* in which he wrote:⁶

Zion National Park in southwestern Utah is the poster child for the crowding of America’s most hallowed natural places.

We address the overcrowding issues at Zion National Park by asking if an increase in the vehicle entrance fee to the park (i.e. the price) would alleviate what *The New York Times* called the ‘toll of overcrowding.’⁷ A basic principle of public goods economics is that the pricing of a public good is inefficient because it rations the use of a good which is by its nature non-excludable (the use and enjoyment of the public good by one person does not prohibit the use and enjoyment of the public good by another person). However, while national parks have public good characteristics, overcrowding diminishes their non-excludability characteristic.⁸

Using data on monthly recreation visits to Zion National Park from the NPS for the years 1993 through 2019, we estimate the vehicle entrance fee (price) elasticity of demand, by month. Our empirical findings suggest that differential pricing by season of the year will reduce, if not alleviate, the overcrowding problem.

The remainder of the paper is outlined as follows. In Section II, we offer a brief history of the national park system and of Zion National Park. Our study is a case study of Zion because of its visibility as being ‘the poster child’ of overcrowded national parks. As such, our emphasis on Zion might give weight to our policy recommendations in Section V about seasonal pricing being a potential market solution to overcrowding.

The data that we use in this paper are described in Section III.

In Section IV, we present our econometric model and our empirical findings. In that section, we also relate our empirical methodology to the existing literature.

Finally, in Section V, we interpret our findings and offer an entrance fee policy recommendation for Congressional consideration about the use of seasonal pricing to address the issue of overcrowding at Zion National Park. And, based on the visibility of the Zion overcrowding experience in the popular press, our recommendation will likely apply to other national parks.

2. National parks

2.1. Brief history

As it has been written (Albright, Dickenson, and Mott, 1978, p. 6):

⁶ See <https://e360.yale.edu/features/greenlock-a-visitor-crush-is-overwhelming-americas-national-parks>.

⁷ Other scholars have suggested pricing policies to discuss various issues related to national parks, but not the issue of overcrowding. See, for example, Mulwa, Kabubo-Mariara, and Nyangena (2018) and Mukanjari, Muchapondwa, and Demeke (2020).

⁸ See, for example, Walls (2013) on this point for U.S. state parks. Her cogent argument applies equally well to U.S. national parks.

The seeds for the National Park Service were planted at an evening campfire in 1870 in the wilds of what would become Yellowstone National Park. Cornelius Hedge, a member of the Washburn-Langford party exploring this wild and unknown region, observed that it should always be preserved for the American people, never to be opened for commercialization. From this farsighted idea came the establishment of Yellowstone as the first national park in 1872, with others being created soon afterward, such as Yosemite and Sequoia in 1890—all carved out of the public domain. It was many years before the idea of a national park system would take form, but America had learned to protect and preserve its treasures.

And, Yellowstone National Park was established on March 1, 1872 by President Ulysses S. Grant's signature to An Act to Set Apart a Certain Tract of Land Lying Near the Head-Waters of the Yellowstone River as a Public Park, also known as An Act Establishing Yellowstone National Park. Yellowstone is the 'oldest member of the national park system' (Cameron 1923, 5).

With the support of President William Howard Taft and Secretary of Interior Franklin K. Lane, the National Park Service Act became law:

That there is hereby created in the Department of the Interior a service to be called the National Park Service, which shall be under the charge of a director, who shall be appointed by the Secretary ...

2.2. Zion national park⁹

There are a number of references to the word *Zion* in both the Old Testament and the New Testament. All of the references use the word *Zion* to refer, conceptually as well as geographically, to a sanctuary in Jerusalem. Perhaps it is not surprising to those familiar with the beauty of Zion National Park that the Mormon settlers of the canyon floor along the Virgin River in the state of Utah called this place Zion Canyon.

Zion Canyon was settled in 1863 because of its agricultural potential. The area was later popularized by artist Frederick Dellenbaugh's paintings on display at the 1904 St. Louis World's Fair,¹⁰ and that attention soon reached the White House.

During the presidency of Woodrow Wilson, Congress passed An Act to Establish the Zion National Park in the State of Utah (41 Stat. 356) on November 19, 1919. Zion was the 15th national park established. Figure 1 shows the number of annual recreation visits to the park from 1919 through 2019. Over this period, more than 124.6 million recreation visits to the park have been recorded.

⁹ This section is based on <https://www.nationalparkstraveler.org/parks/zion-national-park/park-history-zion-national-park>.

¹⁰ See <https://www.nps.gov/zion/learn/historyculture/frederick-samuel-dellenbaugh.htm>.

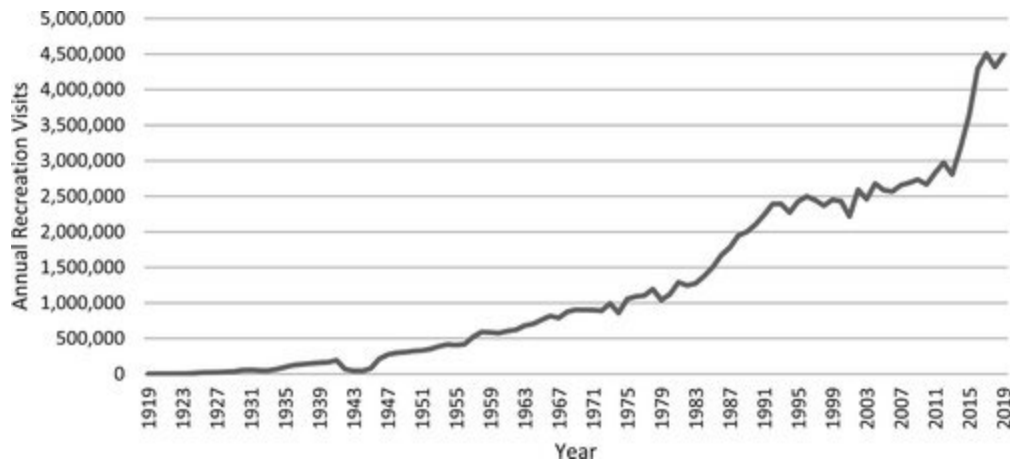


Figure 1. Annual Recreation Visits to Zion National Park, 1919–2019.
 Source: U.S. National Park Service, <https://irma.nps.gov/STATS/Reports/Park>.

3. Description of the data

The data that we use to estimate the vehicle entrance fee elasticity of demand to Zion National Park come from the NPS.¹¹ As discussed below, the variables relevant for our econometric model are the number of recreation visits, the vehicle entrance fee to the park,¹² and the price of gasoline. Figure 2 shows the vehicle entrance fees (\$ current) to the park over the years 1993–2019.¹³

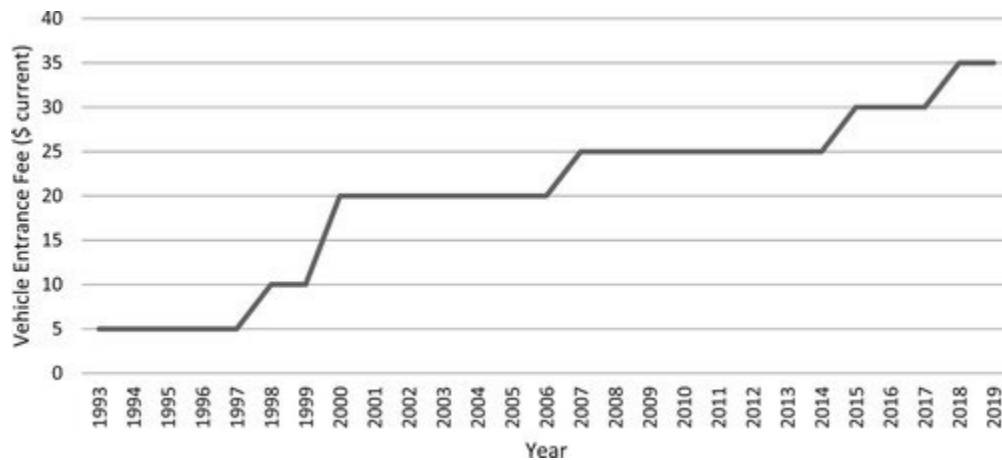


Figure 2. Vehicle Entrance Fees (\$ current) to Zion National Park, 1993–2019.

Source: Data on entrance fees came from <https://www.nps.gov/aboutus/entrance-fee-prices.htm> and from the National Park Service. Entrance fee data begin in 1993.

¹¹ We thank Bret Meldrum, National Park Service Chief of the Social Science Program, and Christine Williamson, National Park Service Recreation Fee Program Manager, for their assistance during the data collection phase of this study.

¹² Data are available from the NPS by year on vehicle entrance fees and per person entrance fees if there is one individual in a vehicle. In recent years, data have become available on motorcycle entrance fees. The literature related to the elasticity of demand for national parks relies on vehicle entrance fees.

¹³ These are the years for which entrance fee data are available from the NPS.

Table 1 presents descriptive statistics on these variables using annual data for 1993–2019. Table 2 shows the descriptive statistics, by month, over the same time period.

Table 1. Descriptive Statistics on Relevant Variables, Annual Data for 1993–2019 ($n = 27$).

Variable	Mean	Standard Deviation	Minimum	Maximum
Recreation Visits	2,895,992	703,482	2,217,779	4,504,812
Vehicle Entrance Fee (\$ current)	20.19	9.35	5.00	35.00
Vehicle Entrance Fee (\$2019)	24.54	8.97	7.97	35.59
Gas Price Index (1982-1984 = 100)	187.46	76.49	92.60	321.64
Gas Price Index (2019 = 100)	0.806	0.329	0.398	1.383

Notes: June Consumer Price Index for All Urban Consumers: All Items in U.S. City Average was used to construct inflation-adjusted annual entrance fees.

June Gas Price Index is the Consumer Price Index for All Urban Consumers: Gasoline (All Types) in U.S. City Average, 1982-1984 = 100 was used to construct the annual Gas Price Index.

Both data series come from the Federal Reserve Bank of St. Louis.

Table 2. Descriptive Statistics on Relevant Variables, Monthly Data for 1993–2019 ($n=27$ per month). Mean, (Standard Deviation), [minimum, maximum].

Month	Recreation Visits	Vehicle Entrance Fee (\$2019)	Gas Price Index (\$2019)
January	69,275.26 (13,420.19) [52,236, 107,960]	25.09 (9.18) [8.11, 36.35]	0.736 (0.302) [0.356, 1.267]
February	75,567.74 (19,713.97) [50,599, 127,790]	25.04 (9.16) [8.09, 36.26]	0.745 (0.311) [0.350, 1.352]
March	186,128.63 (80,675.49) [95,231, 373,523]	24.99 (9.14) [8.09, 36.27]	0.749 (0.308) [0.360, 1.311]
April	284,708.26 (84,511.00) [189,511, 515,652]	24.94 (9.12) [8.08, 36.19]	0.756 (0.310) [0.367, 1.312]
May	310,866.26 (95,242.66) [198,731, 529,553]	24.89 (9.10) [8.08, 36.09]	0.758 (0.312) [0.375, 1.293]
June	375,218.33 (82,736.09) [298,448, 594,896]	24.84 (9.08) [8.07, 36.01]	0.770 (0.314) [0.380, 1.321]
July	388,523.44 (89,021.28) [294,996, 629,802]	24.78 (9.06) [8.06, 35.97]	0.774 (0.320) [0.379, 1.372]
August	379,501.78 (59,420.79) [312,162, 535,322]	24.73 (9.05) [8.04, 35.91]	0.784 (0.321) [0.371, 1.311]
September	339,660.70 (71,757.64) [261,476, 512,940]	24.68 (9.03) [8.02, 35.86]	0.793 (0.320) [0.368, 1.342]
October	267,730.59 (67,152.43) [179,932, 429,604]	24.65 (9.03) [8.00, 35.78]	0.783 (0.311) [0.372, 1.367]
November	139,391.70 (42,076.66) [90,568, 232,271]	24.64 (9.03) [7.99, 35.80]	0.763 (0.301) [0.367, 1.295]

Month	Recreation Visits	Vehicle Entrance Fee (\$2019)	Gas Price Index (\$2019)
December	79,418.81 (31,522.08) [47,283, 171,706]	24.61 (9.02) [7.99, 35.80]	0.757 (0.299) [0.359, 1.258]

Notes: Data on the entrance fee (\$ current) is the same for each month of a year: mean=20.19, standard deviation=9.35, minimum=\$5.00, maximum=\$35.00.

Data on recreation visits to the park came from <https://irma.nps.gov/STATS/Reports/Park>.

Data on entrance fees came from <https://www.nps.gov/aboutus/entrance-fee-prices.htm> and from the National Park Service. Entrance fee data begin in 1993, thus delimiting the number of years of visitation data available for our analysis.

With reference to Table 2, the months of June, July, and August are the busiest of the year for recreation visits, followed by September and then May. The mean monthly number of recreation visits over the years 1993–2019 is highest in July with 388,523 recreation visits. See Figure 3. Also note from Table 2 that the mean inflation-adjusted monthly vehicle entrance fee, in \$2019, is virtually unchanged over the 12 months, but it does decrease slightly in the second half of the year (and mean monthly recreation visits are slightly greater in the second half of the year compared to the first half). A similar pattern of recreation visits is present in 2019, as shown in Figure 4.

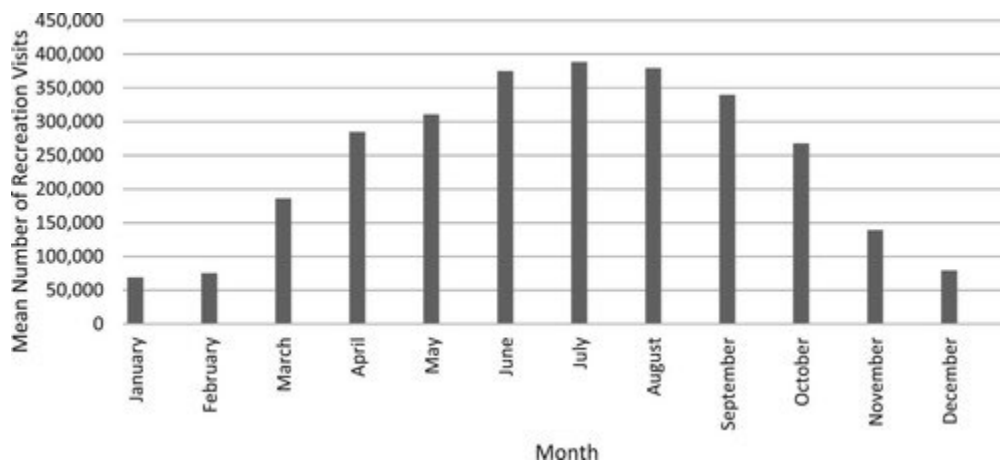


Figure 3. Mean Monthly Number of Recreation Visits to Zion National Park, 1993–2019 (n=27 per month).

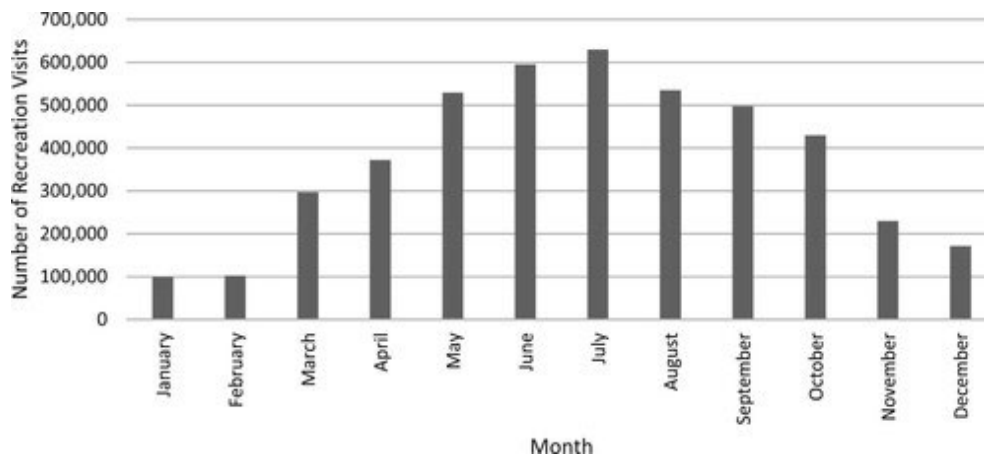


Figure 4. Number of Recreation Visits to Zion National Park in 2019, by Month.

4. Econometric model and empirical findings

The structure of our econometric model follows the relevant literature closely (see, for example, McIntosh and Wilmot 2011; Nerg et al. 2012; Stevens, More, and Markowski-Lindsay 2014; Melstrom and Vasarhelyi 2019). We consider a log-linear park recreation visits model ($\ln Visits$), and we hold constant inflation-adjusted vehicle entrance fees ($\ln EnterFee$) and inflation-adjusted gasoline prices ($\ln PriceGas$) as defined in Table 2. Gasoline is viewed as a complement to park recreation visits. We also include a trend variable ($Year$). Thus, our model is:¹⁴

$$\ln Visits = f(\ln EnterFee, \ln PriceGas, Year).$$

We estimate the model separately by month to allow for not only differences in the error structure across months, but also because we are interested in the possibility of seasonal variation in pricing effects. The focus on monthly regressions and a single park necessitates a parsimonious model specification.

We are assuming that gasoline prices and entrance fees are exogenous to the model in equation (1). The NPS sets entrance fees under the Federal Lands Recreation Enhancement Act (FLREA; 16 U.S.C. §§6801-6814).¹⁵ According to the NPS, since 2014, entrance fees are standardized across groups of national parks using pricing models. Beginning in 2018, the pricing models were updated, by group, and will be every three years.¹⁶ About 80 percent of entrance fees are used for structural repairs with the park, and about 20 percent of fees are used for the benefit of parks that do not charge fees.¹⁷

We estimate the model in equation (1) using Ordinary Least Squares (OLS), and the results are presented in Table 3. Because these are time series data, we use the Durbin-Watson (DW) test to consider the possibility of autocorrelation in the error terms. For a sample size of 27 and 3 regressors, the lower Durbin-Watson critical value is 0.948 and the upper critical value is 1.413. The Durbin-Watson statistics for the regressions are given in the DW column of Table 3. For January through November, we fail to reject the null hypothesis of no autocorrelation. For December, the Durbin-Watson statistic falls in the indeterminate range. Because it is relatively

¹⁴ We also considered specifications that included a binary variable for the Great Recession (2008 and 2009) and a binary variable for the events of 911 (2001 and 2002). These variables were not significant at conventional levels, although the 911 variable was generally negative.

¹⁵ This Act is Title VIII of Public Law 108-447 dated December 8, 2004. The Act states that fees (called recreation fees) be established on the basis of the following criteria: '(1) The amount of the recreation fee shall be commensurate with the benefits and services provided to the visitor. (2) The Secretary shall consider the aggregate effect of recreation fees on recreation users and recreation service providers. (3) The Secretary shall consider comparable fees charged elsewhere and by other public agencies and by nearby private sector operators. (4) The Secretary shall consider the public policy or management objectives served by the recreation fee. (5) The Secretary shall obtain input from the appropriate Recreation Resource Advisory Committee, as provided in section 4(d). (6) The Secretary shall consider such other factors or criteria as determined appropriate by the Secretary.'

¹⁶ See <https://www.nps.gov/aboutus/fees-at-work.htm>. Zion National Park is within a group of larger and more visited national parks that includes Bryce Canyon, Glacier, Grand Canyon, Grand Teton, Rocky Mountain, Sequoia, Kings Canyon, Yellowstone, and Yosemite (USGAO 2015).

¹⁷ See <https://www.nps.gov/aboutus/fees-at-work.htm>. Of the 63 national parks, 22 do not charge an entrance fee.

close to the upper critical value, and for consistency with the other 11 months, we treat this as a failure to reject the null hypothesis of no autocorrelation.¹⁸

Table 3. Regression Results for Equation (1). (standard errors in parentheses).

Month	<i>lnEnterFee</i>	<i>lnPriceGas</i>	<i>Year</i>	R-squared	D.W
January	-0.029 (0.080)	-0.390*** (0.108)	0.032*** (0.007)	0.578	1.65
February	-0.126 (0.080)	-0.463*** (0.103)	0.048*** (0.007)	0.754	1.68
March	-0.163 (0.097)	-0.336** (0.127)	0.068*** (0.008)	0.873	1.77
April	-0.111 (0.073)	-0.273** (0.100)	0.048*** (0.006)	0.841	2.23
May	-0.064 (0.054)	-0.251*** (0.072)	0.048*** (0.005)	0.925	1.94
June	-0.160*** (0.055)	-0.277*** (0.073)	0.041*** (0.005)	0.835	1.66
July	-0.193** (0.055)	-0.283*** (0.070)	0.043*** (0.004)	0.844	1.64
August	-0.208*** (0.044)	-0.277*** (0.056)	0.034*** (0.004)	0.806	1.43
September	-0.178** (0.048)	-0.289*** (0.060)	0.041*** (0.004)	0.870	1.51
October	-0.210* (0.079)	-0.320** (0.107)	0.046*** (0.006)	0.743	1.94
November	-0.153** (0.045)	-0.331*** (0.065)	0.054*** (0.004)	0.942	2.12
December	-0.205* (0.095)	-0.439** (0.131)	0.066*** (0.008)	0.831	1.35

Key: n=27 for each monthly equation.

Note: DW represents the Durbin-Watson statistic; Critical values are $d_L = 0.948$ and $d_U = 1.413$.

*** significant at .01-level, ** significant at .05-level, * significant at .10-level.

Based on conventional levels of statistical significance, we interpret the estimated vehicle entrance fee elasticities of demand for visitation to Zion National Park to be zero from January through May, and then to be relatively inelastic for the rest of the calendar year. For the months of June, July, and August, the average mean vehicle entrance price elasticity of demand is -0.187 . See Table 3. This estimated elasticity value suggests that during those three summer months, a 10 percent increase in the vehicle entrance fee would, on average, result in a 1.87 percent decrease in park recreation visits. Visitors do respond to prices during those months, but in a small amount.¹⁹

The estimated gasoline price elasticity of demand for a visit to Zion National Park is also negative, as expected under the hypothesis that gasoline is a complement to park visits.²⁰ Finally, holding the vehicle entrance fee and the price of gasoline constant, a positive upward trend in the demand for a visit to Zion National Park over the years 1993–2019 remains based on the estimated coefficients on *Year*.

5. Interpretation of our findings, policy considerations, and concluding remarks

¹⁸ The DW statistics suggests that autocorrelation in the December model is indeterminate, although it leans toward no autocorrection. Statistically, we cannot make a claim for or against autocorrelation in the December model. However, based on comments from an anonymous reviewer, we explored the structure of the error terms from the December regression model. Our inspection of the primary data and the error terms suggests that since 2013 there has been a marked increase in recreation visits to Zion National Park in that month, thus creating a smooth increase in the error terms from the model.

¹⁹ We also estimated equation (1) using annual data for 1993–2019. The estimated vehicle entrance fee elasticity of demand is -0.1435 . These results are available on request from the authors.

²⁰ When Jeff Olson, a National Park Service spokesman, was asked by Andrew Flowers in a 2016 interview (as reported in ‘The National Parks Have Never Been More Popular’ which appeared on the FiveThirtyEight website): ‘What explains this [post 2013] burst in popularity of the national parks?’, Olson answered, ‘You mean besides the price of gas?’

Our findings suggest that a pricing solution could be considered to address the overcrowding of Zion National Park. Consider the following illustrative analysis, which is based on our assumption about the acceptable maximum number of recreation visits to the park in any month.

In 1978, the U.S. Congress amended the National Park Service Organic Act of 1916. The amendment urged the NPS to adopt management plans for each park (Timmons 2019).²¹ However, it was not until 2006 that the NPS adopted new management plans to *begin* [our emphasis] to address overcrowding. The NPS is currently developing guidelines for the so-called ‘carrying capacity’ of its parks (Manning, Valliere, and Want 1999, 2002; Haas 2001).²² For purposes of the following illustrative analysis, assume that the acceptable maximum number of park recreation visits in any month is not greater than the mean number of recreation visits for, say, the month of May over the years 1993–2019: 310,866 recreation visits. See Table 2.²³

The average mean vehicle entrance fee elasticity of demand for the peak months of June, July, and August is -0.187 . The mean number of recreation visits to the park during those three months, over the years 1993–2019 was 381,081. See Table 2. To achieve 310,866 recreation visits during the months of June, July, and August, the number of recreation visits to the park would have to decrease from 381,081 to 310,866, or by 70,215 recreation visits, or by 18.425 percent.

Based on the average mean vehicle entrance fee elasticity of demand over the years 1993–2019 for a visit to Zion National Park of -0.187 , it follows that a 98.53 percent increase in the vehicle entrance price would be needed to achieve a 18.425 percent decrease in recreation visits during the peak three months. This reduction in the assumed acceptable maximum number of recreation visits to the park could be achieved if the current vehicle entrance fee about doubled from its current \$35.00 during the month of June, July, and August.²⁴

When interpreting our findings, it is important to note a number of limitations. First, with respect to the monthly pattern of recreation visits to Zion National Park, a reduction in the number of recreation visits in the summer months might result in an increase in visits in the non-summer months, particularly May and September, or it might result in an overall reduction in visits to

²¹ Timmons (2019) discusses with respect to Zion National Park not only the aesthetic losses from overcrowding but also the environment damages from overcrowding.

²² See Interagency Visitor Use Management Council (2019).

²³ Our choice to use the month of May as an illustrative point of reference is not completely arbitrary. From Figure 3, May is the month that precedes the visually apparent peak months of June through August. In practice, our empirical analysis could be used to determine the entrance fee increase necessary to achieve any predefined level of recreation visits.

²⁴ A doubling of the vehicle entrance fee to Zion is not unprecedented. In nominal terms, the fee went from \$5 to \$10 in 1998, and it went from \$10 to \$20 in 2000. Of course, our numerical finding of doubling the vehicle entrance price in June, July, and August is based on our choice of the month of May to illustrate the point that the overcrowding at Zion National Park can be curbed through a seasonal price increase. However, although not addressed in the literature, modifications to an entrance fee increase could be made for seniors or lower-income individuals, although both groups would need to be identified in a respectful manner such as the use of a specific park pass for lower-income individuals or for seniors who do not have an annual pass.

Zion National Park. Future research might attempt dynamic modelling of either of those scenarios.

In a similar vein, an increase in fees at Zion National Park might create spillover effects at other national parks or at other public areas. The magnitude of these spillover effects to other national parks will likely depend on any changes in fees at national parks that may be perceived as close substitutes to Zion National Park. Moreover, to the extent that nearby state parks or other attractions are perceived as close substitutes for Zion National Park, an increase in fees at Zion National Park can be expected to increase visits to those sites. We have not attempted to model these substitution patterns for lack of relevant data.

The relevance of a seasonal vehicle entrance fee across other national parks remains an empirical question. However, notwithstanding these limitations, our analysis clearly suggests that the overcrowding of one park, Zion National Park, during the peak summer season might be ameliorated by increasing the entrance fee in June, July, and August from \$35.00 per vehicle to \$70.00 per vehicle.²⁵ That said, the use of entrance fees is not the only allocation tool available in Zion National Park, or in any national park. *The New York Times* newspaper wrote on July 8, 2021:²⁶

Largely freed from domestic travel restrictions, Americans have been flocking to national parks in record numbers this spring and summer.

A reservation system was initiated in a number of national parks, including Zion National Park, to alleviate congestion.²⁷

While the NPS currently standardizes entrance fees for all national parks across groups of national parks, as noted above, it is authorized under the Federal Lands Recreation Enhancement Act to charge fees at recreation sites only until October 1, 2022.²⁸ Using the findings in this study as an example of the reduction in overcrowding as a result of seasonal entrance fees, perhaps the Department of the Interior will consider seasonal entrance fees in any related Congressional discussions about renewing the Act.

Disclosure statement

No potential conflict of interest was reported by the author(s).

References

²⁵ Seasonal pricing of outdoor recreation or park activities is certainly not a new concept as discussed by Wilman (1988) and Chase et al. (1998), but it has yet to be applied to any U.S. national park.

²⁶ See, <https://www.nytimes.com/2021/07/08/travel/crowded-national-parks.html>.

²⁷ For example, in Zion National Park a reservation system to purchase advance shuttle tickets was initiated from mid-May through the end of August 2021.

²⁸ The Federal Lands Recreation Enhancement Act authorizes certain agencies, including the NPS, to charge and collect recreation fees on federal recreational lands and waters, and to retain the collected fees primarily for on-site improvements. See <https://fas.org/sgp/crs/misc/IF10151.pdf>.

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