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Shred Central: Estimating the user benefits associated with large public skateparks

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ABSTRACT

Skateparks, often called 'wheel parks,' are becoming increasingly common within communities worldwide. Despite this growth in parks, estimates show that the development of parks needs to catch up to users. Using a count data travel cost model, we estimate the adult user benefits associated with the Lauridsen Skatepark in Des Moines, Iowa – the largest in the United States. We estimate adult user benefits to be $61 per user per day and roughly $488,000 annually. This work contributes to the literature by being the first study to use econometric techniques to estimate skatepark user benefits. Second, we develop a simple and easy-to-apply method to assist municipalities in determining community skatepark needs. Third, our results support the literature showing that skateboarders are increasingly diverse.

KEYWORDS

Count data model; travel cost; skateparks; skateboarding; action sports

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1. Introduction

Skateboarding entered the public consciousness roughly 60 years ago (Weyland, 2002; Balma, 2015; Borden, 2019). Since then, the hobby/sport has been through several boom periods (the early to mid-1960s, mid to late 1970s, and middle to late 1980s) and busts (late 1960s, early 1980s, and mid-1990s)(Kemp 2024). Since the turn of the millennium, activity has stabilized significantly, with best estimates showing a steady increase in active participants. Often thought of as a 'fringe' activity within popular literature, skateboarding has become a source of recreation and sport for many individuals across a widening demographic (Avril, 2022; Eberhart, 2021; Farrell, 2010; Odanaka, 2014; Wallace, 2021; Blakely, 2023; Sparks 2022; MacKay & Dallaire, 2014). Although high-quality estimates are unavailable, the information suggests roughly 8.8 million skateboarders in the US (2021) and as many as 80 million worldwide (Atencio 2018, statista.com). These estimates put skateboarding alongside or ahead of conventional American pastimes such as softball (8.1 million) and tackle football 5.2 million (statista.com). Thus, it is clear that skateboarding is well established in the United States in terms of individual participants and purchasing power, if not institutional support or infrastructure.

Casual observation and available estimates suggest that the quantity and quality of public resources devoted to skateboarding lag far beyond other leisure activities such as softball, tennis, or soccer. According to the public skatepark users guide (publicskateparkguide.org), high quality concrete skatepark construction costs run between 50 and 75 USD per square foot of ridable surface. Consistent with this, a leading skatepark construction company reports to the author construction costs of 65 USD per square foot. Concrete tennis courts, by comparison and according to sportvenuecalculator.com, run between 60,000 and 120,000 USD (or 8 – 17 USD per sq. ft. assuming total court size of 7,200 sq. ft.). Thus, assuming equal user rates and resource allocation, a relative cost of 12 USD (tennis court) to 65 USD (skatepark) would suggest roughly 5.5 sq ft of tennis court for every 1 sq ft of skatepark within a community – a ratio far removed from current reality. The ratio of users and public space becomes even more remarkable when public primary and secondary schools are included, each generally having multiple fields and courts devoted to these other, better-instituted pastimes. From the estimates of users, there is a strong likelihood that a mismatch exists in terms of public resource allocation. Specifically, it is likely that an under-provision of public space allocated to skateboarding and related activities exists. That said, no reliable or unbiased metric currently exists to evaluate the degree of this potential misallocation of resources.

In the United States, 'skateparks' are the most common public resource seemingly devoted to skateboarding. Skateparks vary greatly but generally include various obstacles and inclined surfaces conducive to riding a wheeled device. Despite their name, skateparks are utilized by a significantly wider demographic. During a visit to a local public skatepark, one is likely to find a healthy mix of skateboarders, BMX bicycle riders, roller skaters (both inline and conventional), kick scooters, and a variety of onlookers from all walks of life (Atencio et al., 2018). Thus, the number of active skateboarders underestimates the number of skatepark users. It is for this reason that many community skateparks are instead referred to as 'wheel parks.' This term is an improvement as it more accurately points to the relevant user demographic. We will, therefore, use these two terms interchangeably.

While the facilities devoted to skateboarding lag far behind other commonplace activities within public spaces, such as tennis, baseball/softball, basketball, and other leisure activities, the number of skateparks has increased significantly in the past two decades. Thus, there is some indication that the dedicated infrastructure is 'catching up.' According to the non-profit Skatepark Project, the number of public skateparks within the United States has increased from only a handful 25 years ago to somewhere between 2,800 and 3,500 as of early 2023. This number, however, is easily misconstrued. Unlike the softball diamond or basketball court, whose specifications are dictated by the rules of play, the quality and size of public skateparks can differ radically. For example, one may find a small patch of asphalt with a few wooden structures called a skatepark in the same way another facility with several thousand square feet of poured and shaped reinforced concrete is called a skatepark. Thus, the number or even the size of facilities does not accurately evaluate the quality of available infrastructure. Finally, differences in skatepark design can make them suitable for riders of different abilities. In this way, the skatepark is most like a skiing hill or mountain bike trail where some locations cater to more advanced users – except that the riding surface is wholly human created. Due to the great variety of offerings and lack of standardization, the square footage of park space or the number of users in each period does not necessarily get us to a quality metric by which we can evaluate the degree to which a community is meeting user demand.

While the literature devoted to skateboarding is extensive, there has been no academic research (or other) that we are aware of attempting to apply quantitative standards to public (or private) skateboarding facilities. The non-profit organization, The Skatepark Project, has published the only demand-based metric for skatepark location. The most recent version of their 'best practices guide' recommends 10,000 square feet of concrete park for every 25,000 residents. As a point of comparison, the guide also notes that two tennis courts are 14,000 square feet. Despite this modest recommendation, The Skatepark Project estimates that to meet this ratio, the US would need to nearly double the number of parks from current estimates.

While helpful, the primary ratio of 10,000 sq feet of concrete skatepark per 25,000 inhabitants developed by the Skatepark Project ignores the heterogeneity of preferences that almost certainly exists across different communities. If we accept that this ratio reflects average demand from a given population, communities with more than average wheel park users will find that available infrastructure is insufficient, and the reverse will also be true. Equally important, this ratio does not incorporate the variations in the user-assessed quality of a skatepark – that is, differences in how 'good' the skatepark is.

While several ethnographic and textual studies have demonstrated the value users place on locations to skateboard, there have yet to be any attempts thus far to place any economic value upon skateboarding infrastructure (Synder, 2017). Moreover, there needs to be a clear metric by which a community can evaluate whether it is providing an appropriate quantity or quality of infrastructure. To begin to fill this void, we hypothesize that the distance users are willing to travel to use a given skatepark gives a superior indicator as to the quality of the skatepark, allows for differences in both user-to-population ratios and park quality and provides a foundation for a framework by which we can determine appropriate resource provision.

To explain: Rudimentary economic theory suggests a market premium will occur where a shortage exists. Economic theory further suggests that, in the absence of local production or where local production is inferior, a demand for imports will exist. Since places to skateboard cannot be easily imported, we would instead expect an export of users. In plain language, we should observe that skateboarders will be willing to pay to travel to distant locations to skateboard.

Moreover, where user prices are zero – as is almost universally the case with public skateparks- a willingness to travel would strongly indicate the quality of any given skatepark. Furthermore, for a given community, the net export of skateboarders would indicate a relative shortage of usable, quality infrastructure. If wheel park users travel significant distances away from where they live and if few are traveling to the area – there are likely not enough skateparks. The existence of a true 'destination skatepark' (a park with a net number of 'imported' users) would, by this logic, suggest a shortage of dedicated infrastructure in other locations.

Using onsite user survey data applied to a travel cost model (TCM), we estimate user demand and the total economic surplus experienced by users of the Lauridsen skatepark in central Des Moines, Iowa. Completed in 2021 and covering over 88,000 square feet, this skatepark is, as of December 2023, the largest in the United States (Clayworth, 2023). Owned and operated by Polk County, Iowa, the park is free and open to the public. The website, dsmskatepark.com, describes it as a 'world-class' park capable of hosting professional events and drawing people worldwide. It follows that it is, by design, a destination site. Therefore, this park is an ideal candidate for establishing a baseline of user demand. In doing so, this work establishes skateparks as a destination site capable of having considerable economic impact. Furthermore, this work demonstrates the broad appeal of skateboarding facilities. In doing so, this work makes a strong case that these facilities should be seen as mainstream or conventional public infrastructure appropriate for all communities.

This work contributes to the literature in at least three respects. First, this work gives an empirical and numerical estimate of the economic value of skateparks. In doing so, we support the notion that skateparks are a public 'good' that provides measurable utility to their users. Second, the method employed here suggests a simple metric by which policymakers can easily determine whether local skatepark infrastructure meets local user needs. Given a willingness to pay for distant skatepark infrastructure when more local options are available, a hierarchy of said infrastructure exists that can be evaluated by the net export of park users. Third, we find support for the argument that skateboarders are a diverse set of individuals in line with the US population in terms of age and education.

2. Background

The last decade has produced a significant quantity of scholarly interest in skateboarding and skateboarding culture. The relevant literature points in a few directions—specifically, the changing demographics, user values, and community culture. Demographically speaking – the average skateboarder in 2023 is not much like what they were a generation ago. The case is often made that skateboarding has 'grown up' as skateboarders have increased in gender and socio-economic diversity, as well as age (Atencio & Beal, 2016; Atencio et al., 2018; Willing & Shearer, 2016; Bäckström & Nairn, 2018; O'Connor, 2018a). Increasingly, references to the growing number of older people still skateboarding extend into the popular press (Farrell, 2010; Odanaka, 2014; Holt, 2021; Sparks, 2022; Blakely, 2023).

Thus far, the push to create skateparks has primarily been a grassroots effort by users or community advocates. That is, it has been a demand-driven development. With many of the skateboarders from the 1970s and 1980s booms still riding and being well into advanced middle age, it is perhaps not surprising that as a community of individuals, they have been, in recent years, successful advocates for skateboarding in general and for the construction of skateparks both large and small (Atencio et al., 2018; Borden, 2019; Orpana, 2016; O'Connor, 2016, 2018b, and 2018c; Goldenberg & Shooter, 2009; Atencio & Beal, 2016; Vivioni, 2009 and 2013; Weller, 2006). Formal non-profit and for-profit organizations that advocate for and provide funding assistance for developing public skateparks have also arisen. The most significant is the 'Skatepark Project,' formerly the Tony Hawk Foundation (skatepark.org). According to their website, the non-profit organization has assisted in funding over 600 skateparks in all 50 US States and projects in Afghanistan, Cambodia, and South Africa. From this, it seems reasonable to suggest that users of skateparks and their advocates have become a political force capable of significant action.

A second relevant thread is the diverse culture of skateboarding. The literature in this area points to the changes over time and conflicting aspects of the culture within isolated skateboarding communities (Atencio & Beal, 2016; Attoma-Mathews, 2019; Beal, 1992 and 1995; Dupont, 2014; Li, 2022; MacKay & Dallaire, 2014; Lombard, 2016; O'Connor, 2016b; Wood et al., 2014; Willing et. Al., 2019). Still, almost uniformly, researchers report a strong sense of resiliency within skateboard communities. Whether this resiliency results from skateboarding or whether resilient individuals generally prefer skateboarding over other pastimes is not entirely clear and is worthy of additional study. The causality, however, is beyond the scope of this work. It illustrates a strong and persistent demand for usable infrastructure for our purposes.

A third relevant thread in the literature is the value of 'space' within the skateboarding culture. Several ethnographic studies have shown the value that skateboarders place upon 'space' or places where conditions for skateboarding are favorable (Jones & Graves, 2000; Howell, 2005; Vivioni, 2013; Vivoni & Folsom-Fraster, 2021; Borden, 2016, 2018, and 2019). This sense of value manifests itself in multiple ways: First is the skateboarding culture's 'DIY' ethos. Several studies have shown the willingness of skateboarders to construct an environment conducive to riding (Attoma-Mathews, 2019; Bäckström & Sand, 2019; Borden, 2018 and 2019; Carr, 2010; O'Connor, 2016; Vivoni, 2009, 2013, and 2018; Dickinson, 2022). There is a consistent and widespread willingness to exert effort to locate, utilize, and even construct spaces to skateboard. Second, several studies have shown the nomadic nature of skateboarders and their willingness to go to great lengths and distances to find a good 'spot' to skateboard (Wooley & Johns, 2001; Glenney and Mull, 2018; Goldenberg & Shooter, 2009; Warin, 2018; O'Connor, 2018; Bäckström & Sand, 2019).

From this work, there is a clear basis for the hypothesis that in certain localities, there is a need for more ridable space for skateboarding and wheeled activities in general. While there is almost certainly a cultural value aspect to space, it is reasonable to suggest that the value of space is partly due to relative scarcity. Second, there is also a clear basis for the hypothesis that skateboarders would have a willingness to pay for skateparks distant from where they live and work. It also follows that the more desirable a skatepark is, the greater the willingness to pay in terms of travel time and cost, which users would be willing to bear.

3. Method

3.1. Background to the Travel Cost Model

First proposed in an unpublished 1947 letter by Hotelling, the TCM is likely the oldest modern method of non-market valuation. The essence of this model is the notion that people's willingness to travel – which takes time and money -- to a given location will reveal their willingness to 'pay' to get to that location. The TCM is based upon a household production function. Specifically, the idea is that the household will utilize the available resources (income, environment, and time) in such a way as to maximize benefits to the household. More plainly, the household will consider its available options and act to its maximal liking. The household's choice to go to a park, for example, will be a function of the geographic availability of parks (where are they?), other alternative recreational options, financial resources, and available time. Choosing one amenity has a cost in several senses, but most basically, it means less time and financial resources are available to partake in another amenity. Traveling to a park in a distant town means less time and money available to do other things. The willingness of households to expend these resources to travel to a distant amenity indicates the value that the users place upon that amenity.

Non-market valuation techniques estimate the benefits to users and non-users of a wide variety of public and private amenities in cases where actual market prices are not present. Compared with other methods, TC models have the advantage of developing estimates from observed rather than hypothetical economic activity. Since at least the 1960s, TC models have been applied to various site-specific public goods. Some pertinent recent applications of the TCM include surfing and associated beaches (Leisner & Pereira, 2021), a nature reserve (Mandziuk et al., 2020), open urban space (Hanauer & Reed, 2017), snowmobile trails (Larsen et al., 2020), and mushroom picking (Govigli et al., 2019).

Like all economic models, applying a travel cost model requires that several assumptions be met. These pertain to the nature of the travel, the opportunity cost, and the site visit duration (Haab & McConnell, 2002). First, travel costs and time are a reasonable proxy for the 'price' of a given recreational trip. In this case, the destination is a public park with an entry cost of zero. Additionally, we must be able to assume that the trip itself is neutral in terms of utility. The overwhelming objective of travel must be the end site, not the trip itself. Third, we must be able to assume that the site in question is the overwhelming reason for travel. This is because if multiple sites are being visited, the utility associated with these other sites will be conflated with the site in question. It must also be reasonable to assume that users spend similar time at the destination site. Finally, we must assume that individuals base their housing choices on something other than their proximity to the site. In this case, that would mean that the skatepark has not impacted users' choice of where to live.

With this study, we propose determining the average monetary value an individual places upon a single day of recreation using a TCM at the Lauridsen skatepark. We accomplish this by estimating a demand function based on survey data for the amenity – in this case, the skatepark. Like the textbook demand function that relates a consumer's willingness to purchase a given product as a negative function of price, the traditional TC model estimates the number of trips the visitors will be willing to take, given the cost (price) of doing so. The demand function is estimated from user data using a probability density function. The probability density function measures the likelihood of an event occurring given a series of explanatory variables. Here, given various user and travel cost characteristics, the event is the probability of another park visit. The estimated relationship between the sampled users' travel costs and visits gives the estimated demand relationship for a day spent at the site.

That is, by employing the travel cost method, we hypothesize that the following relationship holds (eq. 1),

$$d_{ij} = f(p_{ij}, y_i, x_{1..n}) \tag{1}$$

Where d_{ij} represents the demand for the i user to visit the j destination – in this case, the Lauridsen Skatepark at Des Moines, IA – p_{ij} being the implicit and explicit costs for the i individual to visit the park, y_i being the income of the i individual, and $x_{1..n}$ being a vector of control variables.

Like with the textbook demand function, we can estimate the total benefits to users by evaluating the area graphically 'under' the demand curve. This area represents the potential user's willingness to pay for the amenity. Here, this is the total economic value of the skatepark to users as expressed in terms of their willingness to incur explicit and opportunity costs. Subtracting the amount from this area that users were required to pay gives us the measure of so-called 'Consumer Surplus.' A measure of benefits to users above and beyond the actual price paid. From a policy perspective, consumer surplus associated with a public good such as a wheel park is helpful because it indicates public benefit beyond the direct economic impact.

To derive the Marshallian consumer surplus associated with trip duration, we integrate the estimated demand function over the range p_0 to p_1 (eq. 2);

$$CS = \int_{p0}^{p1} f(p_{i,j}, y_i, x_{1,\ldots,n})dp \tag{2}$$

Where p_0 is the explicit price a visitor must pay: gasoline, hotel rooms, and other expenditures, and p_1 is the so-called 'choke price' or the price that would result in zero demand. Put more plainly, p_1 is the price that would cause everybody to stop going to the park. The value of consumer surplus gives us an estimate of the benefit experienced by users above and beyond their expenditure.

3.2. Count Data Models

To estimate demand, we apply a count data TC model adjusted for the challenges associated with onsite sampling. Count data models are appropriately applied when the dependent variable can only be expressed as an integer. For this study, this is the expected number of park visits as a ratio to the geographic zone population. Challenges occur with onsite sampling methods because the sample only includes individuals who have visited the site at least once and because we are more likely to sample from frequent visitors to the park. These are the truncation problems at zero and endogenous stratification first noted by Carson (1991) and Shaw (1988), respectively. The Poisson and Negative Binomial forms of the probability distribution function are commonly used to resolve these challenges.

TCM is frequently used to determine the likely number of visits to a given amenity, given direct costs, and the trip price. A demand function is estimated by correlating the total trip cost (price) and the number of trips taken (quantity). For example, the traditional data count TCM does not allow for variations across users for different lengths of stay. Burt and Brewer (1971) demonstrated that differences in length of stay affect user experience while not necessarily impacting the travel cost itself. In our case, this creates a problem as users often spend several days at the Lauridsen skatepark. The simple reason for this is that, due to the heterogeneous nature of skateparks, it can take multiple days for even experienced skateboarders to learn to ride the park effectively. As such, it would not be reasonable to assume that the utility of a single visit with varied durations of stay would be consistent across users. Similarly, many visitors to the park could not recall how many separate trips had been made, even over relatively short periods. As such, we use a zonal model that estimates prices from travel cost information and the number of visits from the geographic visit rate.

Since the visitor rate is the dependent variable, the hypothesized demand function is given by (eq. 3),

$$VV_i = f(p_{i,j}, y_i, x_1, .., x_n) \tag{3}$$

VV, the dependent variable, is the visit rate for the i individual with one of the four identified zones. The expected visit rate is hypothesized to be a function of the daily trip cost (p) for the i individual to destination j, individual income (y_i), and, to provide control, a vector of characteristics associated with the individual ($x_{1,..,n}$).

Because the number of days onsite varies across users and impacts onsite costs, travel costs are adjusted to reflect per-day costs, as in Mukanjari et. Al. (2021) (eq. 4).

$$Travel\ Cost_{i,j} = Vehicle\ Costs_i + Per\ Day\ Lodging_i + Per\ Day\ Opportunity\ Costs_i \tag{4}$$

Travel costs to the given site j for the i individual are expressed in terms of their vehicle operation costs, their travel and onsite costs, their opportunity costs, and their onsite costs; each expressed relative to the number of days spent onsite. We assume opportunity costs to be 1/3 given individual hourly income (y_i). For comparative purposes, we also estimate demand with opportunity costs equal to lost wages.

Additionally, we assume that individuals choose where to travel and the total number of days they wish to remain onsite at the beginning of the year. Individuals utilize available resources, including time and money, to travel and choose the number of days to stay that minimize total costs, given the decision to travel to the site.

3.3. Estimated Demand Function

We estimate the specific form of the demand function using Stata 16 and employ a truncated Poisson and a truncated negative binomial regression. The Poisson distribution function requires that we be able to assume that the conditional mean and variance of the trip demand are equal. When trip demand mean and variance are not the same, either under or over-dispersion results. If the conditional mean and variance of the trip demand cannot safely be assumed to be equal, a negative binomial (NB) form of the probability density function is preferable (Englin & Shonkwiler, 1995; Breen et al., 2018). In this case, testing showed that over-dispersion was present, and consequently, the NB is the preferred method and gives a better fit. Below, we present results for both forms of the probability density function. From Englin and Shonkwiler (1995), the probability density function associated with the basic Poisson distribution is (eq. 5),

$$h_i(d_i|d_i > 0, x_i) = \frac{e^{-\lambda}\lambda_i^{d_i}}{d_i!\,(1 - \exp(-\lambda_i))} \tag{5}$$

Following Hellerstein and Mendelson (1993) and Englin and Shonkwiler (1995), the negative binomial form of the density function, in this case, is given by (eq. 6),

$$h_i(d_i|d_i > 0, x_i) = \frac{d_i\Gamma(d_i + \alpha_i^{-1})\alpha_i^{d_i}\lambda_i^{d_i-1}(1 + \alpha_i\lambda_i)^{-(d_i+\alpha^{-1})}}{\Gamma(\alpha_i^{-1})\Gamma(d_i + 1)} \tag{6}$$

In this case, Γ( ) is a gamma function, and α_i is the over-dispersion parameter expressed as constant for all values. All other variables are the same, as explained above.

We express the mean value of the estimated density function as λ. From this, we can estimate the set of parameters $\beta_0 \ldots \beta_n$ associated with per day demand for the i^{th} individual. That is, the expected single-day demand for the *i*th individual, in semi-log form, is (eq. 7);

$$(d_i|x_i) = \lambda_i = \exp(\beta_0 + \beta_1 p_i + \beta_2 y_i + \beta_3 x_1 + \cdots + \beta_n x_n) \tag{7}$$

Where x_i is the vector of the complete set of explanatory variables, p_i is the per day price of the visit by the *i* individual, y_i is one-third the single-day income of the *i* individual, and x_1 to x_n are the additional explanatory variables associated with the *i* individual that are hypothesized to influence demand, including the opportunity costs associated with a substitute amenity and lost income. Following Englin and Shonkwiler (1995), the estimated parameters $\beta_0 \ldots \beta_n$ associated with the respective explanatory variables reflect values in the population in question so long as the above-mentioned set of assumptions has been met.

The estimate of β_1 gives us the sensitivity of the expected visitation rate to travel costs, given all other control parameters. That is, how does price (travel costs) impact quantity demanded (visit rate), given a person's income, opportunity costs, substitutes, and other variables? From these estimated regression results and using the approach developed by Hellerstein and Mendelson (1993), we can derive the average consumer surplus of the representative visitor (eq. 8).

$$CS_D = -\frac{1}{\beta_1} \tag{8}$$

3.4. Study Area

The Lauridsen skatepark is in Des Moines, Iowa USA. This park was chosen for several reasons. It is the largest public skatepark in the United States and one of few that bills itself as a destination site. Being a large park at roughly 88,000 sq ft. increases the likelihood of many users on any given day. Thus, a large park is necessary to ensure a large sample of users absent significant congestion. Additionally, being public, and like most other skateparks, the Lauridsen skatepark does not charge a user fee. Third, because it bills itself as a destination park, inbound travel is expected, and broader economic impacts are presumably a component of park planning. Finally, the size and design of the Lauridsen skatepark is conducive to riding at a wide range of skill levels – thus giving it a broad appeal.

Because the nature of the Lauridsen skatepark does not lend itself to unique single-day visits, we adjust all travel costs by the number of days spent on site and traveling. Our sample visits ranged from 1 to 7 days. Furthermore, because most of the sample users needed help remembering how often they had visited the park in the past month or year, we employed the visit rate from a given zone as the dependent variable. The defined zones are the origin zip codes in the City of Des Moines, The Des Moines Metro Area (excluding the city of Des Moines), the state of Iowa (excluding the Des Moines Metro Area), and the rest of the United States. Visit rates were determined by taking the observed number of visits from a respective zone divided by the respective zone population. All zone population estimates are 2022 U.S. census. Using this method, the visit rate to the Des Moines metro area is (eq. 9),

$$Visits\ from\ Des\ Moines \frac{Metro}{pop\ of\ Des\ Moines\ Metro - pop\ of\ Des\ Moines} \tag{9}$$

Visit rates for the other zones are constructed in a similar manner. Thus, a user that gave their home ZIP code 50311 would be counted as a visit from the City of Des Moines zone. Visit counts from each zone are shown in table 1.

Table 1: Number of visits by zone.

Zone	Observed Number of Visits
City of Des Moines	69
Des Moines Metro Area	65
State of Iowa	21
Rest of the United States	45

To minimize sampling bias, users were sampled during both during weekdays and weekends when reasonable expectations of crowding would be at their highest and during weekdays. Surprisingly, there was no significant drop in user counts during the weekdays, with each of the six onsite days having roughly 100-120 users daily.

3.5. Sampling

The author and two assistants administered an onsite questionnaire. Roughly 210 individuals were surveyed over six days. Several surveys had to be dismissed due to their containing outliers or being incomplete. Willingness to participate in the survey was relatively strong, with about an 80% positive rate.

Surveys were conducted over three days in July and three days in August of 2023, three being weekdays and three being during the weekend. Individuals 18 years or older were offered the option to participate in the voluntary survey upon entering the park. Additionally, users were asked if they intended to spend one full day (at least 3 hours) at the park and if the visit to the park was the primary reason for the trip. Finally, to address possible simultaneity issues, individuals selected for sampling were first asked if the existence of the skatepark had in any way impacted their choice of where to live.

Survey respondents were asked if they were traveling while on vacation and, if so, how many total vacation days they had, as well as their rough annual income to estimate workplace opportunity costs. Additionally, respondents were asked the number of days they planned to spend on site and how the skatepark design conformed to their preferences about difficulty. Most importantly, users were asked about their place of origin (ZIP Code), lodging costs, vehicle type (car or truck), and how many park users traveled with them to determine travel costs. Finally, for control, park users were asked several questions about basic demographics, including age, sex, and education. Summary statistics for travel distances, travel costs, incomes, and other demographics are shown in table 2.

Table 2. Descriptive Statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max
Miles Traveled	200	103.323	221.611	1.2	1464
Travel Cost	200	134.093	168.394	0	919.937
Income	200	59710	51761.299	0	400000
Sex	200	.83	.377	0	1
Age	200	32.495	12.062	18	70
Edu	200	13.8	2.037	10	18
Local	200	7.207	8.173	.6	69.8

Except for the male/female breakdown (83% of respondents were male), other demographics are roughly consistent with broader US averages. Mean education is 13.8 years or roughly 1.8 years of post-secondary education, average (mean) income is just under $60,000 annually (median income is $50,000), and the average age is 32 years (no respondents were under 18). These findings are consistent with the 'diversification' of skateboarding in the literature.

The mean one-way travel distance among respondents was just over 100 miles, with the median value being 13.8 miles. Mean travel costs (inc. opportunity costs) were estimated to be $134, with median estimates being $65. With most users coming from the immediate area, this distribution is expected, with numbers tapering off as travel distance and cost increases. Figure 1 shows respondents' home ZIP code areas.

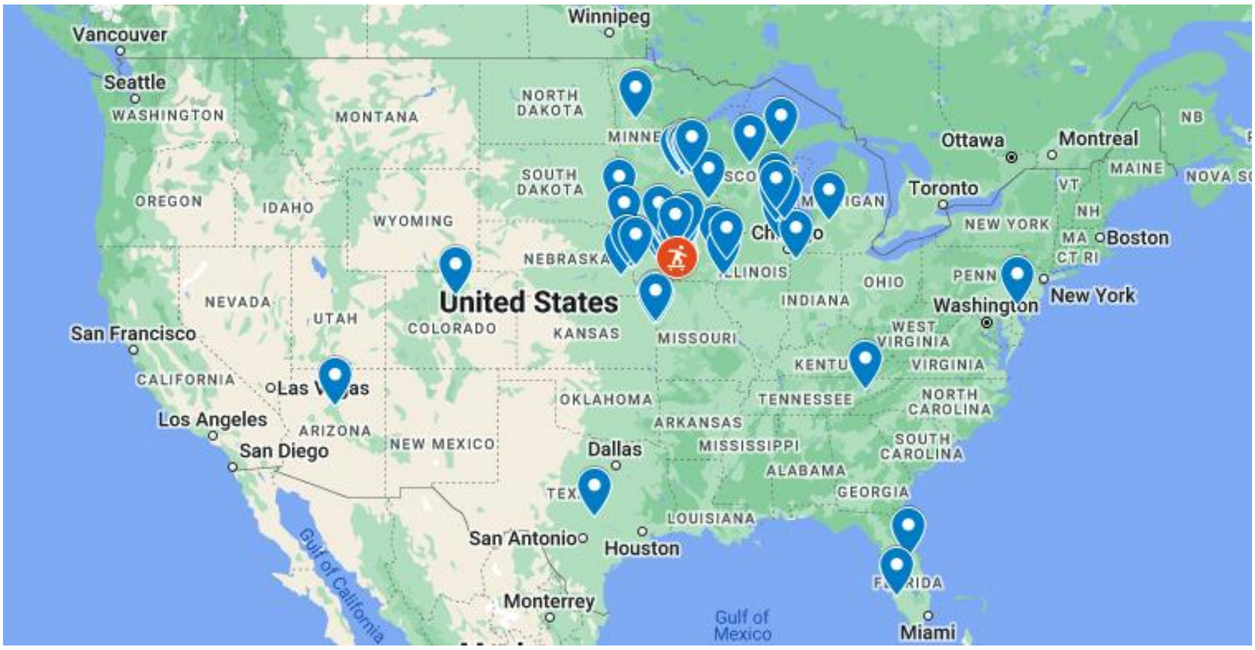

Figure 1. National respondents' home ZIP Code.

3.6. Distance/Vehicle Operation Costs

Using the reported home ZIP codes and Google Maps, the shortest driving distance was calculated from the central point of the given ZIP code to the Lauridsen skatepark. To account for individuals who traveled with others, travel costs were adjusted according to the total number of travelers. Thus, if the total number of travelers was stated to be four, travel costs were adjusted by one-quarter.

We utilized 2022 data published by the American Automobile Association (AAA) to determine per-mile vehicle operating costs. Available data on vehicle costs are broken down by type, including depreciation, financing, fuel, insurance, license and tax, and maintenance and repair for vehicles under five years old. However, because a significant share of the user vehicles exceeded five years old and are therefore well down the depreciation scale, we only include fuel, license and tax, and maintenance costs in our estimates. Thus, operating costs for cars was assumed to be .54 cents per mile and .86 cents for trucks.

3.7. Substitute Amenities

Following Haab & McConnell (2002), a substitute good was included. Given the paucity of substitutes for skateparks, the travel costs to the individual's 'local' public skatepark were used. The travel costs were determined by locating the skatepark closest to the individual's place of living or origin as given by their stated ZIP code. In cases where multiple parks exist within a single ZIP code, the park closest to the central point was used. This approach was taken for two reasons: First, Haab & McConnell (2002) note that failure to include a substitute good in the estimated demand results in bias. Second, knowing what skateparks are – not – being used due to potential users choosing to 'export' themselves gives an indication of the disparities between parks of different types in different geographies.

3.8. Endogenous Costs

To some extent, marginal travel costs are a matter of choice. These endogenous costs impact travel costs but likely have some utility in themselves. If left unaccounted for, these will introduce a positive bias in our estimated impacts. For example, the choice of hotels and type of vehicle used will impact reported travel costs. We assume that users are cost-minimizing. Skateboarding, as noted in the literature, is a relatively low-cost lifestyle activity (Beal, 1999). Given the observed choices of activity, assuming that other costs have been minimized is not unreasonable. Individuals were asked about accommodations and how much costs were shared among those traveling together. The sampled individuals suggested a great desire to economize on total trip costs among users, with most out-of-state visitors choosing to 'stay with friends' rather than purchase a hotel room.

4. Findings

4.1. Regression Output

Table 3. Regression Results.

	(1) Poisson	(2) NB	(3) Poisson Short	(4) NB Short
Travel Cost	-.0184***	-.0163***	-.0194***	-.0159***
	(.0001)	(.0011)	(.0001)	(.0009)
Income	.3995***	.4759***	.3912***	.4169***
	(.0025)	(.0894)	(.0025)	(.0788)
Sex	-.086***	-.103		
	(.0054)	(.3208)		
Age Mod	-.0003***	.0008		
	(0)	(.0007)		
Edu	-.0552***	-.0803		
	(.0011)	(.0636)		
Local	-.0528***	-.0079	-.0519***	-.0076
	(.0005)	(.0129)	(.0005)	(.0117)
_cons	8.18***	7.7268***	7.4***	6.8092***
	(.0168)	(.9239)	(.0072)	(.2597)
/lnalpha		.7585***		.7667***
		(.1182)		(.1183)
Observations	200	200	200	200
Pseudo R^2	.5182	.0505	.5098	.0496

*Standard errors are in parentheses. *** p<.01, ** p<.05, * p<.1*

4.2. Discussion

The Poisson and NB models show similar results with the signs of all significant variables supporting the hypothesized relations. Because of the large disparities involved in the data, to achieve convergence of the model, we completed a log transformation on the daily income variable. Similarly, to avoid the collinearity of income, age, and education, we transformed the age variable with the functional equivalent (eq. 10),

$$Age\ Mod\ = (\ Observed\ Age\ -\ Sample\ Mean\ Age\ )^2 \tag{10}$$

Each of these transformations improved the Pseudo R^2 of the models. Noting the lack of significance of all demographic variables on the NB model, additional regressions were run omitting these variables. These 'short' models resulted in little change in the predicted value of the coefficient on the Travel Cost variable and a lowered Pseudo R^2. The results of these models are therefore shown here only for comparative purposes. As such, we consider the NB model shown in Equation 2 in table 3 to be the correct specification. We use these results in the analysis and conclusions below.

In the cases of the demographic variables, the descriptive statistics are of more interest – in terms of the diversity of user demographics – than their specific correlation to visit rates. Also worthy of note is the estimated relationship for the 'Local' variable. The local park being the 'substitute' amenity. These results suggest that skateparks are not substitutes but are complementary as respondents with another public skatepark nearby are – more – likely to travel a significant distance to utilize the Lauridsen Park. Other demographic variables align with what economic theory would predict – notably income. As expected, we find that the likelihood of a visit to the Lauridsen skatepark increases as one’s income increases.

The estimated coefficient on the Travel Cost variable has the expected sign. That is, as travel costs rise, expected user visitation rates decrease. Thus, estimated user demand corresponds to conventional economic theory. Additionally, estimated daily user benefits are like those reported for similar public amenities – see table 4.

Table 4. Estimated daily user benefit.

Authors	Year of Pub	Amenity	Per User CS
Fix & Loomis	1997	Mountain Biking	\$197-\$205
Deacon & Kolstad	2000	Surfing (USA)	\$19.75
Mendes & Proenca	2011	National Park	\$204
Zhang et. Al.	2015	Surfing (Aus)	\$12
Silva & Ferreira	2014	Surfing (Portugal)	\$65.07
Hannauer & Reed	2017	Urban Open Space	\$13.70
Mulwa et. Al.	2017	National Park	\$115
Larsen et. Al.	2019	Snowmobile Trails	\$53-\$194
Govigli et. Al.	2019	Mushroom Picking	\$9.52-\$49.70
Mandziuk et.al.	2020	Nature Preserve	\$232
Leisner & Paula	2020	Surfing (South America)	\$1.37
Alessandro et. Al.	2022	Natural Area	\$8 - \$18

The daily consumer surplus of the average adult park user from model 2 above (NB) is estimated at \$61 per user per day. If the full value of lost daily wages is used, these estimates rise by roughly \$5 per user, per day. Unfortunately, annual visitor counts are not known, and thus, it is not possible to pinpoint annual user benefits. That said, a highly conservative estimate of 50 adult users per day above freezing and without rain (est. 160 days) suggests an annual user benefit of four hundred and seventy thousand dollars (\$488,000). Given that both user numbers and the annual number of skateable days exceed these numbers, we consider this a conservative estimate. (Survey respondents reported that they often shovel the snow off portions of the park during the winter months!)

Beyond conveying user benefits, these results also support the hypothesis that a demand for user-distant skateboarding facilities exists. That is, the idea that skateboarders will willingly 'export' themselves at an expense to distant facilities to partake in their chosen leisure activity. While the Lauridsen skatepark is not a substitute for local skateparks, similar local skateparks are likely substitutes for each other, and an identifiable demand then exists for each facility. Thus, users' willingness to travel to use facilities suggests a relative inferiority of the nearer facility given positive travel and opportunity costs. The same approach would indicate when a facility is needed but not present.

Finally, it is worth noting that several questions from the survey yielded little useful data and thus were not included in any of the estimated regression. First, overwhelmingly, respondents either had no paid vacation days, needed help understanding the concept of a paid vacation day, or responded that they had as many paid vacation days as they wished. Probing the matter seemed to suggest that most respondents worked on some flex-time model when they worked the hours and days they wished. Other respondents were employed by the specific task and not for a given number of hours or days. These later individuals were often employed in the trades. Thus, they only needed to report to work when a job was ongoing. As such, all reported data – except annual income – attempting to capture opportunity was dismissed from further analysis.

5. Remaining Issues and Conclusions

5.1. Applicability of the Results - Large Parks versus Small Parks, Good and Bad Parks

As mentioned above, the Des Moines Skatepark is currently the largest public park in the United States. While it is reasonable to assume some basic similarities to large skateparks, care should be taken when applying these results to other, notably smaller, community parks. This is not to say that people do not travel to smaller parks but that due to sheer size and variety, one would expect individual user benefits to be significantly reduced. Additionally, as discussed above, skateparks are highly varied in terms of terrain, difficulty, variety, and size. As such, no single or combination of the above metrics would signal a 'good' park. Park usage is the only metric that gives a useful measure of quality and of an adequate facility. Of the over 200 people surveyed for this study, all but three responded that the park at Des Moines was 'perfect' or a synonym thereof. As such, it is extremely well used, and given the above results, it will pay for itself in terms of user benefit well within its expected lifespan.

The findings presented here demonstrate that skateboarders will travel great distances at significant cost to ride a park of high perceived quality. Further study should be conducted to determine what makes for a 'good' skatepark. From a public policy standpoint, it would be worth applying travel cost methods and other non-market valuation techniques to smaller community skateparks. In this way, one may ascertain the marginal value associated with specific features or attributes. As it stands now, one can appreciate the dilemma many communities face. Skateparks are relatively expensive to construct. All is well if the park is well used, and the user count-to-cost ratio compares favorably with other park amenities. However, if the users do not come, the community is stuck with a costly 'white elephant'.

5.2. User Benefits of Unaccompanied Minors

The second remaining issue is the user benefits to unaccompanied minors. The travel cost approach is not well-suited to understanding the user benefits of unaccompanied minors. Given that a significant portion of the users of the Lauridsen Park – and skateparks in general – are under 18 years old, this is a significant issue. Moreover, if, as the literature suggests, there are positive impacts on human development associated with skateboarding, this area warrants further study. Also, it should be noted that if these benefits exist, user benefits associated with the Lauridsen Park will be significantly greater than expressed above.

5.3. Conclusions

Given the significant growth in skateboarding, it remains an important policy question whether communities provide the correct amount and quality of resources for public skateparks. The ratio of users to facilities remains significantly out of line with other, more established leisure pastimes. As such, it is all but certain that a significant resource misallocation of public resources exists. This study has attempted to advance the literature by showing an identifiable and significant demand for a well-developed park. Additionally, we confirm other studies' findings on the value of space in skateboarding by estimating a specific economic value users place on a well-known public park.

In showing a significant willingness to pay for skateparks, we point the way to a method of determining the sufficiency of facilities at the local level. Namely, if an identifiable demand exists for the Lauridsen Park, a demand for smaller, local skateparks also exists. Given that travel costs are positive, it stands to reason that if skateboarders leave an area to skate at a rate exceeding the rate at which non-local skaters use local facilities, those facilities need to be improved (or created). This simple method of talking to local skaters to determine what they are riding and why is arguably the best metric to determine the sufficiency of local facilities. Application of this method should – over time – lead to better quality skateparks and improved resource allocation of scarce public and private monies.

Third, this work supports the argument made within the literature that skateboarding – as a pastime – is increasingly diverse. The reported incomes, age, and education level of respondents participating in this study are much like those in the United States. These results should not be surprising given the demographics of similar pastimes, such as skiing, figure skating, and mountain biking. Estimated user numbers for skateboarding have remained relatively stable and growing for decades. All that remains is for the provision of public facilities to catch up.

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Conflict of interest

The author claims that the manuscript is completely original. The author also declares no conflict of interest.

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