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# The economic geography of civic crowdfunding☆

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ABSTRACT

Civic crowdfunding combines the power of private crowdfunding with grassroots organization to directly fund local public projects. This article presents an empirical analysis of fine scale geographic data on 18,000 donations to roughly 800 campaigns from a leading civic crowdfunding platform. These features of the dataset allow us to empirically assess distributional impacts of crowdfunding and how policymakers should interpret donations. There are several findings that have implications for the role of civic crowdfunding in urban transformation. First, neighborhood characteristics of projects, including median household income, do not impact the ability to raise capital, which addresses the concern that civic crowdfunding will exacerbate inequality in neighborhood amenities. The average distance of a donor to a project is over 300 miles and the median distance is 8 miles, indicating that while projects elicit donations from outside their community local donations are very important. Donors' neighborhood income does not influence whether they contribute to projects in low-income or high-income neighborhoods. The findings serve as a guide to future research on civic crowdfunding and inform how the expansion of this new funding mechanism can integrate into local government policy.

## 1. Introduction

Crowdfunding is a relatively recent development of the digital economy where individuals or firms without access to traditional forms of capital raise money online through small contributions from many donors. Kickstarter, a well-known platform that funds creative projects including entrepreneurs and artists, has raised more than $3 billion from 11 million individuals to fund over 120,000 projects.[1] Civic crowdfunding borrows principles from both private crowdfunding and grassroots community organization by enabling citizens to develop community projects that are funded by donations through an online platform. Civic crowdfunding is not a replacement for traditional government spending on infrastructure. Projects are generally small scale in comparison to municipal capital budgets, and include improvements to local parks; installations of green infrastructure and community gardens; streetscape enhancements such as crosswalks and bike lanes; and public art. Others are temporary or less place-based, such as volunteer cleanup days; youth after-school programs; and street festivals. Although civic crowdfunding does not typically provide large-scale public goods, the projects improve the lives of the community members and represent a shift to a more participatory form of urban planning.

Advocates of civic crowdfunding assert that it empowers community leaders to initiate worthwhile public projects in their neighborhoods and allows citizens to vote with their pocketbooks. In this sense, civic crowdfunding acts as a catalyst for citizens to improve their own neighborhoods as opposed to waiting for governments or external philanthropic organizations to intervene. This is a new form of citizen design and participatory planning (Mueller, Lu, Chirkin, Klein, & Schmitt, 2018). Improving neighborhood amenities in underserved communities has the potential to reduce documented inequalities in environmental quality (Wen, Zhang, Harris, Holt, & Croft, 2013), access to nutritious food (Walker, Keane, & Burke, 2010; Weatherspoon et al., 2013; Whelan, Wrigley, Warm, & Cannings, 2002; Wrigley, 2002), and job accessibility (Kawabata & Shen, 2007; Shen, 2000), among other local disparities. Community decisions regarding the type of project to initiate and where to allocate personal resources serve as a guide to policy-makers for future investments. In fact, the failure of traditional forms of public finance, such as school funding tied to property taxes, to

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[1] Statistics for Kickstarter are available at https://www.kickstarter.com/help/stats.

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generate an equitable distribution of public goods is a motivation for utilizing new tools such as civic crowdfunding.

Despite the potential benefits of civic crowdfunding, there are concerns that relying on private funds to provide local amenities allows for the possibility of *increasing* the unequal distribution of neighborhood amenities and the abrogation of government responsibilities (Davies, 2015; Stiver, Barroca, Minocha, Richards, & Roberts, 2015). Before civic crowdfunding fills a major role in public policy and planning it is critical to assess the basic empirical characteristics of civic crowdfunding. We analyze data from ioby ("In our Backyards"), one of the leading civic crowdfunding platforms targeting projects in underserved communities to address two primary questions about civic crowdfunding that provide insight into the distributional effects of civic crowdfunding and how it may integrate into public policy.

First, what are the implications of civic crowdfunding for local inequality? As opposed to being a force for social inclusion, one concern surrounding civic crowdfunding is that eliciting private funds to improve neighborhoods will exacerbate inequalities in the quality of public amenities if wealthy donors disproportionately fund projects in their own neighborhoods. To address this question we analyze whether neighborhood characteristics, such as median income, determine the ability for civic crowdfunding campaigns to raise capital. We also examine donor behavior to address whether civic crowdfunding engages a wide cross section of the population and attracts resources from outside the immediate community. Second, how can policy makers interpret donations to civic crowdfunding campaigns? Civic crowdfunding allows citizens to vote with their wallets and communicate their preferences for local amenities to policymakers, such that the success of civic crowdfunding campaigns can leverage broader investments by government. However, it is important for policymakers to understand whether donations are made by local constituents or from donors outside the community. We address this question by examining the geographic distance between donors and projects. The spatial pattern of donors is important to understand the ability of different types of neighborhood to attract funding for local projects, and to interpret donations as local support for specific types of public amenities.

Our research fills important empirical gaps about how civic crowdfunding functions. There is little prior empirical literature on civic crowdfunding and the existing literature uses coarse geographic data at the state level (Davies, 2014). Therefore, we provide the first empirical assessment of the distributional implications of civic crowdfunding at the neighborhood level. We are also the first to link fine-scale geographic data on both projects and donors to understand donor-project dynamics including the role of distance. These contributions are a product of utilizing fine-scale spatial data on both project and donor locations: we have the exact address geocoded for all projects and donors. This fine scale spatial resolution allows us to merge in demographic data at the census block level, thereby generating a more accurate assignment of neighborhood characteristics to project locations. Geocoding the exact address of both projects and donors allows us to calculate a very precise metric for distance. We want to note upfront that we do not collect any individual demographic characteristics; all demographic data are collected at the census block level. While we analyze data from only one platform, ioby is one of the largest civic crowdfunding platforms and we analyze data from 178 cities. Therefore, we expect that our results are an important insight into civic crowdfunding more generally.

With respect to the first question, we do not find any evidence for the concern that civic crowdfunding might exacerbate inequality; rather neighborhood characteristics are poor predictors of both the total donations to civic crowdfunding campaigns. This finding holds across a wide range of neighborhood income levels; the median income of neighborhoods for funded projects extends from under $10,000 to over $250,000. Answering the second question is more nuanced. Many donors are very local – the median distance from donor to project is only 8 miles – indicating that donations communicate local preferences. However, there are also many donors that live far from the project; the average distance between a donor and project is 364 miles. With respect to the donor characteristics, we find that donors from wealthier areas contribute more on average; however, donors from less affluent areas contribute a larger percentage of their neighborhood income. The neighborhood income where the project is conducted does not affect the size of the donation. Additionally, the demographic characteristics of donors' neighborhoods do not determine the neighborhood characteristics of the projects to which they donate. Therefore, donors from wealthy neighborhoods are just as likely to fund projects in either poor or wealthy neighborhoods.

These findings are promising for utilizing civic crowdfunding as a tool to combat local disparities in neighborhood amenities. However, there are still open questions regarding how policy makers should interpret donations to civic crowdfunding campaigns. It is important to consider where the donations originate in order to make decisions about public investments based on the success of civic crowdfunding campaigns. The insights from the empirical analysis open the possibility for novel policy instruments that integrate civic crowdfunding with public funding. Local governments can use matching funds where the dollar value of the match increases for local donors and in disadvantaged neighborhoods to balance. How civic crowdfunding develops depends on the goals of the local community and the willingness for governments to embrace the wisdom of the crowd.

## 2. Related literature

This research is fits into a series of related research on civic crowdfunding; traditional private crowdfunding; the documentation, drivers and impacts of inequality; and citizen empowerment and participatory planning. Since civic crowdfunding is a relatively new phenomenon there is little research on the subject. The closest research on civic crowdfunding is based on a master's thesis by Davies (2014) that provides some of the background for civic crowdfunding by examining data from a variety of public-good crowdfunding on more general crowdfunding platforms such as Kickstarter and Indiegogo, as well as civic crowdfunding platforms including ioby. Stiver et al. (2015) also assess qualitative features of civic crowdfunding and, among other insights, highlight the challenge of the potential for a "social wedge" where projects are only funded in wealthy areas. Davies (2015) summarizes a mix of qualitative and quantitative evidence to address "three provocations" for civic crowdfunding: the degree to which it is participatory, the impacts on inequality, and the potential abrogation of government responsibility. Additional civic crowdfunding research discusses how institutional design affects outcomes (Niemeyer, Wagenknecht, Teubner, & Weinhardt, 2016) and how civic crowdfunding principles can apply to funding public media (Bonini & Pais, 2017). The three questions presented in Davies (2015) do not have clear answers. This article brings empirical evidence to address the distributional concerns of civic crowdfunding as well as how governments can use to data from civic crowdfunding campaigns to inform their public investment decisions.

There is somewhat more research on traditional crowdfunding, although it is uncertain how the lessons learned in one traditional crowdfunding translate to civic crowdfunding. Belleflamme, Lambert, and Schwienbacher (2013) explore pre-ordering on traditional crowdfunding, and Belleflamme, Lambert, and Schwienbacher (2014) investigate differences between for-profit and non-profit crowdfunding campaigns. Pitschner and Pitschner-Finn (2014) find that while non-profit campaigns have a higher probability of success and attract higher average contributions, for-profit campaigns raise more money from more donors. Agrawal, Catalan, and Goldfarb (2014) address the economic implications of equity crowdfunding and Agrawal, Catalini, and Goldfarb (2015) analyze the role of geography in traditional crowdfunding. van de Rijt, Kang, Restivo, and Patil (2014) find support for the rich-get-richer hypothesis by contributing to randomly selected

Kickstarter campaigns and observing that these campaigns attract more funding than control campaigns.

Since we assess the finding in the context of how civic crowdfunding can contribute or combat local inequalities it is worth noting some of the impacts of inequality. Poverty related to economic inequality leads to adverse health consequences such as lower birth weights (Currie, 2011), increased obesity (Singh, Siahpush, & Kogan, 2010), and reduced life expectancy (Chetty et al., 2016). Inequality manifests itself in multiple dimensions, often taking a spatial form in metropolitan areas (Modai-Snir & van Ham, 2018), which in turn can affect educational outcomes (Gordon & Monastiriotis, 2006) and crime (Metz & Burdina, 2016; Whitworth, 2013). Research shows that local neighborhoods affect future earnings (Chetty, Hendren, Kline, & Saez, 2014), and one of the primary ways to improve economic mobility is to move away from poor-quality neighborhoods (Chetty, Hendren, & 2015, 2015). If the best and brightest are more likely to move away, migration may in fact exacerbate neighborhood inequalities.

This research also fits into the broader literature on methods for combatting local inequalities. One promising approach of putting concepts into practice is using green infrastructure to promote environmental justice (Liu & Jensen, 2018). Schilling and Logan (2008) show how cities that experienced industrial decline can implement green infrastructure on vacant residential or industrial land. Communities finding a way to convert vacant urban land into green space is a particularly promising avenue for civic crowdfunding, potentially for temporary uses (Németh & Langhorst, 2014). There are still distributional concerns regarding gentrification (Wolch, Byrne, & Newell, 2014) and the utilization rate of parks (Sister, Wolch, & Wilson, 2010) as disadvantaged neighborhood work to resolve long-standing problems of environmental justice.

Lastly, as noted in Davies (2015), a key question in civic crowdfunding is the degree to which it is participatory and how it may integrate into traditional funding and planning structures.

There has been much research devoted to the design of participatory processes (Bryson, Quick, Slotterback, & Crosby, 2013; Fung & Wright, 2001). A recent trend is to understand the role of technology in fostering participation (Conroy & Evans-Cowley, 2006; Mäkinen, 2006) or creating a digital divide (Norris, 2001). Technology does have the potential to introduce participation as part of Citizen Design Science as posited by Mueller et al. (2018). Additionally, Bottini (2018) shows how the built environment affects participation, so civic crowdfunding campaigns that alter the built environment may introduce feedback loops affecting participation. Lastly, Swapan (2016) discusses that participation depends on the local context by examining the determinants of participation in a developing country.

## 3. Civic crowdfunding/ioby

The pooling of small monetary contributions, whether micro-investments or donations, toward a common goal is not a new concept, but the growing prevalence of online platforms in the past decade has caused “crowdfunding” to become a household word. More than 20% of Americans have participated in an online crowdfunding campaign as of 2016 (Smith, 2016). Crowdfunding platforms comprise a broad spectrum focusing on areas ranging from creative projects to personal medical expenses. The sub-field of civic crowdfunding intersects private-interest crowdfunding and traditional philanthropy crowdfunding by targeting small contributions for public or community goods. Another distinguishing characteristic of civic crowdfunding is that projects are primarily planned, funded, and implemented by private citizens, residents and community groups looking to improve their own surroundings.

While civic crowdfunding has grown in popularity in conjunction with the explosive development of private crowdfunding platforms such as Kickstarter, there forms of civic crowdfunding for ages.[2] Additionally, there are a variety of funding mechanisms for public projects aside from the conventional method of elected officials deciding how to spend general taxation revenue. Many counties, states, and cities use referenda that allow citizens to vote raise taxes in order to fund specific projects or programs.[3] Government grants allow private companies and non-profits compete for the design and funding of public initiatives. Charities also provide local public goods, and individual or corporate donors often contribute to funding parks and public art. Therefore, civic crowdfunding presents one more option among a suite of funding and planning mechanisms.

The data used here come from the civic crowdfunding platform ioby, or “In Our Backyards” a nonprofit organization primarily operating in the United States that uses the crowdfunding model as a community development tool, with an emphasis on neighborhoods with a history of public disinvestment. Fundraising campaigns must have a public benefit and occur in the neighborhood where the project leader lives or works. The organization operates through an online site that resembles most crowdfunding platforms, but a large portion of its service model is offline, with staff providing one-on-one coaching and resources in fundraising, community organizing, project implementation and other topics.

ioby's focus on historically under-served neighborhoods is a deliberate attempt to address a common fear that tech-based tools for civic engagement and investment are contributing to the “digital divide” and exacerbating inequality. This model of civic crowdfunding does not focus on advertising that leads to a diffuse and unknown network of investors or donors through online channels, as many others do. Instead, campaign leaders are trained in mobilizing their existing social networks, and in particular, the portion of their networks within their physical, local community. The fact that ioby specifically focuses on combating social inequality needs to be considered when interpreting and extrapolating the empirical results in this article to civic crowdfunding conducted on alternative platforms. There are other crowdfunding platforms that fall within the umbrella of civic crowdfunding. The closest to ioby is Spacehive based in the United Kingdon.[4] Spacehive is place based and often coordinates directly with local councils on crowdfunding campaigns. Citizinvestor was another United States-based crowdfunding platform, but at the time of writing the article the platform was not active. Another US-based platform, Neighborly, transitioned from civic crowdfunding to investor-crowdfunding for municipal bonds.

This model of civic crowdfunding, and in fact the larger civic crowdfunding field, is unlikely to grow to such a degree that it becomes a viable replacement for public funding, or even traditional philanthropy. Nor is that a desirable goal for communities or government entities, as challenging as budget shortfalls may be. Instead, a primary question within the field is: how can civic crowdfunding be leveraged not as a replacement to, but as a way to indicate need and collective valuation within a community, to better guide investment from the government and philanthropic sectors?

## 4. Data

There are two data sources used in the analysis. The first is project

[2] One of the most famous examples is the elicitation of over 120,000 private donations for the Statue of Liberty in New York City. Coming full circle, a museum for the Statue of Liberty was recently successfully crowdfunded - https://www.indiegogo.com/projects/help-us-build-the-statue-of-liberty-museum-family#/.

[3] For example, Switzerland votes on a multitude of direct projects such as roads and public transit. California, in the United States votes on many policies including funding via direct referendum.

[4] More information on Spacehive is available at https://www.spacehive.com/.

and donor data obtained from ioby for all projects started between April 2011 and May 2016. The project data has information on each crowdfunding campaign. The variables of interest for this article are the project address, total number of donors, amount of money raised, and project budget. There are also additional variables such as the start date of the campaign and characteristics of the type of project (environmental, art, etc.). We focus on projects below $20,000 in total donations, which represent less than 2% of all projects and are not representative of the typical projects financed through ioby's platform.[5] There are 659 projects that have completed the funding round and an additional 163 that were currently fundraising at the time the data were obtained. When conducting analysis at the project level we focus on campaigns that have concluded fundraising. The total amount of funding raised at the time the data were pulled was $1,534,075.

The donor data has information on each unique donation to a campaign. The primary donor variables are the donor address, the beneficiary project, the size of the donation, and whether there were any matching funds. There are 16,428 individual donations, however 524 donations were not able to be geocoded. Of the remaining donations there are 11,692 unique donors.

To calculate distances, we geocoded the donor and project addresses using the Data Science Toolkit in R, which results in geographic coordinates (latitude-longitude) for each observation. We performed several quality control checks to ensure that addresses were correctly geocoded.[6] Geographic coordinates for projects and donors generate precise distance calculations for each donor-project pair and allow us to obtain census data at the block level. We link the coordinates of projects and donors to census geographies using the Federal Communication Commission's geocoding API to obtain the Census FIPS code for each coordinate. Lastly, we download census block group level data from the American Community Survey (2010–2014) for several socioeconomic characteristics. A census block is a geographic area consisting of 600–3000 people. There are over 200,000 blocks in the U.S., allowing us to measure neighborhood demographics at fine geographic resolution. It is important to note that all demographic data are collected at the census block level, and that we use the terms “census block” and “neighborhood” interchangeably.

### 4.1. Summary statistics

We begin by providing a basic set of summary statistics on projects and donors. Table 1 shows the mean, standard deviation, median, minimum and maximum values for several relevant variables. The average donation is $93, and the median donation is $25. The average and median amount raised for a campaign is $2500 and $1245 respectively.[7] The average distance between a donor and a project was over 344 miles, however the median distance was only 8 miles. This indicates that most donations are local, but many donors live far away from the project site. When weighting the distance from donor to project by the monetary value of the donation the average distance increases slightly to 353, indicating that more distant donors give larger amounts on average.

[5] Including the outlier projects results in 673 completed projects, $2,006,725 in total funding, the average donation of $109, and the median donation is $30. The average and median amount raised for a campaign is $3190 and $1271 respectively. There are 18,478 individual donations, and 13,184 unique donors when including all projects. The analytical results are similar when including outlier projects.

[6] For example, we checked if the state from the geocoded longitude and latitude matched with the administrative data. We also manually examined records that generated missing values for geographic coordinates.

[7] These values differ somewhat from the statistics that appear on ioby's website - https://www.ioby.org/about. The differences are do to including newer projects, projects currently open, and projects above $20,000.

**Table 1**
Summary statistics of donations.

| Variable | Mean | Std. Dev. | Median | Min | Max | Observations |
|---|---|---|---|---|---|---|
| Donation ($) | 93 | 413 | 25 | 0 | 18,000 | 16,428 |
| Total donations ($) | 2500 | 3079 | 1245 | 2 | 19,519 | 659 |
| Total donors (#) | 21 | 25 | 12 | 1 | 183 | 659 |
| Distance (miles) | 344 | 755 | 8 | 0 | 9934 | 15,893 |

## 5. Project-level analysis

We begin the analysis of project characteristics by examining if higher income areas are able to fund larger more expensive projects. Fig. 1 shows the average value of funded projects by quintiles of the median household income of the project neighborhood. The average incomes within the quintiles in our sample ($24,342, $38,908, $50,840, $66,637, $108,383) are relatively similar to the entire country during the same period ($18,817, $31,282, $45,159, $64,617 $110,716). The figure shows that the largest projects are actually in middle-income neighborhoods. The lowest income neighborhoods actually fund slightly more expensive projects than the highest income neighborhoods. This could be due to the features of the projects or other correlated attributes of projects, so we continue the analysis in a multivariate regression framework.

### 5.1. Determinants of total donations

Our primary analysis of project characteristics examines if higher income areas fund larger more expensive projects. In order to understand how income and demographics affect campaign success we analyze the effect of neighborhood characteristics on the total value of donations that campaigns receive using multivariate regressions. The total level of funding that a campaign raises represents only one measure of success. Other metrics, such as achieving the original funding goal, are complicated by ioby's flex funding model whereby a leader can increase or decrease the total level of funding midway through the campaign. The results are presented in Table 2. Median income is in thousands of dollars and the other neighborhood characteristics represent the change in the total donations for a 10% change in the characteristics. The standard errors are in parentheses below the estimated effect and the stars denote statistical significance. Column (1) shows that increasing the size of the budget by $1 is associated with $0.16 in extra donations. At the project level, we also calculate the average and median distance of donors, both of which are positive and statistically significant. This indicates that projects that attract donors from more distant donors raise more money. One explanation for the effect of distance is that projects are more successful when the organizer is has a well-developed social network outside of the neighborhood, which may be correlated with income. Therefore, it is possible that within a census block more affluent organizers with large social networks are more successful, although we cannot test this directly.

Column (3) adds neighborhood characteristics to explain the funding level of projects. Most of the neighborhood characteristics are not statistically significant, indicating that neighborhood income and demographics are not the primary determinants of funding success. We also examine project categories such as environmental improvements, safe streets or art to determine if certain types of projects attract more donations; none of the categories generated statistically different levels of funding.[8] Adding average donor income in column (4) shows that projects that attract donors from wealthier neighborhoods do not raise more money. The one neighborhood characteristic that is statistically significant is the percentage of active transportation - defined as the

[8] Regressions with project categories are not shown to conserve space and are available upon request.

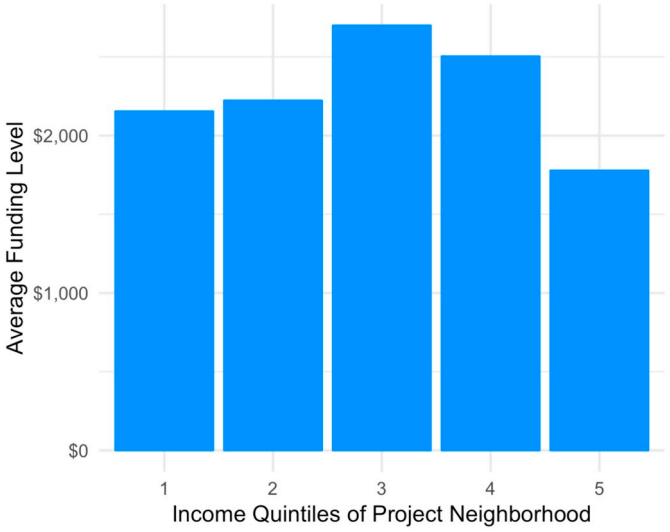


**Fig. 1.** Average project size by median household income.

**Table 2**
The effect of project characteristics on total donations.

| | Model 1 | Model 2 | Model 3 | Model 4 |
|---|---|---|---|---|
| (Intercept) | 1205.05*** | 1361.90*** | 1473.97*** | 1336.79* |
| | (129.70) | (113.92) | (431.36) | (547.77) |
| Budget size | 0.16*** | 0.16*** | 0.16*** | 0.16*** |
| | (0.01) | (0.01) | (0.01) | (0.01) |
| Avg. distance | 0.87*** | | 0.94*** | 0.93*** |
| | (0.26) | | (0.27) | (0.27) |
| Median distance | | 0.64* | | |
| | | (0.26) | | |
| Median income | | | 3.50 | 3.51 |
| | | | (3.74) | (3.86) |
| % Non-white | | | −2.95 | 1.34 |
| | | | (43.34) | (43.72) |
| % active transportation | | | −51.62** | −53.64** |
| | | | (19.69) | (19.98) |
| % college educated | | | −46.74 | −45.70 |
| | | | (107.54) | (108.27) |
| % gov. assistance | | | 118.06 | 121.82 |
| | | | (212.60) | (213.65) |
| Vacancy rate | | | −25.78 | −22.97 |
| | | | (97.50) | (98.74) |
| Avg. income of donor neighborhoods | | | | 1.77 |
| | | | | (5.10) |
| R-squared | 0.23 | 0.22 | 0.24 | 0.24 |
| N | 577 | 577 | 560 | 556 |

Notes: Budget size is measured in dollars, Avg. and Median Distance are measured in miles, Median income is measured in thousands of dollars, the percentage variables are in units of 10%, and the average income of donors is measured in thousands of dollars.
Standard errors are in parenthesis. Asterisks denote statistical significance: * p < 0.1, ** p < 0.05, *** p < 0.01.

share of commuters walking, biking, or using public transportation. Projects in these neighborhoods are smaller on average, which is perhaps a function of the type of project that these communities undertake. The primary lesson from the total donations regression models is that income and other neighborhood characteristics are not the primary drivers of total donations, which refutes the hypothesis that civic crowdfunding will exacerbate inequality due to larger private funding in wealthier areas. Since the projects are not randomly assigned to neighborhoods the estimates provide general associations and should not be interpreted as causal parameters.

### 5.2. Project-level cluster analysis

As an extension to the regression models we also perform cluster analysis to group projects together. Cluster analysis is an unsupervised learning algorithm that iteratively groups observations together that are most similar. We use the partitioning around medioids (PAM) approach (Kaufman & Rousseeuw, 1990), which is a more robust method of k-means clustering. PAM requires a user-defined number of clusters and we select the number of clusters using optimum average silhouette width criteria. In our setting the optimal number of clusters is two. The clusters are formed using standardized project neighborhood demographics; campaign characteristics are not used to generate the clusters. We then examine if clusters with different demographics vary in their project characteristics such as the total funding raised and the distance of donors. In this sense the demographics are the “input variables” and project characteristics are the “output variables”.

The cluster analysis roughly divides the projects into neighborhoods with high and low socioeconomic status (SES), where high SES neighborhoods are wealthier and better educated, but also less diverse. Cluster 1 can roughly be defined as the “high SES cluster” and Cluster 2 is the “low SES cluster”.[9] The projects in Cluster 1 have a slightly higher average funding level of $2661 as compared to $2379 for Cluster 2, but this difference is statistically significant at the 10% level ($p = 0.26$). Projects in both clusters have similar number of donors (Cluster 1 = 24 and Cluster 2 = 22) and donors live similar distances from the project (Cluster 1 = 286 and Cluster 2 = 253).

In order to visualize the cluster analysis we plot the neighborhood characteristics for each cluster in Fig. 2. There is a clear pattern in the demographics data of the two clusters. Panel (a) of Fig. 2 shows that Cluster 1 has projects in wealthier and less diverse neighborhoods, while panel (b) shows that there is no clear pattern across clusters in terms of the number of donors and total revenue generated. The cluster analysis supports the regression analysis that demographics of the neighborhoods do not dictate funding levels of projects.

## 6. Donor-level analysis

This section moves from analyzing project-level variables to individual donor decisions, where the donor is the unit of analysis, as opposed to an entire campaign. Incorporating data on individual donations represents one of the contributions relative to existing research on civic crowdfunding (Davies, 2014; Davies, 2015; Stiver et al., 2015). Since individual donors must fund all projects, learning about donor behavior is critical to understand the viability and expansion of civic crowdfunding. It should be noted that similar to the project data our demographic data on donors are based on census data, so we are actually describing the characteristics of the donors' neighborhoods as opposed to the donors themselves.

### 6.1. Determinants of the size of donations

We analyze the determinants of donations to campaigns as a function of both donor and project neighborhood demographics. Similar to the regression analysis of project characteristics the parameters should not be interpreted as causal estimates. We also include the distance of the donor to the project as a predictor of the size of donations. Table 3 fits several regression models where the dollar value of the donation is the dependent variable and the independent variables are donor and project neighborhood demographics. The variables represent the marginal change in the amount donated for a one-unit change in the variable of interest. Projects with larger budgets attract slightly larger donations, but more individual donors to a given project decrease the

[9] A table of summary statistics is suppressed for space and is available at: https://tinyurl.com/ProjectClusters.

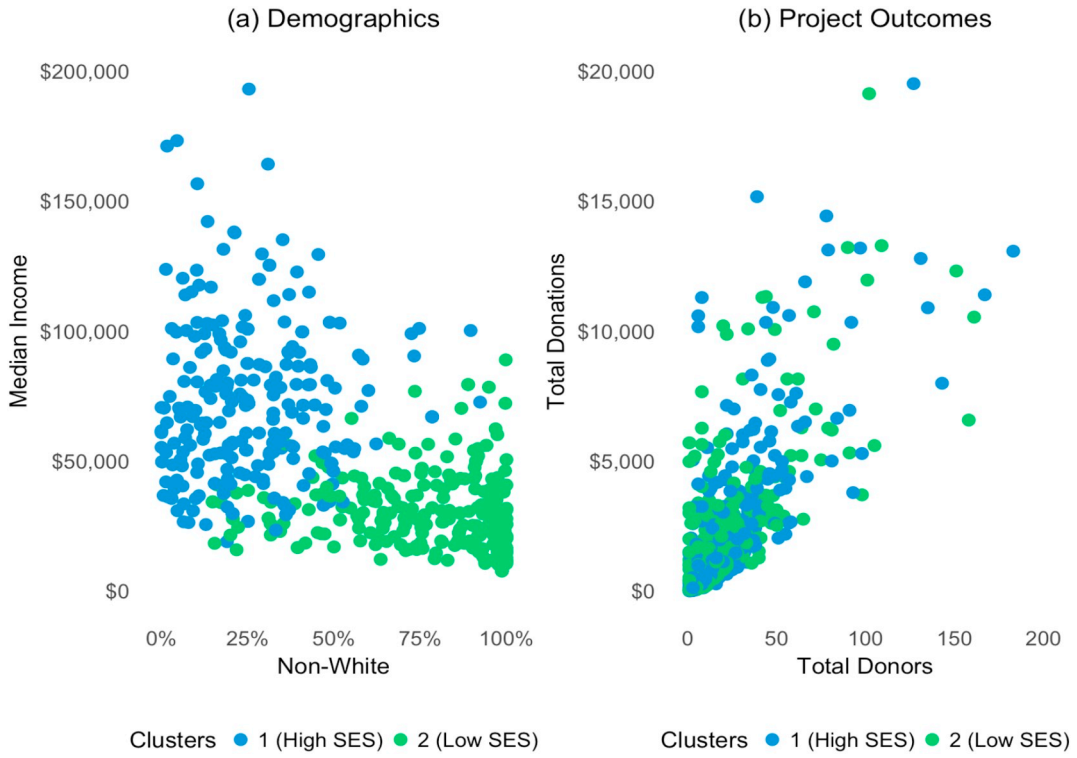


**Fig. 2.** Visualizing project clusters.

**Table 3**
The effect of donor characteristics on the size of donations.

| | Model 1 | Model 2 | Model 3 | Model 4 |
|---|---|---|---|---|
| (Intercept) | 67.36*** | 49.11*** | 57.02*** | 39.50*** |
| | (2.50) | (2.54) | (3.83) | (4.33) |
| Budget size | 0.22*** | 0.22*** | 0.23*** | 0.22*** |
| | (0.02) | (0.02) | (0.02) | (0.02) |
| # of donors | −0.28*** | −0.19*** | −0.18*** | −0.21*** |
| | (0.04) | (0.04) | (0.04) | (0.04) |
| Distance | 0.00 | 0.00* | | 0.01** |
| | (0.00) | (0.00) | | (0.00) |
| Fund | | 0.79*** | 0.78*** | 0.71*** |
| | | (0.03) | (0.03) | (0.03) |
| Same state | | | −11.22** | |
| | | | (3.70) | |
| Same zip | | | −1.89 | |
| | | | (4.94) | |
| Project median income | | | | −0.03 |
| | | | | (0.05) |
| Donor median income | | | | 0.17*** |
| | | | | (0.04) |
| R-squared | 0.02 | 0.07 | 0.07 | 0.06 |
| N | 12,027 | 12,027 | 12,041 | 11,620 |

Notes: The dependent variable is the size of the donation. Budget size is measured in dollars, Distance are measured in miles, Fund is the dollar value of matching funds, Same State and Same Zip are dummy variables. The median income of project and donor neighborhood is measured in thousands of dollars. Standard errors are in parenthesis. Asterisks denote statistical significance: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

average size of the donation. Donors who are further away from the project site contribute more on average, however, the effect is often not statistically significant. These may be people with a personal connection to the campaign and/or the campaign leader. One dollar of matching funding increases the size of the donation by approximately $0.80, however we do not control for any selection effects with regards to the type of campaigns that have matching funds. Column (3) replaces the distance variables with dummy variables specifying whether the donor lives in the same zip code or state as the project. The results are similar to Columns (1) and (2); donors contribute less to projects located within the same zip code and state, though the impact for zip codes is not significant. The neighborhood median income of the project location does not have an impact on the size of the donation, but donors from wealthier neighborhoods donate more.

### 6.2. Donor-level cluster analysis

Similar to the project cluster analysis, we perform a cluster analysis using PAM for the donor data. In this specification, we cluster solely on the neighborhood demographics of the donors; the optimal number of clusters for the donor data is also two. Once we have clustered donors based on their neighborhood demographics we analyze if the clusters differ in terms of the average donation, distance from the project, and neighborhood demographics of projects that they fund. Similar to the project clusters, donor clusters can also be broadly defined by the socioeconomic status of donor neighborhoods. Cluster 1 is the “low SES cluster” and Cluster 2 is the “high SES cluster”.[10] Relative to Cluster 1, donors in Cluster 2 come from wealthier, less diverse, and more educated neighborhoods. Not surprisingly, the donors in the high SES cluster (Cluster 2) average larger contributions. Consistent with the previous results, the donors in the high SES cluster donate to projects that are further away on average, although the median distance is quite similar.

Importantly, the donors in the two clusters don't systematically donate to projects in different types of neighborhoods. The average neighborhood median income for a project funded by Cluster 1 donors is $49,000 compared to $56,000 by Cluster 2 donors. The results are similar for other demographics of the project neighborhoods. This is a promising development because donors from both wealthy and less affluent areas donate to projects in similar types of neighborhoods.

[10] A table of summary statistics is suppressed for space and is available at: https://tinyurl.com/DonorClusters.

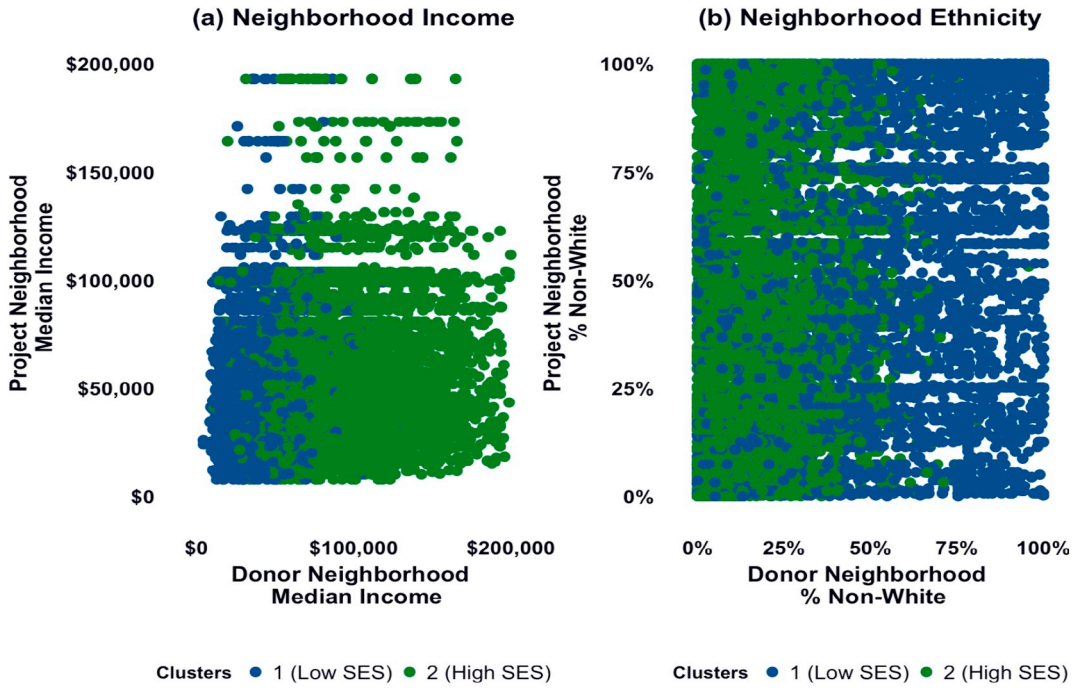


**Fig. 3.** Visualizing donor clusters.

To visualize the differences in the donor clusters we plot project and donor characteristics by cluster. Panel (a) of Fig. 3 shows the donor and project median income by cluster and panel (b) shows donor and project racial composition. If the donors in wealthy areas only donated to projects in wealthy areas we would expect Cluster 2 (green) to be concentrated in the top right corner and Cluster 1 (blue) to be concentrated in the bottom left corner. Both graphs show that clusters are more concentrated horizontally (by donor) compared to vertically (by project). Thus, the donors are from quite different neighborhoods but they contribute to projects in relatively similar neighborhoods, as evidenced by the vertical mix of the two clusters.

## 7. Distance from donors to projects

In this section, we analyze distance in more detail and describe why distance is a particularly important characteristic in civic crowdfunding. Fig. 4 maps the spatial distribution of donors for several representative projects with the red triangle representing the project location and the blue circles are the location of donors. The size of the circle is scaled by the monetary value of the donation so the maps show both the quantity and intensity of donations across space. We define representative projects as having budgets within $75 of the average project budget and having at least 10 unique donors. The key takeaway from the map is the substantial heterogeneity with respect to the spatial distribution of donors. Projects 3, 4, and 6 primarily elicit donations from very local donors, whereas the rest of the projects raise funds from across the country. Identifying who is willing to contribute is important when considering policies that expand the role of civic crowdfunding. For example, if donations are used to communicate public support for a certain type of project that will determine how the local government allocates funding, how should officials treat donations from outside their jurisdiction? Are donations outside the city or state representative of the preferences for the local community? There are not obvious answers, but having a clear understanding of the spatial distribution of donors is important for extrapolating the lessons of civic crowdfunding.

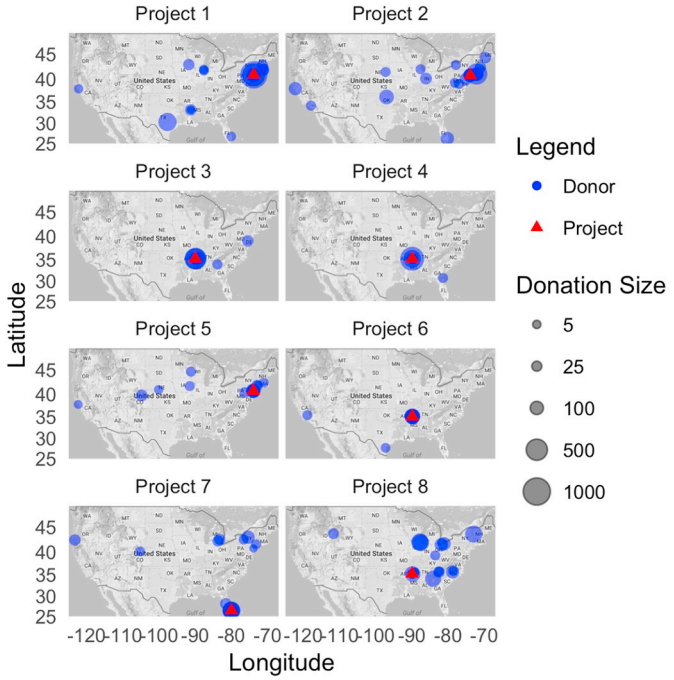


**Fig. 4.** Mapping representative projects.

## 8. Conclusions

This paper fills gaps on the empirics of civic crowdfunding by utilizing fine scale geographic data on both projects and donors from a major civic crowdfunding campaign. The novel dataset allows us to address the potential distributional implications of civic crowdfunding and how policymakers can interpret donations to civic crowdfunding campaigns. The characteristics of the project neighborhood are not strong drivers of total donations. Through graphical analysis, multivariate regression, and cluster analysis we find that features of the

neighborhood where projects take place, such as median income and the racial composition do *not* systematically affect the ability to raise capital for those projects. This addresses an important concern that civic crowdfunding might exacerbate inequalities in public amenities by predominantly funding projects in wealthy areas. Rather, we find that both poor and affluent neighborhoods can successfully fund projects. Donor characteristics do have an impact on the size of donations; donors from wealthy neighborhoods contribute more on average. However, donors fund projects in both high and low SES neighborhoods.

Distance plays an important role in donations. While the average distance between donor and project is over 300 miles, the median distance is roughly 8 miles. Some projects are hyper local with almost all donations coming very close to the project site, whereas other projects attract donors from all over the United States and internationally as well. It is important to consider who is donating to the projects when using data from crowdfunding campaigns to inform broader investments in neighborhood amenities.

The results provide policy insights into local government officials interesting in learning about community preferences from civic crowdfunding campaigns or integrating civic crowdfunding into official government funding mechanisms. Since civic crowdfunding focuses on public goods there is the classic free-rider problem where beneficiaries may choose not to contribute. One policy option is to allocate matching funds from local tax revenue, whereby each private dollar donated to a campaign is matched by a public dollar. Matching funds will amplify communities' preferences and can be designed to promote equity and ensuring that local preferences are rewarded. For example, the match can be inversely proportional to the neighborhood income where the project takes place: high-income neighborhoods will receive small or no matching rates and low-income areas will receive high matching rates. Additionally, matching rates can be tailored to donors' zip codes: local donors may receive matching government funding while donors who are not constituents do not receive matching rates. Utilizing matching incentives provides allows governments to integrate civic crowdfunding into official funding streams while promoting specific priorities such as equity and local input.

There are several important caveats to consider when interpreting the results of this research. We analyze projects from only one platform (ioby), that specifically works to address inequalities in disadvantaged communities. Consequently, the results regarding the equity implications of civic crowdfunding are perhaps not surprising. Additionally, the analysis does not represent a causal relationship between demographic characteristics and projects outcome. Therefore, we conclude that civic crowdfunding *can* be used as an effective tool to address disparities in local public goods, not that it necessarily *will* do so in all settings.

The analysis provides an initial empirical assessment of some important features of civic crowdfunding. However, there are many interesting and worthwhile avenues to pursue. While we analyze geographic distance, it is also important to consider the donors' social networks to account for donors that live far away from the project site but have strong ties to the projects' community and/or campaign leader. A long-term assessment of neighborhood outcomes such as economic development, health and crime can determine both the impact of the projects and spillover effects surrounding increased social capital. Civic crowdfunding also has the potential for a nonmarket valuation tool to help guide public funding. Observing how citizens donate to campaigns reveals information on the preferences for various types of community projects. The political economy of civic crowdfunding is also uncertain. Governments may support civic crowdfunding campaigns through matching incentives using public money or may see private funding of public goods as an opportunity to shirk their responsibilities to save money. There are also several insights into charitable giving from civic crowdfunding. For example, exploring the relative merits of seed vs. matching funds or the effect of the cumulative donations or number of unique donors has important implications for the design of crowdfunding campaigns in conjunction with government or foundation funding. Lastly, the interaction of multiple campaigns is interesting in the context of a donor considering where to spend her money. All of these are worthy avenues of research that can build on the findings of this study and can help expand the role of civic crowdfunding in local community development policy.

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