

MULTI-FAMILY HOUSING, SOCIAL CAPITAL, AND CHARITABLE BEHAVIOR: DOES SPATIAL CONNECTEDNESS INFLUENCE SOCIAL CONNECTEDNESS?

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Abstract

Research and popular discussion in the last decade have led to a growing understanding of the importance of social capital for efficient societal functioning. This article considered the relationship of spatial connectedness in the built environment to social connectedness. Using charitable giving as a measure of pro-social behavior, an examination of 15,535 households participating in the Consumer Expenditure Survey revealed an inverse U-shaped relationship between proximity measures and social connectedness. Tobit and double-hurdle analyses showed charitable giving levels and participation initially rising as the number of units per structure rises and then falling for higher density levels. Separately, a probit analysis indicated a positive association between charitable giving participation and the presence of one shared wall, as well as a smaller, but still positive, association with multiple shared walls. Social connectedness appeared to be most strongly encouraged in the “sweet spot” between the physical isolation of detached single-family homes and the overcrowding of very large, high-density apartment buildings.

Introduction

Despite its sometimes varied definitions, both theory and empirical observation have confirmed the significant consequences of social capital. Social connectedness has been particularly valuable in its ability to generate trust and trustworthiness. Various studies have found that a one standard deviation increase in a survey-based measure of trust on a national level led to a .5 standard deviation increase in economic growth, a .7 standard deviation increase in international investor-perceived judicial efficiency, and a .3 standard deviation decrease in government

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corruption as measured by the *International Country Risk Guide* (Knack & Keefer, 1997; La Porta, Lopez-de-Salanes, Shleifer, & Vishny, 1997). Others have found similar results at the level of local municipalities and even individual organizations (Fukuyama, 1995; Putnam, 1993).

While not always using the term *social capital*, various economists have recognized the fundamental significance of this concept. Kenneth Boulding described its foundational nature in his 1969 article "Economics as a moral science," explaining: "There is a minimum degree of benevolence even in exchange without which it cannot be legitimated and cannot operate as a social organizer" (p. 6). Nobel Laureate Kenneth Arrow pointed out in a 1972 article that social connectedness encourages investment by providing an efficient substitute for expensive or non-existent legal alternatives. Examples from game theory showed that shared social norms can sustain social optimum outcomes among self-interested players, even when those outcomes are not Nash equilibriums (Abreu, 1988). In other words, these shared norms generated socially optimal behavior in selfish players, even in the presence of immediate incentives to deviate. The purpose of this article was to examine the relationship of spatial connectedness in the built environment to social connectedness.

Review of Literature

Housing and Social Capital

Previous research has documented connections between homeownership and social capital (Dietz & Haurin, 2003; Rossi & Weber, 1996). Homeownership naturally generates incentives to invest in the community. The value of the home depends in large part on the quality of the immediate community. Thus, homeowners receive direct financial benefit from community improvements. Homeownership also creates barriers to mobility. These barriers increase the actual and expected length of residence in a particular community. As the expected length of residence increases, so to does the period for benefiting from community improvements, thus increasing the incentive to invest in the community.

The emphasis on homeownership would seem to disadvantage multi-family housing as their homeownership rates are generally much lower than for single-family homes. However, some studies have found positive effects of higher density living arrangements. Festinger, Schacter, and Back (1950) were able to follow individuals who were randomly assigned living units in different buildings. They found that those who were spatially far apart were less likely to form social connections. Later, Baldassare (1979) found that even modest distances in residential placement decreased social interaction (see also Al-Homoud, 2003). In his noted book *Bowling Alone*, Putnam (2000) posited that urban sprawl diminishes social capital formation in part due to increased physical separation.

The presumption here is that diminished *physical* distance at certain levels can create diminished *social* distance. It is this diminished social distance that creates the various outcomes such as trust, loyalty, altruism, and cooperation that we collectively label as social capital (Glaeser, Laibson, & Sacerdote, 2002).

In contrast to the potentially positive effects of proximity, some point to the dangers of overcrowding. In a laboratory setting internal density predicted aggressive behavior, especially in men (Freedman, 1975; Freedman, Levy, Buchanan, & Price, 1972). Some early observations indicated that building density was a significant predictor of some variables of social pathology (Gillis, 1974). However, later studies called this belief into question. Booth, Johnson, and Edwards (1980) found household crowding to be a variable of minimal importance in explaining pathology. One study found that both high and very low levels of internal density, measured by individual-to-room ratios, were detrimental to psychological health (Gabe & Williams, 1986). Indeed, psychological impact may have more to do with perceived crowding than objective crowding. Surprisingly, these two variables are not strongly related (Edwards, Fuller, Sermsi, & Vorakitphokatorn, 1994). Myers, Baer, and Choi (1996) summarized the mixed results in the literature, noting that “after a century of debate it is still in question whether so-called overcrowding is harmful to the people affected” (p. 67).

Charitable Giving as a Measure of Social Capital

Despite the importance of social capital, its measurability has at times been problematic. One concern with using attitude-based measurements is that such measurements may not reflect objective reality. Indeed, Glaeser, Laibson, Scheinkman, and Soutter (2000) found that attitudes expressed in surveys did not predict differences in cooperation either in experimental economic games or in daily behavior. Charitable giving presents itself as a natural antidote to the fuzziness of such attitudinal surveys. In contrast with studies of self-reported feelings, charitable giving reflects concrete behavior. Further, charitable giving is easily measurable and strongly correlated with other observable indicators of social capital. In a Canadian study, a single core group of committed individuals was associated with a large proportion of all donating, volunteering, and political participation—common measures of social capital (Reed & Selbee, 2001). A comparison of charitable giving to public television across different communities found that higher levels of giving were associated with other community social capital measures such as voter turnout, census participation, and belief in the honesty of other people (Kropf & Knack, 2003). Elsewhere, contributions were positively correlated with volunteering and participating in community charitable events, and negatively correlated with self-interested volunteer motives (Farmer & Fedor, 2001).

Economists have attempted to model charitable giving using a variety of approaches. Some approaches seem to struggle valiantly to maintain the foundational economic premise of the self-interested consumer in the face of persistent charitable behavior. The public goods game approach suggested that donors give the smallest possible amount necessary to ensure their use of some public good (Andreoni, 1990). Prestige models introduced others' perception of the consumer's wealth into the consumer's utility function. Under the prestige model, giving is a way to impress acquaintances (Glazer & Konrad, 1996). The "warm-glow" theory suggested that individuals receive direct utility from the act of giving (Andreoni, 1995).

Perhaps most naturally, a model from Boulding's (1969) grants economy simply recognizes that (for better or worse) people have interdependent utility functions. He explained: "The plain fact is that our lives are dominated by precisely the interdependence of utility which the Pareto optimum denies. Selfishness, or indifference to the welfare of others, is a knife edge between benevolence on the one side and malevolence on the other" (p. 6). Using Boulding's approach for the present study, the following equation represents the consumer's utility function:

$$U_i = f(x_i, \mathbf{E}_{i,-i}, \mathbf{X}_{-i})$$

where U_i is the individual's own utility; x_i is the individual's own consumption; \mathbf{X}_{-i} is a vector of the consumption levels of all other individuals; and \mathbf{E} is a vector of empathy factors indicating interdependence of utility, $E_i=1$, $E_j<0$ for misanthropy, $E_j>1$ for idolization. Given that income is constrained,

$$I_i = px_i + t$$

where I_i is the individual's income; t is transfers; and p is prices. The resulting maximizing equality holds for all those making charitable transfers,

$$\frac{\frac{\partial U^i}{\partial X^i}}{\frac{\partial U^i}{\partial U^j} \bullet \frac{\partial U^j}{\partial X^j}} = \frac{MU_i}{E_{ij} \bullet MU_j} = 1 \quad \forall j \text{ receiving transfers}$$

Given this constraint, philanthropy changes can be generated by:

1. A change in the consumer's own marginal utility, MU_i . This is typically due to changes in income or consumption choices.
2. A change in the marginal utility of some potential transfer recipient, MU_j . The devastation of a hurricane, tsunami, or famine can cause such changes through resulting dire need.
3. A change in the empathy factor, E_{ij} , namely, the amount of change in the consumer's own utility (∂U^i) brought about by a change in individual j 's utility (∂U^j). This change in empathy correlates to the concepts of social connectedness and social capital of interest here.

Data and Results

This study examines all complete income reporters making 5th quarter reports in the Consumer Expenditure Survey (CEX) during the three year period from the 2nd quarter of 1998 through the 1st quarter of 2001. This ending point corresponds to a change in the CEX charitable data collection methodology. By excluding households with missing data in the variables of interest, we arrive at 15,535 unique households. Charitable giving is reported in constant 2001 dollars adjusted by the consumer price index and includes all CEX giving categories. This includes gifts to charities (such as United Way and Red Cross), gifts to educational organizations, gifts to churches or other religious organizations (excluding parochial school expenses), political contributions, and other charitable contributions.

The first measure of proximity is structural connectedness, as measured by categorizing housing arrangements into one of three categories.

No shared walls: single-family detached, mobile home, or trailer.

One shared wall: duplex, or end row or end town house (one common wall).

Multiple shared walls: row or town house inner unit, 3-plex, 4-plex, or garden apartment, high-rise apartment, or other apartment or flat.

The first dependent variable indicates the presence of charitable giving. Independent variables include wealth controls (liquid assets reported in \$10,000 units, before tax income reported in \$10,000 units, residence in public housing, homeowner tenure status, number of bathrooms, and number of rooms excluding bathrooms), demographic controls (age of respondent, number of family members residing in household, and dummy variables for married households, urban households, and white respondents), and dummy variables for one shared wall (as compared to detached housing) and multiple shared walls (as compared to detached housing).

The presence of one shared wall, and to a lesser degree the presence of multiple shared walls, significantly increases the probability of a household's participation in charitable giving (Table 1). The predicted probability is the integral of the area to the left of the predicted point on the standard normal curve where $t \sim N(0,1)$.

$$\frac{1}{\sqrt{2\pi}} \int_{-x}^{\beta'x} e^{-t^2/2} dt$$

By reversing the independent dichotomous variable x_i and subtracting

$$\Phi(\beta'x_{-i} + \beta_i) - \Phi(\beta'x_{-i}) \quad \text{where } x_{-i} = \overline{x_{-i}}$$

we can use these results to compare similarly situated individuals with sample mean characteristics. In this case, individuals with one shared wall are 13% more likely to give as compared to those in detached housing. Similar individuals with multiple shared walls are 7% more likely to give as compared to those in detached housing.

Table 1. Shared Walls and the Likelihood of Charitable Giving—Probit Estimates by Maximum Likelihood Estimation with Sample Means

Parameter	Estimate (Standard Error)	Sample (Standard Deviation)	Chi- Square	Pr> Chi- Square
One wall	0.159 (0.0544)	0.0387	8.55	0.0035
Multi-wall	0.0819 (0.0342)	0.1796	5.73	0.0167
Income (10k)	0.0368 (0.0029)	4.7533 (4.7363)	158.51	<.0001
Liquid (10k)	0.0041 (0.0008)	3.8534 (16.874)	25.58	<.0001
White	0.018 (0.0295)	0.8452	0.37	0.542
Age	0.0071 (0.0007)	48.1782 (17.7)	111.05	<.0001
Owner	0.2763 (0.0296)	0.642	87.31	<.0001
Rooms	0.0371 (0.0064)	5.7103 (2.145)	33.6	<.0001
Bathrooms	0.0901 (0.0188)	1.6395 (0.717)	22.92	<.0001
Public hsng	-0.1421 (0.0643)	0.0457	4.89	0.0271
Family size	-0.0483 (0.0086)	2.5208 (1.4958)	31.37	<.0001
Married	0.1738 (0.026)	0.5358	44.78	<.0001
Urban	0.0523 (0.0363)	0.9092	2.07	0.15
Intercept	-1.1083 (0.0664)		278.92	<.0001

Note: Dependent variable is 1 if giving charity, 0 if not; N = 15,535; modeled with SAS 9.1.

The second measure of external density comes from a new polychotomous variable introduced in the 2000 CEX resulting from the question, “How many housing units, both occupied and vacant, are in this structure?” We convert the response categories to a quasi-continuous numeric independent variable, “units,” representing the number of units as follows: “1” = 1; “2” = 2; “3.5” = 3-4; “7” = 5-9; “14.5” = 10-19; “34.5” = 20-49; and “50” = 50 or more. In addition, we add the square of the units variable to allow for a non-linear relationship. Replacing the previous proximity variables with units and the square of units generates the second set of results, as shown in Table 2.

An increasing number of housing units in the family’s residential structure is associated with an increasing probability of charitable giving up to an inflection point at about 27 units, after which the probability falls. Converting the probit estimates into probability changes by $\Phi(\beta'x)$, setting the vector x_j at the sample mean of x_j and varying x_j gives us the graph displayed in Figure 1 of our probability elasticity.

Table 2. Housing Units in Structure and the Likelihood of Charitable Giving—Probit Estimates by Maximum Likelihood Estimation with Sample Means

Parameter	Estimate (Standard Error)	Sample Mean (Standard Deviation)	Chi-Square	Pr> Chi-Square
Units	0.0212 (0.0073)	5.5855 (11.507)	8.46	0.0036
Units ²	-0.0004 (0.0001)	163.59 (533.94)	6.55	0.0105
Income (10k)	0.037 (0.0049)	4.8016 (4.7623)	56.69	<.0001
Liquid (10k)	0.0055 (0.0014)	4.3086 (19.586)	15.82	<.0001
White	0.0311 (0.0496)	0.8377	0.39	0.5315
Age	0.0073 (0.0012)	48.193 (17.706)	39.45	<.0001
Owner	0.2586 (0.0518)	0.6454	24.95	<.0001
Rooms	0.0572 (0.0126)	5.7322 (2.0793)	20.73	<.0001
Bathrooms	0.025 (0.0332)	1.6643 (0.7215)	0.57	0.4511
Public hsng	-0.0994 (0.1069)	0.0517	0.86	0.3523
Family size	-0.0464 (0.0145)	2.5462 (1.5104)	10.22	0.0014
Married	0.1852 (0.044)	0.534	17.72	<.0001
Urban	0.0704 (0.0649)	0.9169	1.18	0.2777
Intercept	-1.2257 (0.1202)		103.94	<.0001

Note: Dependent variable is 1 if giving charity, 0 if not; N = 5,318; modeled with SAS 9.1.

Giving Levels

To this point, we have investigated the impact of physical proximity only on the likelihood of charitable giving. Examining the levels of charitable giving may produce additional information on social connectedness. Analyzing the level of charitable giving introduces a number of new statistical issues. A few major donors, often masking charitable behavior of the poor, heavily influence giving levels. For example, some donors in the present dataset made over \$200,000 in charitable gifts during one year. Because we are not focused on how best to raise money, we are less interested in absolute dollar results than in modeling the general behavior of individuals. We address this issue in part by using a log-lin model, allowing an examination of the *relative* change in gifting levels for an absolute change in regressors. We transform giving level by \$1 so that zeros remain zeros in their natural log transformation.

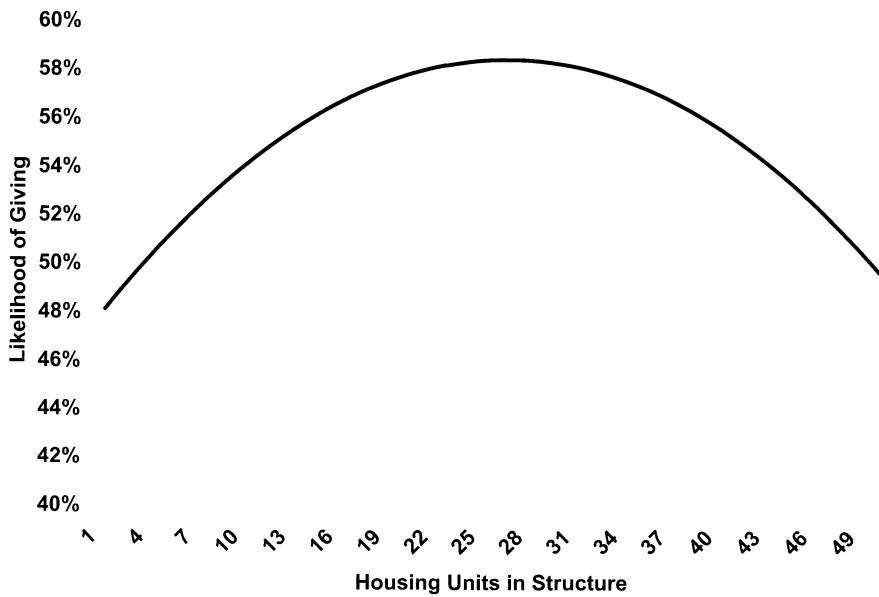


Figure 1. The Built Environment and Likelihood of Charitable Giving

Ordinary least squares is not an ideal methodology for this type of dependent variable due to heteroskedasticity and non-normality of errors. The dependent variable, a transformation of dollars given, is zero for about half of the observations. The error term is the difference between prediction and results. If half of the results are zero, half of the error terms will be the additive inverse of the predicted value. Thus, these error terms will have a direct relationship with x , implicating heteroskedasticity and non-normality. A standard response to a high number of zeros in the dependent variable is to employ a Tobit censored regression model where:

$$y_i^* = X_i' \beta + \varepsilon_i, \quad y_i = \max(y_i^*, 0), \quad \varepsilon_i | X_i' \sim N(0, \sigma^2)$$

Here y_i is the natural log of the sum of charitable giving and \$1.

The Tobit analysis reveals the same patterns in charitable giving levels as observed earlier with charitable giving participation. The presence of one shared wall and, to a lesser degree, the presence of multiple shared walls, significantly increases the predicted level of charitable giving. An increasing number of housing units in the family's residential structure is associated with increasing levels of charitable giving up to an inflection point at about 28 units, after which the probability falls. Results are shown in Table 3.

Table 3. Both Measures of Proximity and the Level of Charitable Giving (Tobit)

Parameter	Shared Walls		Units Per Structure	
	Estimate (Standard Error)	Pr>Chi- Square	Estimate (Standard Error)	Pr>Chi- Square
Units			0.1157 (0.0348)	0.0009
Units ²			-0.0021 (0.0007)	0.0032
One wall	0.6911 (0.2492)	0.0056		
Multi-wall	0.3748 (0.1621)	0.0208		
Income (10k)	0.1663 (0.0116)	0.0000	0.175 (0.0201)	0.0000
Liquid (10k)	0.0143 (0.0027)	0.0000	0.0174 (0.0041)	0.0000
White	0.0338 (0.137)	0.8047	0.0816 (0.2358)	0.7293
Age	0.04 (0.0031)	0.0000	0.0409 (0.0054)	0.0000
Owner	1.4671 (0.1384)	0.0000	1.4723 (0.247)	0.0000
Rooms	0.2077 (0.0294)	0.0000	0.2833 (0.0568)	0.0000
Bathrooms	0.5733 (0.0836)	0.0000	0.3065 (0.1503)	0.0415
Public hsng	-0.9503 (0.308)	0.0020	-0.7502 (0.5204)	0.1494
Family size	-0.2254 (0.0397)	0.0000	-0.2164 (0.0681)	0.0015
Married	1.0467 (0.1189)	0.0000	1.0692 (0.2059)	0.0000
Urban	0.3435 (0.1662)	0.0388	0.3904 (0.3037)	0.1986
Constant		0.0000	-5.886 (0.572)	0.0000
σ		0.0000	5.4198 (0.0852)	0.0000
N =	15,535		5,318	

Note: Dependent variable is the log of (charitable giving + \$1); modeled with LIMDEP 8.0.

One concern with the Tobit results is that, although accurately indicating the overall predicted level of giving, they may be reflecting only increased charitable participation rates rather than increased levels of gifting among givers. A major restriction of Tobit is that a positive β means that an increase in the corresponding X increases both $P(y_i > 0)$ and $E(y_i | y_i > 0)$. In other words, "In the Tobit model any variable which increases the probability of a non-zero value must also increase the mean of the positive value" (Lin & Schmidt, 1984, p. 174). It is possible for a relationship to violate this assumption. For example, the relationship of a building's age to predicted fire losses does not fit this model. For older buildings the likelihood of fire is higher, but the amount of loss resulting from a fire is less.

To investigate whether the Tobit results reflect something more than the increased probability of participation, we investigate by using Cragg's double-hurdle model (Table 4). A double-hurdle model separates the decision to participate from the decision as to the level of participation. The first hurdle is a probit analysis on the likelihood of participation. The second hurdle is a truncated regression analysis on the level of participation among participants (plus an ancillary variable σ to help correct for correlation in the errors). This double-hurdle approach has been used in a variety of consumer research contexts where large proportions of the sample are non-participants. Examples include tobacco (Labeaga, 1999), alcohol (Sharpe, Abdel-Ghany, Kim, & Hong, 2001), food away from home (Yen, 1993), shellfish (Lin & Milon, 1993), and mortgages (Leece, 1995).

Table 4. The Level of Charitable Giving among Active Donors with Both Measures of Proximity (Truncated MLE Regression)

Parameter	Shared Walls		Units Per Structure	
	Estimate (Standard Error)	P[Z >z]	Estimate (Standard Error)	P[Z >z]
Units			0.034 (0.0135)	0.0121
Units ²			-0.0006 (0.0002)	0.0125
One wall	-0.1132 (0.0914)	0.2156		
Multi-wall	-0.0313 (0.0642)	0.6253		
Income (10k)	0.0463 (0.0039)	0.0000	0.0518 (0.0068)	0.0000
Liquid (10k)	0.0057 (0.0008)	0.0000	0.0072 (0.0012)	0.0000
White	-0.1176 (0.0518)	0.0232	-0.1303 (0.0891)	0.1437
Age	0.0143 (0.0011)	0.0000	0.0128 (0.002)	0.0000
Owner	0.1125 (0.0532)	0.0346	0.2411 (0.0951)	0.0113
Rooms	0.0698 (0.0116)	0.0000	0.0528 (0.02)	0.0083
Bathrooms	0.2752 (0.0301)	0.0000	0.2617 (0.0528)	0.0000
Public hsng	-0.4226 (0.1252)	0.0007	-0.3961 (0.2092)	0.0584
Family size	-0.0124 (0.0148)	0.4037	0.0011 (0.025)	0.9649
Married	0.3529 (0.0441)	0.0000	0.2667 (0.0762)	0.0005
Urban	0.1188 (0.0607)	0.0503	0.0383 (0.1114)	0.7305
Constant	3.8901 (0.1164)	0.0000	3.9756 (0.2132)	0.0000
Sigma	1.5193 (0.0121)	0.0000	1.5352 (0.0211)	0.0000
N =	15,353		5,318	

Note: Dependent variable is the log of (charitable giving + \$1) truncated at $\log(\$1) = 0$; modeled with LIMDEP 8.0.

We can initially test for the fit of the double-hurdle model as compared to a Tobit approach by comparing log likelihoods for each:

$$\chi^2 = -2(\ln L_{TB} - (\ln L_{PR} + \ln L_{TR}))$$

where $\ln L_{TB}$, $\ln L_{PR}$, and $\ln L_{TR}$ are the log likelihoods of the Tobit model, probit model, and truncated regression model, respectively. Our first model using shared walls as a proximity measurement generates a χ^2 of 10750.66. The model employing living units per structure as the proximity measurement produces a χ^2 of 3608.62. Given that the critical value of .01 with 14 degrees of freedom is 29.14, we can easily reject the hypothesis that the Tobit model fits just as well. This should not come as a surprise because the Tobit is the restricted model. The truncated regression stage of the double-hurdle reveals the impact of the variables on the charitable giving levels of *donors*.

When we limit our examination to active donors, we find that the number of units retains the same basic relationship with the relative level of giving among donors as it had with the probability of giving among all households. However, the presence of either one or multiple shared walls does not significantly affect the relative level of giving among donors. Thus, for the shared wall measure of proximity, the Tobit results (relative giving level) simply reflect what we already knew from the probit results (giving participation).

Conclusion

If charitable participation is a valid measure of social capital, then we clearly see a relationship in physical connectedness of the built environment and social capital. It is particularly interesting that detached single-family homes are not the “ideal” structure. Previous associations of single-family homes with positive outcomes may simply be reflecting their association with wealth, income, or tenure status. Using the Consumer Expenditure Survey’s financial information we are able to, in part, control for these intervening factors.

Naturally, a fundamental issue with this type of statistical analysis is that although we can prove association, we must infer causation. Thus, the issue arises as to whether built environment proximity is a cause, an effect, or both. An omitted variable challenge is that sociable people may be more likely both to choose social housing and to contribute to social causes. However, the reality of the housing selection process works against this particular omitted variable challenge.

Typically, Americans reside in multi-family housing primarily due to economic constraints rather than from a preference for multi-family housing over detached housing. The housing choice is often externally imposed based on affordability. Given America’s strong cultural preference for detached housing, residence in multi-family housing is likely to result from economic constraints. Although our present regression variables capture some of these economic constraints, others such as high medical costs or job insecurity remain hidden. This suggests that the

multi-family resident group will naturally suffer from selection bias tending toward greater economic constraints. However, economic constraints, *ceteris paribus*, lead to *lower* charitable giving participation and levels. Hence, it is plausible to suggest that the impact of the built environment on charitable behavior is actually *stronger* than is reflected here, because these results occur despite an economic selection bias that works against charitable behavior.

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