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Overcoming Barriers to Placing Manufactured Housing in Metropolitan Communities

Casey J. Dawkins and C. Theodore Koebel

Problem: Manufactured housing is an option that is relatively little used in metropolitan communities although it appears to provide a quality-cost advantage over site-built housing.

Purpose: This article examines barriers to placing manufactured housing in metropolitan areas that planners might influence, focusing particularly on land use and design regulations.

Methods: We paired data from a nationwide survey of planners in Community Development Block Grant (CDBG)-eligible metropolitan communities with information on those communities' characteristics to estimate several regression models explaining two measures of manufactured housing supply using both supply- and demand-side variables.

Results and conclusions: A variety of regulatory restrictions, including the lack of by-right zoning, as well as permits, snow load standards, fire codes, zoning codes, subdivision regulations, and architectural design standards impede the placement of manufactured housing in metropolitan communities. In general, such regulations determine whether or not jurisdictions have any manufactured housing at all; if they do, market conditions have the primary influence on the number of such units in a community.

Takeaway for practice: Planners play an important role in determining whether manufactured housing is a feasible housing alternative when they assess the demand for manufactured housing and recommend policies that will influence whether units are placed in their communities. We suggest that planners emphasize manufactured

Government subsidies in various forms (grant and loan programs supporting low-cost housing construction and rehabilitation, tax incentives and gap-financing programs for low income borrowers, tax credits for affordable housing production, and public and nonprofit ownership) have been the most common tools for increasing the supply of affordable housing in the United States. Alternatively, policy could focus on reducing market barriers to low-cost housing producers. Since the adoption of the National Manufactured Housing Construction and Safety Standards Act (1974) *manufactured housing* must be constructed to the standards of a uniform nationwide building code created by the U.S. Department of Housing and Urban Development (HUD) that is informally called the *HUD code* (Manufactured Home Construction and Safety Standards, 2001), the only housing type for which this is true. Absent subsidies, manufactured housing costs less per unit than any other housing type because of economies of scale in production and because it uses standardized inputs and labor processes.

In metropolitan areas with high land costs, manufactured housing offers potential for substantial cost savings by substituting other inputs for land. Design and development demonstrations such as those supported by HUD's Partnership for Advancing Housing Technology (PATH; 2007) have documented this and also shown that manufactured housing can be made visually compatible with various surroundings. Structural innovations now allow

housing as an affordable housing option and we offer suggestions for accomplishing this.

Keywords: manufactured housing, land use regulations, zoning, HUD code, regulatory barriers

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modestly pitched roofs, as well as two-story stacking of units, although most manufactured housing units do not have these attributes. Oakland, CA, has demonstrated the utility and cost advantages of placing manufactured housing on infill lots in a built-out city. HUD now requires communities entitled to receive Community Development Block Grant (CDBG) funds to address regulatory barriers to affordable housing, including manufactured housing, in consolidated plans outlining how they intend to use HUD funds (Consolidated Plan Final Rule, 1995).

Despite its advantages, manufactured housing has seen limited use in metropolitan areas. Until recently, the stereotypical single-wide unit was a narrow (12–18 feet), long (60–90 feet), single-story structure with a barely perceptible roof pitch (Gartner & Green, 1996). Although double-wide units provided twice the space, they still looked like trailers rather than site-built homes. Manufactured housing typically also included the following design features: placement on cinder blocks or other temporary foundations, elevation of the unit to accommodate the required steel chassis with skirting material covering the gap between structure and ground, and the absence of any porch or similar entryway covering.

The potential for manufactured housing to expand the affordable housing supply in metropolitan areas depends on a variety of factors, several of which planners influence. Many places adopted restrictive or exclusionary regulations because manufactured housing units were perceived to be temporary structures that could be moved from site to site and to be suitable for rural areas or trailer parks but not for city neighborhoods. Despite improvements in the quality and visual appeal of manufactured housing, restrictive land use and design regulations in urban and suburban jurisdictions limit the number of locations where manufactured housing can be placed, impose additional onsite installation standards and other design requirements that do not pertain to site-built units, and, in some cases, continue to prohibit the use of manufactured housing units altogether (Sanders, 1998).

While this problem has not gone unnoticed among affordable housing advocates, little is known about the degree to which regulatory restrictions affect the actual placement of units that meet the HUD code in metropolitan communities. The purpose of this article is to fill this gap. Toward that end, we examine data from a nationwide survey of planners working in CDBG-eligible jurisdictions, paired with information on those communities' characteristics, to determine which factors impede the placement of manufactured housing units.

Background

Manufactured housing offers a potential solution to the affordable housing crisis. By taking advantage of cost savings on materials and labor associated with large-volume production, manufactured housing producers can offer housing products that are considerably less expensive than traditional site-built homes. Since manufactured homes are produced more quickly than site-built homes, and in secure, temperature-controlled environments, both project financing costs and the cost of maintaining the unit during the production process are less than for site-built homes (Vanderford, Mimura, & Sweaney, 2005). Adjusting both for land costs (most manufactured housing is built on less valuable land) and unit size (manufactured housing units are smaller), the average per square foot cost of site-built single-family homes has been estimated to be 128% of the cost of constructing and siting manufactured units (Manufactured Housing Institute, 2006). Another study finds an even greater difference, estimating the cost of constructing a new manufactured home to be less than two thirds the cost of the average site-built single-family home (HUD, 1998). Vanderford et al. (2005) find that the lower cost of manufactured housing is passed on to the consumer in the form of lower housing prices. Of all the variables included in their hedonic regression model, whether or not a unit was manufactured housing had the largest explanatory power. With the increased use of multi-section units and recent innovations in manufactured housing building technology, particularly integrated floor and chassis systems, many manufactured housing units are now virtually indistinguishable from conventional site-built units. Furthermore, an increasing number of units are now placed on conventional owned lots, rather than on rented lots in mobile home parks as was previously more common (Mrozowski, 2002).

Residents of manufactured homes see the quality of their homes as comparable to that of site-built homes. Boehm (1995) finds that residents of manufactured homes perceive their homes to be higher quality than similar rental units and lower cost than traditional owned units. Evidence from the 2003 American Housing Survey (HUD, 2004) indicates that severe physical problems are rare in manufactured housing, and are comparable to those for other types of housing units. While residents of 1.5% of manufactured housing units reported severe physical problems with their units, this was only slightly higher than the percentage for all owner-occupied units (1.3%) and slightly less than the percentage for total occupied units (1.9%).¹ This quality-cost advantage should create potentially significant market demand for manufactured units.

The quality-cost advantage of manufactured housing also has important implications for planning affordable housing. Older housing units provide the largest supply of affordable housing in most urban communities. Although available at lower prices than new units, the ongoing user costs associated with maintaining and upgrading them may burden low-income households. Although manufactured housing units are constructed with less expensive materials, they have been shown to be durable over a household's typical ownership lifecycle of approximately nine years (HUD, 2008), and since the units are new, they require no upgrading. Although planners have few tools with which to make existing units more affordable, they can affect the affordability of new units through inclusionary zoning requirements. Manufactured housing provides a potential source for such units that does not require additional public subsidies.

Despite having a cost advantage over site-built homes of comparable quality, manufactured housing's share of the market has waned since 2000, primarily because the market for financing manufactured housing collapsed before that for subprime lending more generally.² Manufactured housing placements fell from 23% of total single-family production (site-built starts plus manufactured housing placements) in 2000 to only 8% in 2003, remaining at or below 8% through 2007 (U.S. Census Bureau, 2007).

Perhaps the most significant barrier to siting new manufactured homes in metropolitan areas is the presence of zoning codes that restrict the size, design, and location of manufactured units. Typical regulatory barriers include restrictions on building types, which effectively rule out the most common types of manufactured homes and zoning requirements that limit the locations where manufactured housing units are considered allowable uses (Sanders, 1998). As an example, the most affordable manufactured homes are not constructed to meet the steep roof pitch requirements many local regulations require because steep pitches make units more expensive to produce, transport (due to height restrictions on highways), and set up (Hart, Rhodes, & Morgan, 2002).

Several factors motivate local governments to adopt these and other manufactured housing regulatory barriers, including general prejudice against all forms of low-cost housing (Beamish, Goss, Atilas, & Kim, 2001) and the low aesthetic appeal of the traditional trailer park community design (Gann, 2001). They are also influenced by perceptions that manufactured home residents constitute a transient population with weak ties to the community (Atilas, 1995; Beamish et al., 2001), that manufactured housing is substandard and unsafe (Advisory Commission on Regulatory Barriers to Affordable Housing, 1991), and

that manufactured housing appreciates more slowly than traditional site-built homes and negatively influences adjacent housing prices (Bean, 2004). Evidence suggests that nearly all of these claims are either illegitimate (like the desire to exclude any low-cost housing from a community) or unwarranted. As mentioned previously, modern manufactured housing units need no longer look like traditional trailers. And, despite the common perception that manufactured homes are moved often, the reality is that few manufactured homes are ever moved from their initial setup sites (Bean, 2004). As mentioned earlier, severe structural problems are no more common in manufactured housing than in all owner-occupied housing (HUD, 2004). Although manufactured housing units face a higher risk of being overturned in storms, this risk can be minimized by attaching units to a secure permanent foundation. Manufactured homes sited on owned lots appreciate at rates comparable to those for site-built homes (Consumers Union, 2003). Furthermore, several studies find no evidence of any impact of manufactured homes on the sales prices of adjacent properties (Apgar, Calder, Collins, & Duda, 2002; Hegji & Mitchell, 2000; Stephenson & Shen, 1997; Warner & Scheuer, 1993). Despite this evidence, negative stereotypes of manufactured housing persist, making it likely that local government officials will continue to impose regulatory restrictions on such housing.

Sanders (1998) is the only study to examine the extent and severity of local manufactured housing regulatory barriers nationwide. It reports on 475 responses to a 1996 survey of 1,172 communities conducted by the American Planning Association, finding that while almost all communities permit manufactured homes in some residential districts, on individual lots, and *by right*³ (without additional administrative review or approval), considerably fewer allow them in all or in the most restrictive residential districts. Only 29% of responding communities had regulations that treated site-built homes and manufactured homes comparably.

A few states and localities have adopted regulations addressing practices that severely restrict or impede the use of manufactured housing. Oakland, CA, has promoted the use of manufactured housing on infill lots since 1981 and the state of California passed legislation the same year mandating that cities and counties allow manufactured homes on lots zoned for conventional single-family dwellings if they are on approved foundation systems and subject to architectural requirements addressing design compatibility. The impact of these regulatory reforms has not been examined in the research literature.

Despite the large literature examining the impact of various types of land use and design regulations on housing

market outcomes (see Nelson, Pendall, Dawkins, & Knaap, 2004, and Quigley & Rosenthal, 2004, for reviews), less is known about their impacts on the manufactured housing market. In general, however, patterns of effects on mobile homes do not appear very different from those on single-family homes. For example, the literature shows that both prohibiting low-cost housing and requiring specific amenities are associated with higher home prices. Green (1999) traces the effects of six regulatory indicators, one of which is the permitting of mobile homes, in 37 Milwaukee suburbs and finds that a mobile home prohibition increased home prices between 7.1% and 8.5% (the highest impact among the six regulatory variables studied). He found that both excluding mobile homes and setting minimum street widths significantly reduce the proportion of modestly priced homes.

Also consistent with findings for other types of housing is the result that the effects of rent control are capitalized in higher home prices. Hirsch (1988) found that the sales prices of California mobile homes were about 32% higher in communities that imposed rent control on mobile home pad rents. Similar results were reported by Mason and Quigley (2004). Hirsch and Rufolo (1999) found that rent control had reduced the shipments of manufactured housing units to California by between 200 and 300 units per year.

To date, no study has examined the impact of local land use and design regulations on the supply of manufactured housing in metropolitan communities. The next section draws on the larger housing supply literature to develop a model of manufactured housing supply.

Analyzing the Supply of Manufactured Housing

Empirical models of housing supply typically model the number of new housing starts as a function of variables influencing the price and cost of producing housing. In the familiar stock-adjustment model of housing supply (DiPasquale & Wheaton, 1994), producers respond to economic shocks with a considerable lag, leaving a short-run gap between actual and equilibrium quantities of housing. But several unique features of the manufactured housing market complicate attempts to empirically estimate the supply of this type of housing.

First, unlike traditional site-built homes, manufactured units are often constructed in one location, transported to a dealer in another location to be sold, and finally placed on a site in a third location. This has implications both for measuring housing supply and for the independent variables thought to influence housing supply. The U.S. Census of

Construction provides state-level information on shipments of manufactured housing units from plants to dealers and ultimately placements on sites, but neither shipment nor placement information is publicly available for substate areas like counties or municipalities. A possible alternative would be to use the estimates of mobile homes provided by the U.S. Census of Population and Housing. However, the last such data are for 2000, and they count "mobile homes" rather than manufactured homes that meet the national building code standards that are of interest here. The census data also provide a count of housing units existing at the time the census is taken, and do not track the flow of new units. Given these data limitations, we chose to measure manufactured housing supply using both U.S. Census of Construction shipments to dealers and the estimates of local placements provided to us by local planners in response to our mail survey.

A second important distinction between manufactured housing and site-built homes is the difference in the cost of supplying units. Almost all of the costs for labor, land, and materials associated with constructing a site-built home are incurred locally. Several sources (McGraw Hill Construction, 2009; R.S. Means Company, 2008) produce construction cost indices, which vary as functions of these inputs. For manufactured housing, however, onsite labor requirements are minimal, land costs are typically low because manufactured homes tend to be constructed in rural areas, and almost all material costs are incurred offsite. Furthermore, manufactured housing producers must transport units from the plant to the final dealer or home site, and placement on the site can require a crane, a piece of equipment not normally used by onsite builders. Thus, the standard construction cost indices are not very accurate measures of the true costs facing manufactured housing producers. We include a ratio of the value of manufactured housing in the subject community to the value of all single family housing in the community as a substitute.

A final distinction that is particularly relevant for this analysis is the difference in the manner in which regulations typically treat manufactured housing relative to site-built units. Traditional, site-built, single-family residential units are easy to identify and define, and almost all zoning ordinances are designed with the explicit purpose of protecting this housing type from incompatible land use interactions. Such is not the case with manufactured housing. Zoning ordinances define manufactured housing units in a variety of ways and usually treat them differently from other single-family homes. Furthermore, approving manufactured housing units often involves a different review process that is administrative in some cases and legislative in others. These subtleties must be captured when quantifying the

impact of zoning ordinances on the supply of manufactured homes. We attempted to do this by surveying local representatives in each community on their subjective judgments about such matters.

In the empirical analysis that follows, we modify the reduced-form housing supply model developed by DiPasquale and Wheaton (1994) to incorporate these factors. We model the numbers of placements and shipments as functions of factors the literature identifies as determinants of supply, including regional control variables, population density (a proxy for land costs), and the number of manufacturing plants within 500 miles (a proxy for shipment costs from the manufactured housing plant to the final site). As demand-side influences, we include median family income and the ratio of manufactured home values to all single-family home values. Since the supply of manufactured housing can be expanded only through modifications to the existing stock through additions (additional rooms or porches are often added to pre-existing manufactured homes) or shipments of new units, we include both the number of existing and newly shipped units as exogenous controls to capture the stock adjustment process. Finally, we incorporate measures intended to capture the influence of regulatory constraints on the number of new units supplied.

Data Used in the Regression Analyses

Table 1 provides descriptive statistics for all of the variables used in our regression analyses, and identifies the sources of the data. Our regression models each aim to explain one of two measures of manufactured housing supply (shipments or placements, both described below) at the community level, using both secondary data and results from our own survey to provide estimates of factors influencing supply and demand.

In April 2007, we sent a mail survey to all 1,839 cities and counties eligible for CDBG funds under the 2003 criteria (HUD, 2009). This includes only cities and counties for which federal housing and urban development policy has been established, making it an appropriate group for which to analyze federal policy. As well, the selected cities and counties are also all roughly homogeneous in terms of population size (the sample includes cities with populations of at least 50,000, counties with populations of at least 200,000, and smaller principal cities with populations below 50,000) and geography (all are located in census-designated metropolitan statistical areas). Most of these cities and counties are urban, although several are suburban or exurban.

We used a modified Dillman technique for mailed surveys, which often generates response rates of over 50% when the survey content is of direct interest to the recipient.

We mailed the survey instrument along with a personalized cover letter and a postage-paid, pre-addressed return envelope to the planning director in each of the sampled cities and counties. Two weeks after the first mailing, we sent the recipients postcard reminders. If no response was received within a few weeks following the reminder, we sent a second and final survey instrument along with a cover letter encouraging the recipient to reply.

Out of the initial universe of 1,839 CDBG-eligible cities and counties, 940 responded to the survey. Of these, several did not respond to all questions that we wanted to use and had to be dropped from the analysis. Furthermore, manufactured housing shipments data were not available for some communities in the sample. Thus, the final sample sizes we used in the regression analyses range from 547 to 843 for different models, but all are large enough to ensure efficient estimates of the regression parameter coefficients.

We examined two measures of manufactured housing supply. Through a special contractual arrangement with the Institute of Building Technology and Safety, we were able to obtain information on manufactured housing unit shipments to jurisdictions for all years between 2000 and 2005. We obtained the second measure, self-reported estimates of manufactured housing placements from respondents' answers to the survey question, "Approximately how many HUD-code homes have been placed or located in your jurisdiction in the past five years?" Since the survey was distributed in 2007, the answers pertain to the period 2003 through 2007.⁴ We assumed that respondents would not be able to recall precisely the numbers of units placed, and thus provided categories for them to choose among.⁵

We also obtained our community-level information on local land use and design regulations that might influence manufactured housing placements, and potential barriers to placement, from responses to the survey. We constructed two measures from the survey responses. The first was whether or not the community permitted manufactured housing by right, and the second concerned whether the respondent perceived regulatory barriers to manufactured housing in the community to be significant. The first measure was objective, and equal to one if respondents placing manufactured homes during the last five years answered "yes" to the question "Does your jurisdiction allow HUD-code homes as a by right use in one or more single-family zones if design standards are met?" and zero otherwise. However, this measure did not capture the extent to which the regulation, as implemented in practice, actually constrains the supply of manufactured units. The second measure was subjective, and we constructed it from responses to the question, "For your jurisdiction, please rate the following potential barriers to HUD-code homes:"

Table 1. Descriptive statistics for variables used in regression models predicting manufactured housing (MH) unit placements in communities.

Variables	Descriptive statistics		
	N (communities)	Mean	Std. dev.
MH shipments, 2000–2005 ^a	843	393.686	684.089
MH placements scale ^b	843	2.047	1.052
Northeast region ^c = 1, other = 0	843	0.108	0.310
Midwest region ^c = 1, other = 0	843	0.281	0.450
South region ^c = 1, other = 0	843	0.364	0.481
Population density per sq. mi. ^c	830	2,756.609	2,485.024
% Population growth, 2000–2004 ^d	843	4.134	9.195
1999 Median family income ^e (\$)	843	46,167.780	13,339.980
2000 MH units ^c	843	897.263	1962.430
Median value MH homes ^e /median value all SF homes ^c	843	0.303	0.256
Number of MH manufacturing plants within 500 miles	843	11.275	12.974
MH is a by-right use in SF zones ^f = 1, other = 0	843	0.437	0.496
Fees are a significant MH barrier ^f = 1, other = 0	682	0.034	0.181
Permits are a significant MH barrier ^f = 1, other = 0	712	0.067	0.251
Deed restrictions/covenants are a significant MH barrier ^f = 1, other = 0	617	0.358	0.480
Wind standards are a significant MH barrier ^f = 1, other = 0	663	0.109	0.311
Snow load standards are a significant MH barrier ^f = 1, other = 0	547	0.051	0.221
Fire codes are a significant MH barrier ^f = 1, other = 0	683	0.078	0.268
Zoning codes are a significant MH barrier ^f = 1, other = 0	767	0.347	0.476
Subdivision regulations are a significant MH barrier ^f = 1, other = 0	715	0.227	0.419
Architectural design standards are a significant MH barrier ^f = 1, other = 0	611	0.185	0.389
Citizen opposition is a significant MH barrier ^f = 1, other = 0	696	0.409	0.492
Environmental regulations are a significant MH barrier ^f = 1, other = 0	624	0.035	0.185
Historic district regulations are a significant MH barrier ^f = 1, other = 0	587	0.365	0.482
High land costs are a significant MH barrier ^f = 1, other = 0	713	0.452	0.498
Not much land (built-out) is a significant MH barrier ^f = 1, other = 0	678	0.344	0.475
No new MH communities approved is a significant MH barrier ^f = 1, other = 0	599	0.457	0.499
Insufficient demand is a significant MH barrier ^f = 1, other = 0	624	0.271	0.445

Sources:

- a. Provided by Institute of Building Technology and Safety.
- b. This variable was recoded from our survey data.
- c. U.S. Census Bureau (2000a).
- d. U.S. Census Bureau (2004).
- e. U.S. Census Bureau (2000b), defined as mobile homes.
- f. This variable is from our survey data.

to which they were to assign each variable in the vector the value of one if a given issue is seemed a “significant barrier” or worse, and zero otherwise. The issues posed for consideration by respondents included: fees, permits, deed restrictions/covenants, wind standards, snow load standards, fire codes, zoning codes, subdivision regulations, architectural design standards, citizen opposition, environmental regulations, historic district regulations, high land costs, not much land (built-out), no new manufactured housing communities approved, and insufficient demand for man-

ufactured housing. This measure aimed to capture the practical effect of these regulations, although we recognize that it reflects the subjective interpretation of respondents.

We also included in our models: dummy variables indicating the region of the country, population density in 2000, the percentage of change in population over the period 2000 to 2004, median family income in 1999, the ratio of the median value of mobile homes to the median value of all single-family homes in 2000, and the total number of existing mobile homes in 2000 for each surveyed

city and county. Taken together, the number of existing mobile homes in 2000 plus the number of manufactured housing units shipped between 2000 and 2005 establish the existing stock of units as of 2005, the year in which we begin measuring new placements.

The final independent variable we included was the number of manufactured housing plants within 500 miles of each CDBG-eligible community. We chose this radius both to reflect the distance that a home could reasonably be shipped in a single day and to have a measure for which the numbers of plants varied enough to have potential explanatory power. To do this, we employed Arc-GIS to construct 500-mile circles around the centroid of each CDBG-eligible community, allowing us to count the number of manufactured housing plants that fell within each circle. The data on the location of manufactured housing plants were provided by the Institute of Building Technology and Safety.

Results

In this section, we discuss the results of several different empirical analyses, beginning with the perceptions of

planners we surveyed about the severity of regulatory and market barriers facing manufactured housing in their communities. Next, we examine the impact of land use and design regulations on manufactured housing placements, controlling for a variety of market influences. Finally, we examine the location of manufactured housing unit placements in communities placing any such units.

How Important Barriers Are Perceived To Be

The survey respondents were asked to rate a list of potential barriers to HUD-code homes and the results are shown in Table 2. Although most of these items were regulatory, three were market characteristics that could limit the placement of HUD-code homes (high land cost, not much land, and insufficient demand). The approval of new HUD-code subdivisions was also included as a potential barrier, since if the community lacked a supply of land in such subdivisions this could inhibit placements. None of the respondents identified any these barriers as “not applicable,” so that category is not shown in Table 2. Most respondents either felt that the potential barriers listed were not barriers, were minor barriers, or they apparently did not know and skipped the item. Fewer than 10% of respondents thought any of the barriers listed would prevent HUD-code homes

Table 2. Percentages of respondents reporting perceptions of each barrier to HUD Code homes.

Potential barrier	N	% not a barrier	% minor barrier	% significant barrier	% prevents HUD- code homes	% no response
Fees	682	67.3	17.6	2.5	0.5	12.1
Permits	712	66.4	19.0	5.1	1.5	8.0
Deed restrictions/covenants	617	33.5	19.6	20.4	6.4	20.1
Wind standards	663	53.7	23.1	7.4	1.1	14.7
Snow load standards	547	50.5	16.3	2.7	0.8	29.7
Fire codes	683	62.6	20.0	5.6	0.7	11.1
Zoning codes	767	34.2	28.7	24.2	9.2	3.7
Subdivision regulations	715	46.6	24.1	14.4	6.0	8.9
Architectural design standards	611	39.0	24.7	10.2	3.1	23.0
Citizen opposition	696	22.2	31.6	31.3	4.8	10.1
Environmental regulations	624	64.4	13.3	2.7	0.5	19.1
Historic district regulations	587	31.8	16.1	16.2	9.9	26.0
High land costs	713	26.5	22.0	38.0	4.4	9.1
Not much land (built-out)	678	35.9	20.0	27.3	3.8	13.0
No new HUD-code parks, communities, or subdivisions approved	599	27.0	14.6	28.4	7.2	22.8
Insufficient demand for HUD-code homes	624	37.8	20.7	18.2	3.6	19.7

Note:

Respondents could also choose “not applicable” for any barrier, but none chose this option in any case.

from being placed in their communities, though they were somewhat more likely to classify potential barriers as significant. The potential barriers with the largest share of respondents saying they were significant or would prevent placements were: the high cost of land (42.4%), citizen opposition (36.1%), no new parks (35.6%), zoning codes (33.4%), not much land (31.1%), deed restrictions (26.8%), and historic district regulations (26.1%). Fees, permits, wind codes, snow load standards, fire codes, and environmental regulations were the most likely items to be identified as “not a barrier” or a “minor barrier.”

Testing the Effects of Potential Barriers on Two Measures of Supply

Since we measured the manufactured housing placements variable on an ordinal scale, we estimated the regression model using this dependent variable with a generalized ordered logit model rather than an ordinary least squares (OLS) model, which would have treated the dependent variable as a continuous measure. We also used a generalized ordered logit model because it allowed us to obtain separate coefficients for defined levels of the dependent variable, providing more insight into whether regulatory barriers have an impact on placements, and because we conducted chi-square tests (not included here), which soundly rejected the proportional odds restriction placed on the usual ordered logit model in favor of the generalized model which relaxes this restriction. Although the value of pseudo R^2 is rather low, it is comparable to pseudo R^2 values reported in similar studies of housing supply relying on qualitative response models (see, e.g., Somerville & Mayer, 2003).

Table 3 reports the odds ratios from the regression model. The three levels of the dependent variable shown in Table 3 can be thought of as distinguishing communities completely lacking manufactured housing from those with a small amount per capita, those with a moderate amount per capita, and those with quite a bit per capita, since all have roughly similar population sizes. Each odds ratio represents the impact of a one-unit increase in a particular variable (or, for the dummy variables, the impact of going from zero to one) on the odds of observing that level of manufactured housing or more. Although we report three sets of coefficients, one for each level of the dependent variable, these were obtained from a single regression model.

Table 3 shows that several community characteristics influenced manufactured housing supply. For communities in which the survey respondents reported that up to 50 manufactured housing units had been placed from 2003 to 2007, being located in any region except the West reduced manufactured housing placements, but among communi-

ties with more than 50 manufactured housing placements during this period this difference was statistically significant only for communities in the Midwest. Possible explanations for these regional differences include supply-side factors such as proximity to manufactured housing plants or demand-side factors such as regional income differences.

Population density and growth are both negatively associated with placements of manufactured housing, although growth is only a statistically significant predictor for communities placing more than 20 but fewer than 50 manufactured housing units. Population density likely has significant explanatory power because low-density suburban areas typically have lower land costs and higher levels of manufactured housing demand than do higher density urban areas.

Median family income is negatively associated with this measure of manufactured housing supply, as might be expected given that manufactured housing units typically sell for lower prices than equivalent site-built homes. Median family income is not significant in communities placing more than 20 units, however. Among communities placing a larger number of units, it is possible that other factors, such as unobserved tastes for manufactured housing, are more important than income differences.

Placements from 2003 through 2007 are also positively associated with shipments between 2000 and 2005 and with the supply of manufactured housing in 2000. This suggests that manufactured housing does not follow the process of stock adjustment that typically characterizes the supply of site-built homes. In the case of manufactured housing, the existing stock is likely an indicator of community-level tastes for manufactured housing, as well as the historical regulatory stance of the community in allowing the placement of such units. In contrast to developers of site-built homes who face longer construction periods when meeting anticipated demand, manufactured housing dealers also maintain large inventories in anticipation of demand.

Interestingly, the ratio of the value of manufactured housing units in the community to all single-family homes in the community does not influence supply until over 50 manufactured homes have been placed. Beyond this threshold, communities where manufactured housing values are closer to those of single-family homes generally have fewer placements. A possible explanation for this finding is that since manufactured housing dealers operate on a thinner profit margin, dealers are only price sensitive at high production volumes.

Finally, proximity to manufactured housing plants does positively influence the number of units placed, suggesting that the higher costs of shipping longer distances do dampen placement activity.

Table 3. Generalized ordered logit regression model predicting the scale of local manufactured housing (MH) unit placements 2003–2007.

	Independent variables	Coefficient	Odds ratio	Signif.
At least 1 MH unit placed 2003–2007	Constant	3.007		
	Northeast region	–1.233	0.292	**
	Midwest region	–0.907	0.404	**
	South region	–0.647	0.524	*
	MH shipments, 2000–2005	1.60×10^{-5}	1.00002	
	2000 Population density	-2.90×10^{-4}	0.9997	**
	% Population growth, 2000–2004	–0.002	0.998	
	1999 Median family income	-4.10×10^{-5}	0.99996	**
	2000 MH units	1.50×10^{-4}	1.0002	ψ
	Median value MH homes/median value all single-family homes	–0.174	0.84	
	Number of MH plants within 500 miles	0.006	1.006	
	MH is treated as a by-right use in single-family zones	1.596	4.935	**
More than 20 MH units placed 2003–2007	Constant	0.437		
	Northeast region	–1.697	0.183	**
	Midwest region	–1.343	0.261	**
	South region	–0.68	0.507	**
	MH shipments, 2000–2005	2.50×10^{-4}	1.0002	ψ
	Population density	-2.80×10^{-4}	0.9997	**
	% Population growth, 2000–2004	–0.02	0.981	*
	1999 Median family income	-1.20×10^{-5}	0.99999	
	2000 MH units	3.70×10^{-4}	1.0004	**
	Median value MH homes/median value all single-family homes	–0.562	0.57	
	Number of MH plants within 500 miles	0.011	1.011	ψ
	MH is treated as a by-right use in single-family zones	0.555	1.742	**
More than 50 MH units placed 2003–2007	Constant	–1.948		
	Northeast region	–1.089	0.337	
	Midwest region	–1.388	0.25	**
	South region	–0.212	0.809	
	MH shipments, 2000–2005	2.20×10^{-4}	1.0002	
	Population density	-2.40×10^{-4}	0.9998	**
	Population growth rate, 2000–2004	–0.004	0.996	
	1999 Median family income	1.40×10^{-5}	1.00001	
	2000 MH units	3.60×10^{-4}	1.0004	**
	Median value MH homes/median value all single-family homes	–1.511	0.221	ψ
	Number of MH plants within 500 miles	0.02	1.02	*
	MH is treated as a by-right use in single-family zones	0.526	1.693	*
<i>N</i>		830		
Pseudo <i>R</i> ²		0.158		

 $\psi p < .10$ * $p < .05$ ** $p < .01$

Table 3 shows that by-right zoning for manufactured housing has a positive impact on unit placement that is greatest when explaining whether a community has any manufactured housing placements at all as opposed to

none. The effect of by-right zoning on the odds of placing one unit or more is three times higher than it is on the odds of placing more than 20 units. Above 50 units the impact of by-right allowances diminishes in magnitude

even further, although it is still statistically significant. This result is consistent with what we expected, since zoning can prevent development activity but its absence does not stimulate it. Once the zoning constraint is removed, other local economic factors become more important in determining the supply of manufactured housing units. Among the factors influencing whether a single unit is placed, the impact of by-right zoning is nearly five times larger than that of any other variable, based on the odds ratios.

Table 4 examines an OLS regression model predicting communities' total numbers of manufactured housing unit shipments received from 2000 to 2005. The results reported in this table are similar those of the model shown in Table 3 with two exceptions. When supply is measured with shipments of manufactured housing units received, the South captures a larger share. However, when placements are taken as the dependent variable, supply is higher in the West. One possible explanation for this apparently contradictory finding is that the South may have a larger inventory of unplaced units. Table 4 also indicates that by-right zoning for manufactured housing, which had an impact on the placement of manufactured housing units, does not have a statistically significant impact on shipments.

Table 5 compares the results from models that include the by-right zoning indicator with a series of models each substituting one of several subjective measures of regulatory restrictiveness for the by-right indicator, displaying results

for models employing both dependent variables. Each model includes all variables identified in Tables 3 and 4 and introduces a separate measure of regulatory restrictiveness for each model, given that each is likely highly correlated. In contrast to the analysis examined in Table 2, the results shown in Table 5 examine whether a barrier perceived to be burdensome actually influences the number of units placed, controlling for other market conditions. We focus only on the subset of regulatory barriers listed in Table 2 and do not examine perceived market barriers, because we control for these in the model. Since citizen opposition is a determinant of regulatory barriers and influences their implementation, we examine this barrier as well. Again, the results from chi-square tests (not shown) for each of these models suggested that the generalized ordered logit model was superior to the basic ordered logit model which relies on the proportional odds assumption. The R^2 and pseudo R^2 values are comparable to those shown in Tables 3 and 4.

Generally speaking, while local regulations reduce both placements and shipments, fewer perceived barriers affect shipments. In models predicting shipments, only wind standards and subdivision regulations reduced shipments by statistically significant amounts. Turning to the models predicting placements, we found the overall permitting system to have the largest impact on communities placing very few or many manufactured housing units and less of an effect on those placing moderate numbers of units. The effects of snow load standards, fire codes, zoning codes, and architectural design standards either diminish in magnitude or become statistically insignificant in communities that place more manufactured housing units. Such is not the case with subdivision regulations, which have greater (more negative) impacts in communities placing many units. One unexpected finding is that deed restrictions and covenants actually increase the odds of a higher number of units being placed, although this effect is only statistically significant at the .10 level. The odds ratio for each of the subjective measures is substantively smaller in magnitude than the odds ratio reported for the objective by-right zoning indicator.

Differences between the impacts that regulations have on shipments and placements suggest that after units are shipped to dealers they are often placed in jurisdictions outside the original shipment destination. This is expected. To maximize access to a regional market, dealers choose locations that provide access to several surrounding jurisdictions. Our finding that fewer regulatory barriers affect shipments merely suggests that jurisdictions without regulatory constraints absorb the excess supply of units that cannot be placed in communities with regulatory constraints.

This finding is consistent with anecdotal evidence on manufactured housing supply chains. Units are typically

Table 4. OLS regression model predicting manufactured housing (MH) shipments, 2000–2005.

Independent variables	Coefficient	Signif.
Constant	431.161	**
Northeast region	–61.022	
Midwest region	–51.497	
South region	339.263	**
Population density	–0.019	*
% Population growth 2000–2004	–0.221	
1999 Median family income	–0.005	**
2000 MH units	0.139	**
Median value MH homes/median value all single-family homes	–61.342	
Number of MH plants within 500 miles	3.277	*
MH is treated as a by-right use in single-family zones	–3.046	
N	830	
R^2	0.281	

$\psi p < .10$ * $p < .05$ ** $p < .01$

Table 5. Summary comparison of previous ordered logit and OLS models substituting subjective for objective measures of barriers to manufactured housing (MH).

	Ordered logit models predicting the scale of MH placements 2003–2007						OLS model predicting MH shipments 2000–2005	
	>0 MH units		>20 MH units		>50 MH units		Coefficient	Signif.
	Odds ratio	Signif.	Odds ratio	Signif.	Odds ratio	Signif.		
Original model ^a with objective measure								
By-right zoning	4.935	**	1.742	**	1.693	*	–3.04	
Original model ^a after substituting subjective measures for objective measure								
Fees	0.506		0.979		1.901		–142.619	
Permits	0.287	**	0.414	*	0.229	ψ	–79.351	
Deed restrictions/covenants	1.272		1.259		1.547	ψ	–21.452	
Wind standards	0.735		0.632		0.561		–138.197	ψ
Snow load standards	0.421	ψ	0.392		1.125		155.520	
Fire codes	0.358	**	0.612		1.012		–138.243	
Zoning codes	0.415	**	0.601	**	0.535	*	–18.768	
Subdivision regulations	0.456	**	0.487	**	0.326	**	–125.938	*
Architectural design standards	0.397	**	0.560	*	0.867		–64.432	
Citizen opposition	0.474	**	0.492	**	0.442	**	53.979	
Environmental regulations	0.621		1.618		2.482		–201.085	
Historic district regulations	0.913		0.752		1.003		56.570	

Note:

a. The original ordered logit models are shown in Table 3. The original OLS model is shown in Table 4.

ψ $p < .10$ * $p < .05$ ** $p < .01$.

shipped from a manufactured housing plant to a dealer who supplies many communities in the same region, based on anticipated local demand for such units. Once units are shipped, the dealer may face limitations on placing units in some communities due to regulatory constraints, but continue to receive shipments from the plant to serve other communities with less restrictive regulations. Our results suggest that the impacts of most manufactured housing restrictions are localized and do not significantly influence such supply chains.

Our findings show that subdivision regulations, on the other hand, constrain both shipments and placements of manufactured housing units. One possible explanation for this finding is that while building codes and other restrictions place limitations on the design and placement of manufactured housing units, subdivision regulations limit the supply of land available for siting manufactured housing. If new

manufactured housing subdivisions or mobile home parks are not allowed by local subdivision regulations, or if manufactured housing is disallowed in new single family subdivisions, dealers may be reluctant to accept new shipments or may choose to locate in different jurisdictions altogether.

Where Are Units Placed?

Table 6 provides information on the percentage of manufactured housing units placed in HUD-code parks, infill locations, and single-family zones between 2003 and 2007. Chi-square tests indicate that the number of units placed in the community overall during this period is statistically associated with placement in HUD-code parks at the .001 level and with placement in infill locations at a less than .05 level. The association with single-family zone placements is not statistically significant. Communities where fewer than 25% of units are placed in HUD-code

Table 6. Shares of manufactured housing in different types of locations by number of units placed in the community.

Units placed in the community	Share in HUD-code parks						<i>N</i>
	0–24%	25–49%	50–74%	75–89%	90%+	Total	
1–10	43.7%	18.5%	10.5%	13.3%	26.5%	31.7%	151
11–30	33.5%	25.9%	36.8%	30.0%	24.7%	30.0%	143
31–50	7.0%	11.1%	13.2%	20.0%	18.7%	12.6%	60
51+	15.8%	44.4%	39.5%	36.7%	30.1%	25.6%	122
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	476
<i>N</i>	215	27	38	30	166	476	

Share in infill locations							
	0–24%	25–49%	50–74%	75–89%	90%+	Total	<i>N</i>
1–10	33.8%	14.3%	20.8%	26.7%	44.8%	32.0%	151
11–30	28.6%	46.9%	41.7%	30.0%	39.7%	32.6%	154
31–50	13.5%	8.2%	8.3%	13.3%	8.6%	12.1%	57
51+	24.1%	30.6%	29.2%	30.0%	6.9%	23.3%	110
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	472
<i>N</i>	311	49	24	30	58	472	

Share in single-family zones				
	0–24%	25+ %	Total	<i>N</i>
1–10	31.2%	20.0%	30.2%	127
11–30	31.9%	37.1%	32.4%	136
31–50	12.7%	5.7%	12.1%	51
51+	24.2%	37.1%	25.2%	106
Total	100.0%	100.0%	100.0%	420
<i>N</i>	385	35	420	

parks are more likely than others to have placed very few (1–10) manufactured housing units in the community overall and much less likely to have 51 or more units placed. Fewer than 7% of communities with 90% or more of their manufactured housing units in infill locations reported placing more than 50 units, suggesting that land assembly costs may have been too high to make this practical. The pattern is less clear but similar for communities placing manufactured housing in single-family zones. These findings suggest that while by-right zoning allowances are one means of promoting the use of manufactured housing, emphasis should also be placed on providing land for manufactured housing in mobile home parks. Placements in infill locations appear to be most appropriate for development of individual parcels.

Discussion

Our results suggest that a variety of regulatory restrictions impede the placement of manufactured housing in urban areas, but that market factors influence the volume of units placed. Laws requiring localities to allow manufactured housing in single-family districts increase the likelihood that manufactured housing will be available, but a variety of market factors such as land costs influence how many units will be supplied. Additionally, the availability of designated manufactured housing subdivisions (parks) increases the supply of units, while locating manufactured housing on infill sites only restricts overall supply. The regulatory and market dynamics affecting manufactured housing in urban communities are very complex and likely to be affected by conditions specific to localities.

Nonetheless, regulatory restrictions are troublesome, given that manufactured housing offers a potential solution to the affordable housing crisis facing many urban areas. It is unlawful to prohibit the placement of manufactured housing solely for the purpose of excluding low income persons. Unfortunately, the legal options available to those affected by such forms of regulatory discrimination are limited. The Fair Housing Act, which limits discrimination on the basis of race, color, national origin, religion, sex, familial status, and handicap, does not prohibit discrimination on the basis of income. While some have challenged manufactured housing restrictions on the grounds that such constraints do not constitute a legitimate public purpose, courts grant considerable flexibility to local government interpretations of what constitutes a legitimate public purpose. Furthermore, given that the burden of proof for such cases lies on those facing discrimination, the expense of challenging such ordinances discourages most from pursuing legal remedies. Given this, planners should recognize and eliminate such barriers when they exist.

The HUD code preempts state and local codes except those pertaining to placement of manufactured housing units, utility hook ups, and site work. For example, the HUD code addresses fire safety, and preempts state and local fire codes related to the construction of the unit, but not any subsequent additions to the unit (e.g., garages and decks). State and local fire codes could impose standards for these additions as well as site standards such as distance between units, but these standards would be no different than for any other single family housing and should not affect manufactured housing differently. Yet local code administration often requires local interpretation, and local officials can legally impose delays and conditions that relate to additions to the unit onsite, site preparation, or installation. However, if local building codes are impeding manufactured home placement, this could either reflect ignorance that the HUD code preempts local codes, or intentional efforts to prevent the use of manufactured housing. In either event, corrective action is warranted.

At a minimum, all communities should review how they administer state and local building codes that are preempted by the HUD code. HUD code officials are available throughout the country and can advise on any questions about preemption. Local code administrators should be educated on preemption to avoid their misapplying local building or fire codes out of ignorance or prejudice against manufactured housing.

The approach to reviewing local codes that are not preempted depends on the regulatory regime of the locality. If the locality (or state) requires manufactured housing to be treated equally to site-built single-family units without

condition, the approach can focus on whether that is indeed the case and work to remove any differences.

Localities with *compatibility standards*, requiring manufactured housing to be similar to surrounding site-built units, should review these standards to assure that they are clear and can be readily interpreted by both the developer and the code official. Compatibility standards mostly relate to roof pitch, roofing materials, exterior cladding, and site design. They should specify the geographic area with which the manufactured housing unit must be compatible, which might be the block on which the subject property is located, or both this block and immediately adjacent blocks. They should also impose the same conditions on site-built housing, because otherwise they could be challenged under the equal protection clause of the U.S. Constitution.

Localities that restrict manufactured housing to parks (manufactured housing subdivisions) should review the existing zoning to determine whether any new parks are permissible. In addition, the conditions for developing new parks should be reviewed to assure that they do not impose standards that exceed those applicable to site-built housing with similar densities.

Our results suggest that communities allowing manufactured housing in single-family zones by right should not ignore the potential benefits of establishing zoning and subdivision standards for manufactured housing parks, which can help create a bundled supply of land for developing manufactured housing. Such standards should be designed to maximize the affordability benefits of manufactured housing while achieving compatibility with site-built housing subdivisions.

In addition to local codes and regulations, local NIMBY (not in my back yard) opposition often proves to be a significant barrier to any project involving low-cost or manufactured housing in many communities. NIMBY is a complex and multi-faceted problem (Koebel, Lang, & Danielsen, 2004; Pendall, 1999) that often is not resolvable by discussion and education. Despite the challenges, there are several aspects of the NIMBY problem affecting manufactured housing that can be addressed.

Atilas (1995) and Beamish et al. (2001) suggest that resistance to manufactured housing is often rooted in perceptions about the occupants as much as about the design and construction of the units. Some states and localities, responding to negative stereotypes associated with affordable housing, have launched public information campaigns. These campaigns portray residents of affordable housing who provide essential services within communities, such as teachers and safety workers (Koebel et al., 2004), in an effort to garner more public support. The effectiveness of these campaigns remains to be documented.

In Seattle (Growth Management Planning Council of King County, WA, 2000), focus group research revealed that citizens already understood the need to provide more affordable housing opportunities to lower-income households, but had more specific concerns. Several of those concerns related to the visual compatibility of the units with the surrounding neighborhood. Residents of many neighborhoods were hostile to traditional flat-sided trailers with vinyl siding and low-pitched roofs (see the art on the cover of this issue, for example). Temkin, Hong, Davis, Hudson, and Cantrell (2007) document the persistence of this stereotype despite improvements in design and construction standards. Both the manufactured housing industry and affordable housing advocates should educate the public about the availability of contemporary manufactured housing designs that are much more compatible with site-built housing.

Fears about negative impacts on nearby property values, while unsupported by the bulk of research on this topic, remain a major impediment to manufactured housing. Equity insurance programs can address those fears by offering compensation if values are indeed impaired (Fishel, 2001a, 2001b; McKenzie & Ruby, 2002), but these programs are rare.

Public information campaigns, design charettes, and open communications with neighbors rely on voluntary acceptance of manufactured housing and other affordable housing types. Education and communication are not likely to overcome opposition without mandates to increase the supply of affordable housing. Mandatory inclusionary housing programs and specified goals for affordable housing outperform voluntary programs even when the latter include incentives (Porter, 2003). Koebel et al. (2004) conclude that the carrot and stick combination of state mandates, inclusionary programs and incentives is possibly the best approach.

Conclusion

This article examines the influence of local land use and design regulations on manufactured housing placement, controlling for a variety of local market conditions. We find that a variety of regulatory restrictions, including the lack of by-right zoning and the presence of permits, snow load standards, fire codes, zoning codes, subdivision regulations, and architectural design standards impede the placement of manufactured housing in metropolitan areas. These regulations primarily influence whether jurisdictions have any manufactured housing units, while market conditions play a greater role in determining the number of

units placed in communities that allow them. Among the various restrictions, by-right zoning for manufactured housing has the largest relative impact on unit placement. By-right zoning and most other local regulations have no impact on shipment activity, but subdivision regulations significantly reduce both shipments and placements of manufactured housing units.

Among market factors, land costs influence perceived regulatory restrictiveness and actual unit placement. Intra-urban location (location in parks, infill, or single-family zones) is also shown to influence unit placement. Proximity to manufactured housing plants influences manufactured housing placements, probably indicating the importance of holding down costs in this low-priced segment of the housing market. Units are more likely to be placed in areas where manufactured housing already exists and where market demand exists. This could also reflect demand for new units to replace others that were moved or demolished. We also found evidence suggesting that higher prices limit placements of large numbers of units. These findings all suggest that planners should tailor manufactured housing strategies to local market conditions.

Given that planners directly influence whether units are placed in metropolitan communities, and participate in assessing the demand for this particular housing type, they can help determine the extent to which manufactured housing is a viable housing option in urban communities.

Planners can promote affordable housing by projecting the potential demand for manufactured housing, devising educational programs to promote community acceptance, encouraging public-private partnerships that support manufactured housing provision, reviewing and modifying existing regulations so they treat manufactured housing the same as site-built single-family housing, designing incentives to promote affordable redevelopment using manufactured housing on vacant infill lots, and modifying regulations to promote manufactured housing subdivisions that meet basic design standards for compatibility with their surroundings.

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Notes

1. One anonymous reviewer pointed out that manufactured homes may be perceived to be of quality comparable to site-built homes in part because manufactured homes are, on average, newer than existing site-built homes. The most recent American Housing Survey (HUD, 2008), for example, reports that the median manufactured housing unit was built in 1989, while the median owner-occupied housing unit was built in 1975, and the median rental housing unit was built in 1971.
2. Despite the dismal state of manufactured housing finance, there are promising signs that point to a possible recovery when the market for single-family homes rebounds, including the reentry of Fannie Mae into the manufactured home lending market, interest in the manufactured housing sector among large investors such as Warren Buffet, and Energy Star improvements that are increasingly being incorporated into new manufactured homes (Power, 2004).
3. We used the term *by right* rather than *as of right* in our survey, and continue to use it here.
4. Over the time period under investigation, manufactured housing's market share declined precipitously as the market for manufactured home loans collapsed. While our analysis covers a rather unique period of weak demand in the manufactured housing sector, if anything, this bolsters our findings. Regulatory constraints are typically most constraining during periods of strong demand. Thus our finding that several regulatory restrictions constrain demand even during periods of weak demand suggests that such barriers are important during all stages of the market cycle.
5. We initially asked survey respondents to use the following categories: 0, 1–10, 11–20, 21–30, 31–40, 41–50, 51–99, and 100 or more. After seeing the responses, we combined some of these categories to estimate the regression model described in the next section, so that each category would have a sufficient number of responses to estimate the relevant regression coefficients. The final category ranges, after combining categories with low response rates, were the following: 0, 1–20, 21–50, and 50 or more.

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