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Adjacency Neighborhood Effects and Owner-Assessed Home Values

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ABSTRACT

Adjacency neighborhood effects such as neighbor interactions or perceived neighborhood quality have been neglected in the housing literature due to a lack of data. We investigate the impact of these effects on the housing wealth perceived by homeowners. Using a national longitudinal survey, we find that perceived neighborhood quality positively impacts owner-assessed home values. However, this effect is driven by homeowners' assessment of their neighborhoods' quality relative to other neighborhoods rather than their neighborhoods' perceived cleanliness or upkeep. Depending on the financial characteristics of homeowners, we also find neighbor interactions and perceived neighborhood safety to have a significant relation with self-assessed home values. Trust and support among neighbors and joint feel of the home and neighborhood on the other hand have no relation with estimated values. While neighborhood quality consistently explains owner-assessed values, home quality only has a relation with value estimates for homeowners with certain financial characteristics. Considering the importance of perceived housing wealth for household financial decisions as well as transaction prices, our findings have implications for policy makers and developers.

Introduction

Owner-assessed values have received considerable attention in the housing literature for several reasons. First, homeowner valuations influence asking prices, which attract buyers, represent the starting point for sales negotiations, and affect transactions prices (Arnold, 1999). In this context, self-assessed home values have been found to be reliable estimates of house prices (Kiel & Zabel, 2003). Second, the assessment of perceived housing wealth impacts household decisions, for example, regarding consumption (e.g., Agarwal, 2007; Browning et al., 2013; Kalifa et al., 2013), savings (e.g., Juster et al., 2006), retirement (e.g., Lusardi & Mitchell, 2007) and mortgage refinancing (e.g., Agarwal, 2007).

Besides home, market, and owner characteristics, neighborhood effects impact homeowner valuations (Kiel & Zabel, 2008). These effects can be distinguished into absolute neighborhood effects, i.e., community-specific characteristics such as school quality or crime rates, and adjacency neighborhood effects that are associated with the behavior of

nearby neighbors (Kiefer, 2011). Previous studies on self-assessed home values account for absolute neighborhood effects by controlling for, amongst others, household income, schools, or distance to water at census tract level (Kiel & Zabel, 2008, 2003; Tur-Sinai et al., 2020). Adjacency neighborhood effects such as relations among neighbors or perceived neighborhood quality, on the other hand, have received little attention in the literature, primarily due to the difficulty of measuring them (Kiefer, 2011) and limited neighborhood quality variables available in the American Housing Survey (AHS; Kiel & Zabel, 2003), which is predominantly used by studies on owner-assessed home values (e.g., DiPasquale & Somerville, 1995; Kiel & Zabel, 2008, 2003).

We use this gap in the literature as a starting point to investigate the impact of adjacency neighborhood effects on owner-assessed home values. We focus on neighborhood effects such as perceived neighborhood quality, neighbor interactions, perceived neighborhood safety, and trust and support among neighbors. For our empirical investigation, we leverage the national Midlife in the United States (MIDUS) survey, which collects information about these neighborhood effects at the homeowner level.

Using longitudinal data from the MIDUS survey for 1,429 US homeowners, we find that perceived neighborhood quality has a consistently positive impact on self-assessed home values. If we distinguish different dimensions of neighborhood quality, this effect is driven by the assessment of homeowners on whether most people live in a better neighborhood than them or not rather than a neighborhood's perceived upkeep or cleanliness. On the other hand, trust and support among neighbors, and the joint feel of a home and neighborhood have no impact on the homeowners' value estimates. Furthermore, interactions with neighbors, the perceived safety of a neighborhood, and perceived home quality significantly impact the self-assessed values for a subset of homeowners based on financial variables.

We contribute to the literature by providing insights into the impact of different dimensions of adjacency neighborhood effects on owner-assessed home values. We hereby complement previous studies employing owner-assessed values in their empirical analysis and controlling for absolute neighborhood effects (e.g., Agarwal, 2007; DiPasquale & Somerville, 1995; Kiel & Zabel, 2008, 2003; Tur-Sinai et al., 2020) by providing evidence for an impact of perceived (relative) neighborhood quality on homeowner value estimates.

Our results are also relevant to the housing literature investigating single-family sales prices. Several studies account for community-level neighborhood effects such as school quality (e.g., Beracha & Hardin, 2021; Bonilla-Mejía et al., 2018; Hwang et al., 2019), green spaces and parks (e.g., Asabere & Huffman, 2009; Conway et al., 2010), or other neighborhood characteristics such as street layout and new urbanism features (Matthews & Turnbull, 2007; Song & Knaap, 2003). However, transaction-based datasets commonly do not include neighborhood effects such as neighbor interactions, trust and support within a neighborhood, or neighborhood quality perceived by homeowners. Considering that owner-assessed values represent reliable estimates of house prices (Kiel & Zabel, 2003), the adjacency neighborhood effects identified in our study are likely to also have an impact on sales prices.

One shortcoming of our study is that the MIDUS dataset does not contain any geospatial information to match observations with actual transaction data, market-specific

control variables, or absolute neighborhood effects such as school quality or crime rates. Thus, compared to other studies (Benítez-Silva et al., 2015; DiPasquale & Somerville, 1995; Kiel & Zabel, 2008, 2003), which employ AHS data, we cannot analyze the extent to which the neighborhood effects investigated in our study lead to an over- or under-estimation of values by homeowners. Furthermore, we cannot investigate how absolute and adjacency neighborhood effects interact with each other or control for market-specific economic variables such as unemployment rates or home prices. However, considering the difficulty of measuring adjacency neighborhood effects, lack of adjacency neighborhood variables in the AHS and adjacency neighborhood effects being under-researched, we consider our study a valuable contribution to the literature on owner-assessed home values.

Finally, our study has implications for policy makers and real estate developers as it shows perceived relative neighborhood quality to impact self-assessed values by home-owners and therefore their perceived housing wealth. For example, policy makers focused on influencing financial decisions of households (e.g., savings or retirement) can do so by developing strategies to increase the relative quality of a neighborhood per-ceived by residents.

Our study is structured as follows. Next, we review the relevant literature to provide a theoretical framework. Then, we discuss our data, variables, and estimation method, which is followed by our results and conclusion.

Literature Review

An extensive literature investigates factors impacting self-assessed home values as well as the relation of owner value estimates and actual sales prices (e.g., Agarwal, 2007; Benítez-Silva et al., 2015; Chan et al., 2016; DiPasquale & Somerville, 1995; Gonzalez-Navarro & Quintana-Domeque, 2009). One set of factors that impact homeowner valua-tions are neighborhood characteristics (e.g., Kiefer, 2011; Kiel & Zabel, 2008).

The concept of neighborhood has multiple dimensions, ranging from the immediate neighborhood of a home to a broader neighborhood (Kiel & Zabel, 2008). Neighborhood effects can be distinguished into absolute or adjacency effects. Absolute neighborhood effects relate to the location of a home in a community and externalities such as school quality or access to water. Adjacency neighborhood effects on the other hand represent externalities stemming from the relations with and the behavior of neighbors in the immediate neighborhood of a home (Kiefer, 2011). Compared to broader community effects (absolute neighborhood effects) such as school quality or crime, adjacency neigh-borhood effects represent externalities that cannot be easily measured (Kiefer, 2011), par-ticularly at a disaggregated level (Kiel & Zabel, 2008). One of the challenges of assessing the impact of adjacency neighborhood effects on owner-assessed home values is that the AHS, which is commonly used to obtain value estimates (e.g., DiPasquale & Somerville, 1995; Kiel & Zabel, 2008, 2003) does not contain information on neighbor-hood quality (Kiel & Zabel, 2003).

Previous studies on self-assessed home values use several approaches to control for neighborhood effects such as zip-code fixed effects (Agarwal, 2007) or census tract neighborhood variables (Kiel & Zabel, 2008, 2003; Tur-Sinai et al., 2020). Census tract

neighborhood data such as income, poverty rate, or unemployment rate capture absolute neighborhood effects. Based on information on the AHS, DiPasquale and Somerville (1995) create a binary variable to capture neighborhood quality and use homeowner characteristics such as race/ethnicity to capture other neighborhood characteristics. To measure neighborhood quality at different levels, Kiel and Zabel (2008) create clusters of housing units based on street, town, and MSA-level information. At street-level, they control for resident characteristics (e.g., age, income, education, race) and housing market-characteristics (e.g., vacant units, owner-occupied units and proportion of homes sold in the last 5 years). However, these street-level variables are not able to capture adjacency neighborhood effects such as interactions and trust among neighbors as well as the safety and quality of a neighborhood perceived by homeowners.

Considering the impact of absolute neighborhood effects on homeowner valuations identified in previous studies (e.g., DiPasquale & Somerville, 1995; Kiel & Zabel, 2008), we expect adjacency neighborhood effects such as the perceived neighborhood quality, interactions with neighbors, or trust and support among neighbors to affect self-assessed values. However, given the lack of previous studies on these types of neighborhood effects, we do not have any a-priori expectations for the strength of the relations of different dimensions of adjacency neighborhood effects and owner-assessed values.

Data and Variables

Previous studies investigating self-assessed home values rely on surveys that ask homeowners to provide home value estimates, i.e., ask respondents to estimate what their house is worth. Most studies use the AHS in their empirical investigation (Benítez-Silva et al., 2015; Chan et al., 2016; DiPasquale & Somerville, 1995; Kiel & Zabel, 2008, 2003). Other studies have employed the Panel Study of Income Dynamics (Agarwal, 2007), Health & Retirement Study (Benítez-Silva et al., 2015; Chan et al., 2016) or the Household Expenditure Survey from Israel (Tur-Sinai et al., 2020). The advantage of surveys with value estimate data is that, compared to transactional data, they provide more detailed information on homeowner characteristics (Tur-Sinai et al., 2020).

In our empirical investigation, we employ longitudinal data from the second (2004 to 2006) and third wave (2013 to 2014) of the Midlife in the United States (MIDUS) study (see Radler, 2014, for detailed information on the MIDUS dataset). The MIDUS study is a multi-disciplinary, national study comprised of roughly 20,000 variables. Spatially, MIDUS covers the contiguous United States. MIDUS data have been used in a variety of disciplines, including, but not limited to, medicine (e.g., Boylan & Ryff, 2015; Yemiscigil & Vlaev, 2021), economics (e.g., Bhai, 2016; Ferrer et al., 2018), psychology (e.g., Bogg & Slatcher, 2015; Tan et al., 2020), management (e.g., Kungu et al., 2019; Nikolaev & Maldonado-Bautista, 2019), and sociology (e.g., Oates & DeMaris, 2021; Son & Wilson, 2015).

Our dependent variable is based on the MIDUS survey item "How much do you think your home would sell for?" As the MIDUS survey includes homeowners and renters, we remove observations for the latter from our sample. We only include individuals in our sample that participated in both survey waves and did not move, i.e., lived in the same neighborhood for both survey waves. We also exclude all observations without a

Table 1. Definition of variables.

Variable	Definition
Neighborhood and Home Variables	
NeighInteraction	Average score of • How often do you have any contact, even something as simple as saying "hello," with any of your neighbors? (6 – almost every day to 1 – never or hardly ever); recoded • How often do you have a real conversation or get together socially with any of your neighbors? (6 – almost every day to 1 – never or hardly ever); recoded
NeighSafety	Average score of • I feel safe being out alone in neighborhood during the daytime. (4 – a lot to 1 – not at all); recoded • I feel safe being out alone in my neighborhood at night. (4 – a lot to 1 – not at all); recoded
NeighTrust	Average score of • I could call on a neighbor for help if I needed it. (4 – a lot to 1 – not at all); recoded • People in my neighborhood trust each other. (4 – a lot to 1 – not at all); recoded
NeighQuality	Average score of • Most people live in a better neighborhood than I do. (1 – a lot to 4 – not at all) • Buildings and streets in my neighborhood are kept in very good repair. (4 – a lot to 1 – not at all); recoded • My neighborhood is kept clean. (4 – a lot to 1 – not at all); recoded
HomeQuality	Average score of • I live in as nice a home as most people. (4 – a lot to 1 – not at all); recoded • I'm proud of my home. (4 – a lot to 1 – not at all); recoded • I don't like to invite people to my home because I do not live in a very nice place. (1 – a lot to 4 – not at all)
FeelNeighHome	Average score of • I feel very good about my home and neighborhood. (4 – a lot to 1 – not at all); recoded • It feels hopeless to try to improve my home and neighborhood situation. (1 – a lot to 4 – not at all)
CurrentNeighLength	How many years have you lived in your current neighborhood, or if you live in a rural area, in your current township? (If less than one year, enter "0.")
DiscriminationHome	In each of the following, indicate how many times in your life you have been discriminated against because of race, ethnicity, gender, age, religion, physical appearance, sexual orientation, or other characteristics: You were prevented from renting or buying a home in the neighborhood you wanted.
DiscriminationNeigh	In each of the following, indicate how many times in your life you have been discriminated against because of race, ethnicity, gender, age, religion, physical appearance, sexual orientation, or other characteristics: You were prevented from remaining in a neighborhood because neighbors made life so uncomfortable?
Financial variables	
logValue	Log of value entered for "How much do you think your home would sell for?"
Mortgage	Coded 1 if "Do you own your home outright, are you paying on a mortgage, or do you rent?" Was answered with "paying on a mortgage" for primary residence; rent and own home outright are coded 0
RentalIncome	Coded 1 if answered "yes" to "Do you have any income from rental property?"
BetterFinSituation	Coded 1 for respondents that answered 8 or higher (above median) with regard to "Using a scale from 0 to 10 where 0 means "the worst possible financial situation" and 10 means "the best possible financial situation," how would you rate your financial situation these days?"
Other Variables	
Age	Age of respondent
NoChildren	Number of children
College	Coded 1 if completed four-year college degree or higher
Male	Coded 1 for male respondent

Variable	Definition
Married	Coded 1 for married respondent
Extraversion	Average score on 5 extraversion items
Neuroticism	Average score on 4 neuroticism items
Conscientiousness	Average score on 4 conscientiousness items
Agreeableness	Average score on 5 agreeableness items
Openness	Average score on 7 openness items
MIDUS3	Coded 1 if response is from MIDUS survey 3; 0 for MIDUS survey 2

Note: This table presents the definition of variables derived from the MIDUS survey. Data for individual respondents from the second and third wave of the MIDUS survey (2004–2006 and 2013–2014) are used in this study.

response to the home value survey item. We then derive the log of this value estimate (*logValue*) and winsorize it at the 1% level in each tail. We match respondents based on their unique ID in the second and third MIDUS datasets. Our final sample covers 1,429 individual respondents in the US.

Our independent variables of interest are based on neighborhood-specific items in the MIDUS survey that capture different dimensions of adjacency neighborhood effects. To achieve a parsimonious model, we derive multi-dimensional variables from these MIDUS survey items. First, we create a variable (*NeighInteraction*) reflecting the frequency of the interactions of neighbors, ranging from a simple "hello" to real conversations or social get togethers, by averaging the items shown in Table 1. Averaging the items for a given construct to create a composite variable is common in social science research (Rose et al., 2019), such as that conducted with the MIDUS dataset. Next, we capture the day and night-time neighborhood safety as perceived by homeowners (*NeighSafety*) by averaging the respective MIDUS survey items shown in Table 1. We follow the same approach to derive a measure for the trust and helpfulness shared among neighbors (*NeighTrust*) as well as the perceived neighborhood quality regarding cleanliness, repair, and quality of neighborhood compared to others (*NeighQuality*). Please note that we recode some of the MIDUS neighborhood variables, if needed, so that a higher score signifies a higher agreement with a statement. Recoded variables are indicated in Table 1.

Previous studies using the AHS include home-level characteristics such as age, number of rooms, and presence of a garden in their investigation (Tur-Sinai et al., 2020). The MIDUS survey does not contain information such as home age or size. However, we capture property-level characteristics that impact the owner-valuation with several survey items. We derive an aggregate measure for the home quality as perceived by the owner (*HomeQuality*). This variable is based on the extent to which 1) respondents think their home is as nice as those of most people, 2) the pride in their home, and 3) their comfortability in inviting guests into their home. Furthermore, the MIDUS survey contains two items that capture the joint effect of a respondent's home and neighborhood. The resulting variable (*FeelNeighHome*) reflects how good a respondent feels about their home and neighborhood as well as how hopeless they consider the improvement of home and neighborhood.

As a robustness check, we use principal component analysis (PCA) to reduce the dimensions of our multi-dimensional variables. Our results are robust to whether we use the average of survey item scores or a PCA approach to create the aggregated neighborhood variables. Consequently, we only report the results for the variables using the averaging approach in the remainder of this study.

The tenure of homeowners in a home has an impact on their value estimates. Gonzalez-Navarro and Quintana-Domeque (2009) find that owners with a shorter tenure in a home provide more unbiased, reasonable, and accurate estimates of their home values while owners with a longer tenure are more likely to overestimate their home value. While we do not have information on how long a respondent has lived in their respective home, we do have data on how long they have lived in the neighborhood. To control for the effect of tenure in a neighborhood on self-assessed values, we hence include the number of years a respondent has lived in neighborhood (*CurrentNeighLength*).

Kiel and Zabel (2008) find evidence for discrimination and prejudice based on race in the housing market. To account for the impact of discrimination due to race/ethnicity, gender, age, religion, physical appearance, sexual orientation, or other characteristics, we include two items from the MIDUS survey. The first item asks respondents to state the number of times they were prevented from renting or buying a home in the neighborhood they wanted (*DiscriminationHome*). The second item asks respondents for the number of times they were prevented from remaining in the neighborhood because of neighbors making their lives uncomfortable (*DiscriminationNeigh*).

Previous studies on owner-assessed values include several household characteristics such as income, mortgage amount, age, marital status, and education (Agarwal, 2007; Benítez-Silva et al., 2015; Tur-Sinai et al., 2020). In line with these previous studies, we control for a number of owner characteristics. We control for whether the respondent currently has a mortgage on the home (*Mortgage*) or receives rental income (*RentalIncome*). Please note that the MIDUS survey does not allow to specify whether the respondent receives rental income from their primary residence, for example, from an accessory dwelling unit (ADU), or another rental property such as a condo purchased as an investment. However, at a minimum, the rental income variable captures the financial sophistication of a respondent. Homeowners that generate rental income, either with their primary residence or other properties, are likely to have a superior understanding of real estate valuation and housing market conditions.

To capture the impact of the perceived financial situation of a respondent on their home value estimates, we use a survey item that asks respondents to assess their current financial situation from "worst possible situation" (0) to "best possible financial situation" (10). We create a binary variable (*BetterFinSituation*) coded 1 for all respondents that in the third and fourth quartile, i.e., answered 8 or higher (median response: 7).

Other respondent-specific control variables include their age and number of children as well as binary variables coded 1 if the respondent has a four-year college degree or higher (*College*), is male (*Male*) or married (*Married*). Please note, few respondents provided information on the race/ethnicity survey item, and we cannot use this variable for our analysis. We control for temporal effects by including a binary variable (*MIDUS3*) coded 1 for responses from the third wave of the survey (2013–2014) and 0 for the second wave (2004–2006).

Furthermore, the MIDUS survey allows us to control for personality-specific variables that are likely to impact a respondent's assessment of their home value and/or neighborhood. We use MIDUS items to derive variables capturing the extraversion, neuroticism, conscientiousness, agreeableness, and openness of respondents. Together, these variables represent the Big Five personality traits, a broad and well-accepted taxonomy of

personality (Barrick & Mount, 1991; Digman, 1990; Goldberg, 1990). Extraversion reflects a tendency to be gregarious, sociable, talkative, active, and assertive. Given its association with positive emotions (Smillie et al., 2015), it is possible that more extraverted people would have positively biased views of their neighborhood and home value. Conversely, neuroticism reflects a tendency to be angry, anxious, depressed, emotional, insecure, or worried. Given its association with negative affect (DeNeve & Cooper, 1998), neuroticism may lead to negatively biased assessments of neighborhood and home value.

Beyond extraversion and neuroticism, conscientiousness reflects the tendency to be dependable, hard-working, organized, and achievement-oriented, whereas agreeableness reflects the tendency to be courteous, trusting, good-natured, cooperative, and tolerant. People higher in conscientiousness, a facet of which is orderliness, might be prone to paying attention to the upkeep and cleanliness of the neighborhood. Therefore, it is possible that they attend more to these aspects when evaluating their neighborhood and home relative to people lower in conscientiousness. Likewise, people higher in agreeableness, which contains the facets of modesty and trust, might attend more to neighborhood interactions and trust among neighbors when evaluating their neighborhoods and homes relative to people lower in agreeableness. Finally, openness reflects the tendency to be imaginative, cultured, curious, broad-minded, and artistically sensitive. People higher in openness have an appreciation for art and beauty, and thus it is possible that, relative to people lower in openness, they pay more attention to esthetics when evaluating their neighborhood and assessing the value of their home. Given these potential effects, it is important to account for the Big Five personality traits, so as to help rule them out as viable alternative explanation for our findings.

While the definitions for all our variables are shown in Table 1, Table 2 presents the descriptive statistics for our variables. The average number of years respondents have lived in their current neighborhood is 19 years (median: 16 years) with a minimum of less than a year to a maximum of 84 years. On average, respondents in our sample are approximately 59 years old with a minimum of 34 and maximum of 92 years. Most respondents have between 2 and 3 children and are married (76%). 47% of respondents have at least a four-year college degree and are male. Most respondents have a mortgage (56%), and a small number (14%) receives rental income.

To assess the threat of multicollinearity to our statistical conclusion validity, we examine variance inflation factors (VIFs) for our variables. The VIF for each variable is reported in Table 2, and the mean VIF for all variables is 1.36. None of the individual VIF exceeds 2.5, which makes us confident that multicollinearity does not represent a threat to our results.

Estimation Method

Our data have multiple sources of random variability as the MIDUS data is collected in groups at two levels. First, observations from individuals are nested within families for which more than one family member, e.g., siblings, can respond to the survey. In our sample, 1,429 individuals are nested within 1,213 families. This results in a lack of independence of observations within these families.

Table 2. Descriptive statistics.

Variable	Mean	Median	St.Dev.	Min	Max	VIF
logValue	12.14	12.21	0.97	7.31	14.08	
NeighInteraction	3.98	4	1.22	1	6	1.22
NeighSafety	3.72	4	0.46	1	4	1.39
NeighTrust	3.41	3.5	0.65	1	4	1.61
NeighQuality	3.49	3.67	0.54	1	4	1.68
HomeQuality	3.69	4	0.47	1	4	1.68
FeelNeighHome	3.75	4	0.46	1	4	2.15
CurrentNeigh	19.08	16	14.42	0	84	1.36
Age	59.39	59	11.74	34	92	1.80
NoChildren	2.51	2	1.68	0	22	1.12
College	0.47	0	0.50	0	1	1.14
Male	0.47	0	0.50	0	1	1.27
Married	0.76	1	0.43	0	1	1.09
Mortgage	0.56	1	0.50	0	1	1.39
RentalIncome	0.14	0	0.35	0	1	1.04
BetterFinSituation	0.44	0	0.50	0	1	1.17
DiscriminationHome	0.03	0	0.22	0	6	1.03
DiscriminationNeigh	0.01	0	0.11	0	2	1.04
Extraversion	3.10	3.20	0.57	1.2	4	1.65
Neuroticism	2.02	2.00	0.61	1	4	1.14
Conscientiousness	3.50	3.50	0.43	1.25	4	1.16
Agreeableness	3.42	3.6	0.50	1.2	4	1.56
Openness	2.91	2.86	0.53	1	4	1.49

Note: This table presents the summary statistics and variance inflation factors (VIFs) for all variables. Definitions of variables are in Table 1.

Furthermore, considering that we have repeated measures for each respondent, non-independence of observations for a particular individuals can be assumed. Consequently, variability in the owner-assessed home values likely exists between the two types of groups (family and individual) as well as within groups. To control for variability at the family and individual respondent level, we use a multilevel mixed effects generalized linear regression to estimate our model shown in Equation (1).

Mixed-effects models have both fixed and random effects. Hereby, fixed effects are estimated directly in the form of regression coefficients while random effects are not. We employ a three-level model with random effects at the family-level (FamilyID) and individual-level (IndividualID) with individuals nested within a family. We furthermore use family-clustered standard errors in our estimation.

$$logValue_{ji} = \alpha + X_{ji}\beta + Z_{ji}u_{ji} + \varepsilon_{ji} \tag{1}$$

where $logValue$ is the home value estimate by a respondent. X is a set of our independent variables, including the neighborhood variables, for individual i in family j, and β is a vector of fixed effects regression coefficients. Z is a matrix for the random effects u for the two groups (family and individual). ε_{ji} represents the residuals.

To assess whether the mixed effects model employed in our empirical analysis is the appropriate method, we conduct a likelihood ratio (LR) test that compares the mixed effects model to a linear model. The significant LR test statistics reported with our results in Table 3 suggest that a mixed effects model controlling for variability at the family and individual level is superior to the linear model, and thus the appropriate estimation method.

Table 3. Mixed-effects (ML) results for full sample and separated by financial situation.

	Full sample		Worse financial situation		Better financial situation	
	Coef.	SE	Coef.	SE	Coef.	SE
Constant	9.49***	0.35	9.81***	0.42	9.00***	0.61
NeighInteraction	−0.04**	0.02	−0.02	0.02	−0.05	0.02
NeighSafety	0.01	0.05	−0.05	0.06	0.15**	0.08
NeighTrust	0.04	0.04	0.06	0.06	−0.004	0.06
NeighQuality	0.18***	0.05	0.19***	0.06	0.19***	0.06
HomeQuality	0.18***	0.05	0.23***	0.07	0.09	0.08
Home&NeighFeel	0.07	0.06	0.04	0.08	0.07	0.09
CurrentNeighLength	−0.01***	0.002	−0.01**	0.003	−0.003	0.003
Age	0.004	0.002	0.01**	0.003	−0.0003	0.003
No of Children	−0.01	0.01	−0.02	0.02	0.002	0.02
College	0.41***	0.04	0.47***	0.06	0.38***	0.07
Male	0.09	0.05	0.13**	0.06	0.03	0.07
Married	0.22***	0.05	0.16**	0.07	0.34***	0.08
Mortgage	0.16***	0.04	0.18***	0.07	0.16***	0.05
RentalIncome	0.22***	0.06	0.21**	0.10	0.22***	0.08
BetterFinSituation	0.17***	0.04				
DiscriminationHome	0.06	0.04	0.03	0.03	0.22	0.12
DiscriminationNeigh	−0.12	0.10	−0.23	0.13	0.05	0.14
Extraversion	0.03	0.04	0.02	0.06	−0.004	0.06
Neuroticism	−0.01	0.03	0.001	0.05	−0.03	0.04
Conscientiousness	0.09	0.06	−0.03	0.06	0.26**	0.11
Agreeableness	−0.17***	0.05	−0.16**	0.07	−0.15**	0.06
Openness	0.20***	0.05	0.14**	0.07	0.25***	0.07
MIDUS3	0.16***	0.04	0.09	0.05	0.21***	0.04
Observations	2,073		1,161		912	
FamilyID	1,213		807		641	
IndividualID	1,429		902		715	
Wald Chi2	393.34***		268.07***		227.51***	
FamilyID: var	0.22	0.06	0.17	0.10	0.31	0.10
IndividualID: var	0.13	0.06	0.14	0.10	0.11	0.08
Var(residual)	0.41	0.07	0.49	0.12	0.25	0.08
LR-Test	166.19***		48.95***		94.72***	

Note: This table presents the mixed-effects results for the full sample and separated by a respondent's assessment of their financial situation. Better financial situation represents respondents that assessed their financial situation better than the median, worse financial situation represents all other respondents. Definitions of variables are in Table 1. Random effects are at family and individual level. Family-clustered standard errors are used.
'***', '**' and '*' denote significance at the 1%, 5%, and 10% level respectively.

Results

Table 3 presents the results for our model shown in Equation (1) for the full sample. The random-effects equations are labeled *FamilyID* and *IndividualID*, and the variance of level two and three errors are reported at the bottom of Table 3. *Var(residual)* is the level-one error, i.e., the overall error term.

Neighborhood quality in terms of upkeep, cleanliness, and relative neighborhood quality compared to others (*NeighQuality*) has a significantly positive relation with owner-assessed home values. Thus, the higher a homeowner perceives the quality of their neighborhood, the more they think their home will sell for. A one unit increase in the perceived neighborhood quality yields a 19.72%[1] increase in the self-assessed home value.

Furthermore, the frequency of neighbor interactions (*NeighInteraction*) negatively affects the self-assessed value. A one unit increase in neighborhood interaction results in a 4.08% decrease in this value. The negative relation of neighbor interactions and home

value estimate is initially surprising. However, one explanation for this finding is that frequently interacting with neighbors provides homeowners with an understanding of potentially value-reducing neighbor behaviors and characteristics. A second explanation is that homeowners who frequently interact with neighbors, for example, in their front yards or homes, are more aware of how their properties compare to their neighbors', which affects their value assessments. While perceived neighborhood quality and neighbor interactions impact self-assessed home values, other adjacency neighborhood effects such as neighborhood safety (*NeighSafety*), the trust among neighbors (*NeighTrust*), and the joint feel of home and neighborhood (*FeelNeighHome*) do not.

The longer a respondent has lived in their neighborhood (*CurrentNeighLength*), the lower they assess their home value. This may be driven by the fact that mobility out of a neighborhood is affected by income and wealth. Respondents may stay in a neighborhood longer not because they enjoy living there, but because of a lack of opportunities to move somewhere else due to affordability issues. Another explanation for this finding is that the longer a respondent resides in their neighborhood, irrespective of whether it is an affluent one or not, the more are they aware of negative externalities, for example, the behaviors of neighbors, which negatively impacts their value estimates.

Besides the perceived quality of their neighborhoods, the quality of their homes in terms of niceness of the home, pride in the home, and the owner's comfort in inviting guests over (*HomeQuality*) has a positive impact on the home value estimates by owners. In particular, a one unit increase in the perceived home quality results in a 19.72% increase in the owner-assessed value. This finding is in line with expectations and shows that not only home features such as age and number of rooms have an impact on self-assessed values (e.g., Tur-Sinai et al., 2020), but also perceived home characteristics as captured by the owner's comfort to invite guests, their pride in their home, and assessment of its overall quality (niceness).

Respondents with a college degree, spouse, mortgage, or rental income have significantly higher owner-assessed home values. Furthermore, homeowners that consider their financial situation to be better (*BetterFinSituation*) also assess their home values to be higher than homeowners who consider their financial situation to be worse. With respect to the personality variables, the higher a respondent scored on the agreeableness scale, the lower their self-assessed value, while openness had a positive relation with the owner's valuation. Modesty is considered a sub-facet of agreeableness, whereas esthetics, an appreciation for art and beauty, is a sub-facet of openness (Costa & McCrae, 1998; Judge et al., 2013). Although speculative, it is possible that the modest nature of those higher in agreeableness leads them to underestimate their home values, perhaps to appear humble. In contrast, people higher in openness may focus on and therefore better appreciate certain esthetically pleasing aspects of their homes, prompting their higher valuations. Last, compared to 2004–2006, respondents assessed their home values higher in 2013–2014 (*MIDUS3*).

As shown for the full sample in Table 3, the assessment of their financial situation affects homeowner valuations. To investigate which adjacency neighborhood effects are most important for value estimates considering a homeowner's financial situation, we separate our sample into respondents that (1) scored above median on the financial situation item (i.e., *BetterFinSituation* equals 1) and (2) have a median or below score on this

item (*BetterFinSituation* equals 0). We estimate our model in Equation (1) for these sub-samples and report the results in the respective columns in Table 3.

While neighborhood quality has a consistently positive effect on the self-assessed values for both groups, the quality of the home only has a significantly positive coefficient for homeowners with a worse financial situation. One explanation for this finding is that homeowners who assess their financial situation to be worse place more emphasis on the equity in their home, as they may have limited other investments and/or a lower occupational income. Consequently, the quality of their homes has a larger impact on their value estimates than for homeowners that are in a better financial situation.

Furthermore, the negative relation of *CurrentNeighLength* and home value estimate only exists for respondents in a worse financial situation. This may point to the explanation that these homeowners remained in their current neighborhood not because of the neighborhood itself, but due to a lack of affordable alternatives to which they could move. Last, for homeowners in the better financial situation sub-sample, the perceived safety of a neighborhood (*NeighSafety*) has a significantly positive relation with their value estimates.

The findings in Table 3 suggest that having a mortgage and/or rental income has an impact on homeowners' value assessments. To investigate how the relations of adjacency neighborhood effects and self-assessed values varies across homeowner groups with these financial characteristics, we separate our sample into 1) homeowners with a mortgage and without as well as 2) with rental income and without. We then report our results in Table 4.

For homeowners with a mortgage, the neighborhood and home quality have an impact on their value estimates. On the other hand, for homeowners without a mortgage, only the neighborhood quality has an impact on their self-assessed values. One explanation could be that the homes of respondents without mortgages are older and of a lower quality considering that the owners have lived in them long enough to pay off their mortgages. Alternatively, respondents without a mortgage may also include homeowners in lower-price housing segments such as mobile/manufactured homes that never qualified for a traditional mortgage. Therefore, the home quality itself may not be as important for their value estimates as the neighborhood they live in. Furthermore, for homeowners without a mortgage, the coefficient on *NeighInteraction* is significant, which suggests that our results for this variable in Table 3 were driven by this group of respondents.

For homeowners without rental income, home and neighborhood quality have a significantly positive impact on their value estimates. For homeowners that are also landlords, only the neighborhood positively affects their self-assessed values. One explanation for this finding is that the presence of renters on their property has an impact on how they assess the quality of their home, for example, regarding inviting guests or the pride in their home. Interestingly, only for homeowners with no mortgage and no rental income does the length of tenure in the neighborhood have a negative relation with value estimates. This finding provides further evidence that the length of neighborhood tenure may be driven by affordability issues rather than choice.

Overall, our results in Table 4 suggest that, irrespective of the financial characteristics of homeowners such as a mortgage or rental income, the perceived quality of a

Table 4. Mixed-effects (ML) results separated by mortgage and rental income.

| | Mortgage | | | | Rental income | | | |
| | With mortgage | | No mortgage | | With rental income | | No rental income | |
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
Constant	**10.03*****	**0.43**	**9.12*****	**0.53**	**11.66*****	**0.92**	**9.38*****	**0.38**
NeighInteraction	−0.01	0.03	**−0.06****	**0.02**	−0.08	0.05	−0.03	0.02
NeighSafety	0.02	0.06	−0.03	0.08	−0.28	0.20	0.03	0.05
NeighTrust	0.05	0.05	0.02	0.06	0.23	0.15	0.01	0.04
NeighQuality	**0.22*****	**0.06**	**0.17****	**0.07**	**0.29****	**0.14**	**0.16*****	**0.05**
HomeQuality	**0.21*****	**0.07**	0.16	0.08	0.04	0.13	**0.19*****	**0.06**
Home&NeighFeel	−0.03	0.08	0.15	0.09	−0.02	0.16	0.07	0.06
CurrentNeighLength	−0.004	0.003	**−0.01*****	**0.002**	−0.003	0.003	**−0.01****	**0.002**
Age	0.002	0.003	0.01	0.003	0.001	0.01	0.003	0.003
No of Children	−0.01	0.02	−0.01	0.02	−0.06	0.04	−0.01	0.01
College	**0.42*****	**0.06**	**0.38*****	**0.07**	**0.36*****	**0.13**	**0.43*****	**0.05**
Male	0.07	0.06	0.09	0.07	**0.34*****	**0.12**	0.05	0.05
Married	**0.16****	**0.07**	**0.29*****	**0.08**	**0.28****	**0.13**	**0.23*****	**0.06**
BetterFinSituation	**0.21*****	**0.06**	**0.16*****	**0.05**	**0.28****	**0.11**	**0.14*****	**0.05**
RentalIncome	**0.24*****	**0.08**	**0.22****	**0.10**	**0.22****	**0.10**	**0.16*****	**0.05**
DiscriminationHome	0.05	0.05	0.09	0.13			0.06	0.04
DiscriminationNeigh	−0.14	0.12	−0.04	0.20			−0.12	0.10
Extraversion	0.03	0.06	0.01	0.06	−0.14	0.13	0.06	0.04
Neuroticism	−0.01	0.05	−0.03	0.04	−0.05	0.11	−0.01	0.03
Conscientiousness	0.03	0.08	**0.16****	**0.08**	**−0.29****	**0.13**	**0.15****	**0.06**
Agreeableness	**−0.16*****	**0.06**	**−0.19*****	**0.07**	−0.13	0.11	**−0.17*****	**0.05**
Openness	0.12	0.06	**0.27*****	**0.07**	**0.48*****	**0.15**	**0.13*****	**0.05**
MIDUS3	**0.11****	**0.05**	**0.19*****	**0.05**	**0.27*****	**0.09**	**0.15*****	**0.04**
Observations	990		1,083		297		1,776	
FamilyID	712		702		226		1,082	
IndividualID	794		786		233		1,260	
Wald Chi2	283.33***		228.31***		100.83***		298.82***	
FamilyID: var	0.22	0.10	0.33	0.10	0.35	0.18	0.23	0.07
IndividualID: var	0.05	0.09	0.04	0.09	0.06	0.14	0.15	0.06
Var(residual)	0.36	0.11	0.48	0.11	0.36	0.23	0.37	0.07

Note: This table presents the mixed-effects results separated by whether respondents have (1) a mortgage or not and (2) rental income or not. Definitions of variables are in Table 1. Random effects are at family and individual level. Family-clustered standard errors are used.
'***', '**' and '*' denote significance at the 1%, 5%, and 10% level respectively.

neighborhood has a consistently positive impact on self-assessed home values. On the other hand, the effect of home quality on the value estimate varies across groups.

Our results in Tables 3 and 4 show that neighborhood quality consistently predicts homeowners' value estimates. To understand which of the dimensions of *NeighQuality* drive this relation, we estimate our model in Equation (1) with the individual items that make up *NeighQuality* as opposed to the multi-dimensional variable. Considering that *HomeQuality* has been revealed as another important predictor, we also estimate our model for individual items that make up *HomeQuality*.

Our results are presented in Table 5 (Model 1 column) and suggest that the relative perceived quality of a neighborhood ("Most people live in a better neighborhood than I do"), but not the perceived upkeep and cleanliness drive our findings for *NeighQuality* in Table 3. Regarding home quality, the niceness of the home ("I live in as nice a home as most people.") and to a lesser extent the comfort of a homeowner to invite guests ("I don't like to invite people to my home because I do not live in a very nice place.") drive our results for *HomeQuality* in Table 3. The results for *NeighInteraction* and *CurrentNeighLength* are in line with Table 3.

Table 5. Mixed-effects (ML) regression results with separate home and neighborhood quality variables.

	Model 1		Model 2	
	Coefficient	SE	Coefficient	SE
Constant	9.47***	0.35	9.53***	0.35
Relative Neigh Quality	0.05**	0.02		
Neigh Upkeep	0.05	0.03	0.05*	0.03
Neigh Cleanliness	0.07	0.05	0.08	0.05
Nice Home	0.12***	0.04	0.13***	0.04
Pride in Home	−0.01	0.05	−0.02	0.05
Invite to Home	0.06*	0.03	0.07**	0.03
NeighInteraction	−0.04**	0.02	−0.04**	0.02
NeighSafety	−0.0004	0.05	0.002	0.05
NeighTrust	0.04	0.04	0.04	0.04
Home&NeighFeel	0.08	0.06	0.09	0.06
CurrentNeighLength	−0.01***	0.002	−0.01***	0.002
Age	0.004	0.002	0.004	0.002
No of Children	−0.01	0.01	−0.01	0.01
College	0.40***	0.05	0.40***	0.05
Male	0.09*	0.05	0.09**	0.05
Married	0.22***	0.05	0.22***	0.05
Mortgage	0.16***	0.04	0.16***	0.04
BetterFinSituation	0.17***	0.04	0.17***	0.04
DiscriminationHome	0.06	0.04	0.06	0.04
DiscriminationNeigh	−0.10	0.10	−0.09	0.10
Extraversion	0.03	0.04	0.03	0.04
Neuroticism	−0.01	0.03	−0.02	0.03
Conscientiousness	0.10	0.06	0.10	0.06
Agreeableness	−0.17***	0.05	−0.17***	0.05
Openness	0.20***	0.05	0.19***	0.05
MIDUS3	0.16***	0.04	0.16***	0.04
Observations	2,073		2,078	
FamilyID	1,213		1,215	
IndividualID	1,429		1,431	
Wald Chi2	408.79***		399.09***	
FamilyID: var	0.22	0.06	0.21	0.06
IndividualID: var	0.12	0.06	0.13	0.06
Var(residual)	0.41	0.07	0.41	0.07

Note: This table presents the mixed-effects results with the NeighQuality and HomeQuality variables separated into different dimensions. Definitions of variables are in Table 1. Random effects are at family and individual level. Family-clustered standard errors are used.
'****', '**' and '*' denote significance at the 1%, 5%, and 10% level respectively.

One explanation for the insignificant coefficients on the upkeep and cleanliness neighborhood variables may be that these aspects of neighborhood quality are captured by the relative neighborhood quality-variable. To further investigate this explanation, we estimate our model without the relative neighborhood quality variable ("Most people live in a better neighborhood than I do."). Our results are presented in the Model 2 column in Table 5. Removing this variable results in a significant coefficient on neighborhood upkeep, however, the respective p-value is 0.10. The coefficient on neighborhood cleanliness remains insignificant. This suggests that relative neighborhood quality perceived by homeowners captures tangible and intangible characteristics of a neighborhood that go beyond the neighborhood's cleanliness and repair of buildings and streets. Future studies may use our findings as a starting point to investigate these neighborhood quality factors, particularly relative to other neighborhoods, in more detail.

Table 6. Robustness check – results for MIDUS 3 only.

	With income		With income and change in income	
	Coefficient	SE	Coefficient	SE
Constant	9.60***	0.42	9.63***	0.43
NeighInteraction	−0.02	0.02	−0.02	0.02
NeighSafety	−0.03	0.07	−0.04	0.07
NeighTrust	0.04	0.06	0.04	0.06
NeighQuality	0.14**	0.06	0.13**	0.06
HomeQuality	0.29***	0.07	0.29***	0.07
Home&NeighFeel	0.10	0.09	0.10	0.09
CurrentNeighLength	−0.01***	0.002	−0.01***	0.002
Age	0.002	0.003	0.002	0.003
No of Children	−0.01	0.02	−0.01	0.02
College	0.25***	0.05	0.25***	0.05
Male	0.01	0.06	0.01	0.06
Married	0.25***	0.06	0.25***	0.07
Income	0.004***	0.0004	0.004***	0.0004
IncomeChange – More			−0.04	0.06
IncomeChange – Less			0.09	0.06
Mortgage	0.17***	0.06	0.18***	0.06
RentalIncome	0.16**	0.07	0.16**	0.07
BetterFinSituation	0.14***	0.05	0.15***	0.05
DiscriminationHome	0.17**	0.08	0.15**	0.08
DiscriminationNeigh	0.08	0.11	0.07	0.11
Extraversion	−0.04	0.05	−0.03	0.05
Neuroticism	−0.01	0.04	−0.01	0.04
Conscientiousness	−0.01	0.06	−0.01	0.06
Agreeableness	−0.14**	0.06	−0.15**	0.06
Openness	0.26***	0.06	0.25***	0.06
Observations	*1,185*		*1,182*	
No of Family	*1,032*		*1,030*	
Wald Chi2	*495.72****		*499.86****	
FamilyID: var	*0.17*	*0.10*	*0.16*	*0.10*
Var(residual)	*0.53*	*0.11*	*0.54*	*0.11*

Note: This table presents the mixed-effects results for responses to the MIDUS 3 survey only. Income is the respondent's pretax income from all sources in 2012. IncomeChange represents the change in pretax income of a respondent from 2007 to 2012. It is coded as More, Same and Less with Same being the reference group. Definitions of all other variables are in Table 1. Random effects are at family level. Family-clustered standard errors are used.
'****', '**' and '*' denote significance at the 1%, 5%, and 10% level respectively.

Robustness Check

The second and third wave of the MIDUS survey lack a consistent income variable. In the second MIDUS survey, respondents are asked to separately report their income from wages, pensions, or social security. No other income categories are considered, and no aggregated income variable is provided. The third MIDUS survey (2013–2014) contains two items that reflect a respondent's income. First, the survey asks respondents to provide their 2012 pretax income from all sources (*Income*). Second, the survey asks homeowners to compare their pretax income in the last year to their pretax income in 2007. Hereby, respondents are given the options "less," "same" and "more."

To assess the robustness of our findings in Table 3 to homeowner income, we estimate our model in Equation (1) using the third wave data only and including the income and income change variables. In particular, we derive two binary variables coded 1 for an income change that resulted in a higher 2012 income (*IncomeChange–More*) and in a lower 2012 income (*IncomeChange-Less*). Respondents whose income did not change from 2007 to 2012 represent the reference group. This income measure has a significant

pairwise correlation with *College* (correlation coefficient: 0.31), *BetterFinSituation* (0.21) and *RentalIncome* (0.19) based on the third wave MIDUS data.

Our results in Table 6 for are in line with Table 3. Controlling for a homeowner's income, perceived neighborhood and home quality continue to positively impact owner-assessed value estimates. Thus, our main results are robust to excluding respondent income as an explanatory variable.

Conclusion

We investigate the impact of adjacency neighborhood effects such as the frequency of neighbor interactions and perceived neighborhood quality on owner-assessed values. Compared to absolute neighborhood effects, which have been controlled for in previous studies in self-assessed home values (e.g., Kiel & Zabel, 2008, 2003; Tur-Sinai et al., 2020), adjacency neighborhood effects have been neglected in the literature. We take advantage of the MIDUS survey, which collects neighborhood-specific variables at the home-owner-level that capture different dimensions of adjacency neighborhood effects.

Using longitudinal data for 1,429 US homeowners, we find that perceived neighborhood quality is the most consistent predictor of homeowners' value estimates. This effect is driven by how homeowners perceive the quality of their neighborhood relative to other neighborhoods rather than a neighborhood's perceived upkeep or cleanliness. Furthermore, trust and support among neighbors and the joint feel of the home and neighborhood have no relation with self-assessed values. For different sub-sets of home-owners based on financial variables such as self-assessed financial situation, a mortgage or rental income, interactions with neighbors and perceived neighborhood safety also affect the value estimates by owners.

Our findings have implications for policy makers and real estate developers in that we find the relative neighborhood quality perceived by homeowners to be most important for perceived housing wealth. Considering the importance of self-assessed home values for household financial decisions (e.g., Agarwal, 2007; Browning et al., 2013; Juster et al., 2006; Kalifa et al., 2013; Lusardi & Mitchell, 2007), policies and development strategies may focus on factors that can help improve this comparative quality of neighborhoods.

Future studies may use our findings as a starting point to further investigate adjacency neighborhood effects. They may empirically investigate the relations of and interactions between adjacency neighborhood effects investigated in this study and absolute neigh-borhood effects such as crime or school quality. Such studies could also provide explanations for some of our findings that appear counter-intuitive.

Considering that we find perceived neighborhood quality to be an important predictor of self-assessed home values, more research is needed into the concept of neighborhood quality. Future studies could identify different dimensions of relative perceived neighborhood quality in order to better understand what drives homeowners' perception of neighborhood quality. These dimensions could include neighborhood characteristics such as traffic, curb appeal, walkability, density, neighborhood associations, playgrounds, or other positive externalities. These studies could then provide more insight into what constitutes a high- or low-quality neighborhood to homebuyers and existing residents by jointly analyzing adjacency and absolute neighborhood effects. Lastly, these studies

could investigate drivers of differences between perceived and actual neighborhood quality.

Other studies could analyze the impact of adjacency neighborhood effects on the over- or underestimation of home values by owners. Future studies may also investigate joint effects of homeowner and neighborhood characteristics (e.g., race/ethnicity, previous discriminations, gender, age) in more detail to understand their impact on value assessments.

Note

1. Considering the log-transformed dependent variable, the effect sizes for independent variables are based on (exp(coefficient size)-1)*100.

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