Measuring Heterogeneous Preferences for Residential Amenities*

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Abstract

This study reports on estimates of heterogeneous preferences for residential amenities among households in the Mountain West region of the US. The estimates are derived from a choice experiment funded by the Utah Department of Transportation and Utah Transit Authority—an experiment based upon large samples of both homeowners and renters who participated in a larger, statewide transportation study. The choice experiment and transportation study allow us to control for a rich set of household-level demographic and lifestyle characteristics, which in turn permits identification of a host of factors contributing to heterogeneity in residential preferences. We leverage a percentage-change housing cost attribute included in the experiment to obtain measures of marginal willingness to pay (MWTP) for the various residential attributes and attribute levels in our study. Our method of converting the percentage-change cost attribute to dollar-denominated MWTP results in theoretically plausible estimates of a household's MWTP. We find that preferences for residential amenities differ across homeowners and renters with respect to intensity rather than direction—homeowners are generally willing to pay more for these amenities, in some cases up to seven times more. Our quantitative estimates of these preferences and the extent to which we control for heterogeneity across households provide urban and regional planners with precise monetary welfare measures for a sizable majority of the region's residents.

Keywords: Residential preferences; Choice experiment; Marginal willingness to pay.
JEL: D10, D19.

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This study reports on estimates of heterogeneous preferences for residential amenities among households in the Mountain West region of the US. The estimates are derived from a choice experiment funded by the Utah Department of Transportation and Utah Transit Authority—an experiment based upon large samples of both homeowners and renters who participated in a larger, statewide transportation study. The choice experiment and transportation study allow us to control for a rich set of household-level demographic and lifestyle characteristics, which in turn permits identification of a host of factors contributing to heterogeneity in residential preferences. We leverage a percentage-change housing cost attribute included in the experiment to obtain measures of marginal willingness to pay (MWTP) for the various residential attributes and attribute levels in our study. Our method of converting the percentage-change cost attribute to dollar-denominated MWTP results in theoretically plausible estimates of a household's MWTP. We find that preferences for residential amenities differ across homeowners and renters with respect to intensity rather than direction—homeowners are generally willing to pay more for these amenities, in some cases up to seven times more. Our quantitative estimates of these preferences and the extent to which we control for heterogeneity across households provide urban and regional planners with precise monetary welfare measures for a sizable majority of the region's residents.

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1 Introduction

As metropolitan areas expand over time, urban and regional planners and county and city officials are tasked with anticipating diverse household preferences for residential amenities both within a respective area's boundary and on its periphery.[1] Anticipating residential preferences, in turn, entails understanding the extent to which disparate households value the various attributes comprising their preferences—attributes such as neighborhood composition, parking availability, street design, and proximity to local destinations, transit stations, and places of employment—as well as the implicit trade-offs households make among these attributes. For instance, certain types of households may value living on or near larger lot sizes in neighborhoods with predominantly single-family homes, at the same time as they prefer shorter commute distances to their places of employment and more convenient access to public transit hubs and shopping locations. Clearly, households exhibit relative preferences among these types of attributes; they make implicit trade-offs that differ by household type. The question is, how do different types of households value these trade-offs? Our underlying hypothesis is that households exhibit considerable heterogeneity in their relative preferences for residential amenities and the associated, implicit trade-offs they willingly make among them.

This paper demonstrates how our underlying hypothesis can be tested using choice-based experimentation, in our particular case using household-level data from a massive travel study recently undertaken along Utah's Wasatch Front region, one of the nation's fastest-growing metropolitan areas (Perlich et al., 2017; Madison, 2018; Stebbins, 2019). Herein, we demonstrate how direct estimation of heterogeneous preferences for residential amenities can provide an empirical foundation upon which metropolitan planning efforts may be based.

Our study follows on the path of previous residential-preference studies (discussed at length in the next section), but with a notable distinction. To our knowledge, this is the first study of residential preferences that controls not only for basic household-level socio-demographics (such as income and education level, employment and home-ownership status, etc.), but also a rich set of what we call lifestyle characteristics (such as a household's primary reasons for choosing its current residential location, number of bicycles owned, attitudes pertaining to traffic congestion and gasoline prices, and stated willingness to pay higher taxes for improved social amenities such as the availability of more sidewalks, hiking trails, and bicycle lanes).

The choice experiment we report on was conducted in 2012 as part of a Utah Department of Transportation (UDOT) and Utah Transit Authority (UTA) jointly funded survey of household travel behavior in the Wasatch Front region of Utah. As a result of UDOT's

[1] Otherwise, planners and city officials choose by default to rely on developers' interpretations of these preferences. In the best-case scenario, planners and developers work closely together in guiding the urbanization process (Kaplan, 1965; Stein, 2019).

and UTA's sizable investment in the survey, a large sample of respondents and a rich set of socio-demographic and lifestyle controls for both homeowners and renters enables us to account for a wide variety of factors contributing to heterogeneity in residential preferences; heterogeneity that is unaccounted for in previous studies. The choice experiment was designed to elicit household preferences for ideal neighborhood characteristics, in particular (1) commuting distances to work, (2) proximity to social amenities such as public transportation hubs, shopping, restaurants, and schools, (3) parking availability, (4) street design (e.g., primarily for motor vehicle travel vs. more pedestrian friendly), and (5) neighborhood type (e.g., different lot sizes and mixtures of single- and multi-family residences).[2] Because the experiment was conducted as part of a broader travel study, its main purpose was to aid regional planners in better understanding long-range transportation and land-use preferences of households along Utah's Wasatch Front.[3]

Housing cost is incorporated in our experiment using a novel approach. In the original survey, participants are asked to value different choice alternatives according to percentage changes (increases and decreases) in the prices they currently pay for their housing, rather than in response to arbitrary cost levels. Couching the housing cost attribute in percentage terms as opposed to dollar-denominated levels naturally raises the question of which approach elicits more accurate responses from participants in a choice experiment—a generic question that is beyond the scope of this study. Instead, in this study we concentrate on how best to leverage the survey's percentage-change housing-cost format to obtain accurate measures of marginal willingness to pay (MWTP) for the various residential attributes. The method we adopt to convert the cost attribute measured in percentage terms to dollar-denominated MWTP values results in theoretically plausible estimates of household welfare.[4]

We find that on average Wasatch Front renters exhibit MWTP values upwards of $30 per month to avoid commute distances of five to 20 miles or more to work, as well as to avoid traveling distances of 10 miles or more to local destinations. This MWTP value to avoid longer commute distances is more than twice the value renters obtain from living in

[2]While participants in our experiment compare alternatives whose attribute levels may differ substantially from those present in their current residential locations—thus constructing the notion of an ideal residence in their minds—we acknowledge Garvill et al.'s (1992) "differential predictability" critique that including a housing cost attribute in the choice alternatives (which we do in order to estimate monetary welfare measures) can confound a participant's preference rating in terms of how well it reflects his or her true, ideal residential location.

[3]A full report on the choice experiment was subsequently prepared by RSG (2013).

[4]Our cost attribute is, nevertheless, based upon self-reports from survey participants. In contrast, Phaneuf et al. (2013) propose a combined revealed-preference (RP)/stated preference (SP) generalized method of moments (GMM) approach that bases MWTP estimates of an environmental amenity obtained from a second-stage SP choice experiment on baseline market conditions derived from a first-stage RP hedonic model of property values (in their case property values in Buffalo, NY proximate to an aquatic hazardous waste site). The authors report MWTP estimates from their GMM model that are more than double their comparable measures from an SP-only version of the model. These findings suggest that to the extent bias exists in our MWTP estimates of households' residential amenity values, it is likely in the downward direction.

less-congested neighborhoods, suggesting that Wasatch Front renters are implicitly willing to trade-off shorter commute distances for residing in less-congested neighborhoods. Renters are also willing to pay over $20 per month to live less than 10 miles from a transit stop for bus or rail, and to have access to a personal driveway or parking garage. All else equal, renters are willing to pay more to live in less-congested neighborhoods where single-family homes are situated on larger lots sizes and where streets are designed for mixed use of cars, bicyclers, and pedestrians.

By comparison, Wasatch Front homeowners are willing to pay a monthly equivalent of almost $90 to avoid having to commute more than 20 miles to work, and almost $100 per month to avoid having to travel more than 10 miles to local destinations. They are also willing to pay an equivalent of over $60 per month to be located less than 10 miles from a transit stop, and over $190 per month for their own garage. Homeowners are willing to pay roughly $50 per month to be located on a street designed for mixed use, and almost $80 to reside in less-congested neighborhoods with half-acre lots and solely single-family homes. Interestingly, homeowners exhibit a slight preference for living in neighborhoods with half-acre lot sizes rather than one-acre lots. Further, homeowners' relatively large MWTP values for avoiding long distances associated with commuting to work and local destinations are outweighed only when the value obtained from residing in less-congested neighborhoods is combined with the value obtained from owning a garage. Thus, owning a garage is a crucial determinant of the implicit trade-off a typical Wasatch Front homeowner is willing to make between commuting distances and residing in a less-congested neighborhood.

As these results suggest, residential preferences differ across Wasatch Front homeowners and renters with respect to intensity rather than direction, e.g., while both homeowners and renters prefer living in neighborhoods composed of single-family residences on larger lot sizes, homeowner preferences for this attribute are stronger. For most attributes homeowners are willing to pay between two to five times more in monthly equivalent than renters. For having the option to park their vehicles in an attached garage, homeowners are willing to pay roughly seven times more than renters.

Controlling for a wide variety of socio-demographic interaction effects on the average household's MWTP for the different residential attributes—effects associated with household income, gender, age, and employment status of respondent, highest education level attained by a household member, number of adults and children comprising the household—we are able to quantify both expected and unexpected relationships in the data, and divergences between homeowners and renters. For example, while both middle-income renters and homeowners are willing to pay more than lower-income renters and homeowners, respectively, for driveway/garage parking, only the middle-income renters are willing to pay more for closer proximity to the nearest transit stop. Middle-income homeowners are willing to pay more(less) than their lower-income counterparts for shorter commute distances to work(local destinations).

Further, with respect to location-specific and non-location-specific lifestyle interaction effects—effects associated with the choice of urban or non-urban residential locations, number of years having resided in current location, main reason for having chosen current location, number of vehicles and bicycles owned, and attitudes about various aspects of residential development—we generally find consistency between the choices both renters and homeowners have actually made with those they indicate they would make under ideal circumstances. For example, urban households express higher willingness-to-pay than suburban and rural households to live in more-densely populated neighborhoods. Urban homeowners are also willing to pay more for closer proximity to the nearest transit stop and multi-use street design. Along these same lines, as both renters and homeowners acquire more motor vehicles the less they are willing to pay for shorter commuting distances to work, local destinations, and the nearest transit stop, and the more they are willing to pay for lower-density housing.

The next section discusses the relevant literature. Section 3 provides background on our study area, Utah's Wasatch Front region. Section 4 discusses the choice experiment conducted with the region's households and describes the data obtained. Section 5 presents the underlying theoretical model used to motivate our analysis, as well as the Mixed Logit empirical model used to estimate the data. Section 6 presents our empirical results and Section 7 concludes. Five appendices contain additional analyses relevant to information presented in Sections 4-6.

2 The Literature

Although a host of previous studies have estimated residential preferences using similar techniques as ours, none are capable of accounting for heterogeneity in household welfare measures to the extent that our data permits. In this section we review six pertinent studies that use stated-preference techniques to measure household preferences for residential amenities, and one study that utilizes an alternative, revealed-preference method.

Bullock et al.'s (2011) choice experiment eliciting residential preferences among rural and non-rural households in the Republic of Ireland is closest to ours in terms of methodology and focus on neighborhood characteristics. The sampled households' preferences reflect what the authors claim is the nation's tradition of dispersed rural living combined with historically permissive zoning and ordinance policies; a tradition in turn reflecting the nation's strong cultural disposition for living in the countryside.[5] In Bullock et al.'s (2011) choice comparisons, participants are tasked with choosing hypothetically between a "single rural house", "village property", "suburban property within a nearby town", and their current

[5]By way of comparison between Ireland and our study area in Utah, the CSOI (2017) estimates that slightly more than 37 percent of Irish citizens reside in rural areas, while in Utah less than 10 percent of the state's citizens reside in rural counties (URPG, 2017). Since Ireland's Census Bureau defines a rural area as consisting of 1,500 residents or less compared with the US Census Bureau's definition as areas (i.e., counties) with no city of more than 50,000 residents that are not significantly affected by urban growth, using Ireland's definition suggests an even wider disparity between the respective percentages of populations living in Ireland's and the US's rural areas (CSOI, 2017; URPG, 2017).

residence. The authors find that in general both Multinomial Logit (MNL) and Mixed-Logit (ML) empirical specifications of their data indicate strong positive marginal impacts on household preferences associated with larger garden sizes, shorter commute times to work, and nearness to shops, social amenities, and schools. Interestingly, households owning a single vehicle value shorter commute times to work more highly than households owning two or more vehicles. Housing cost—derived as the household's upper limit of affordability—is negatively related to welfare. Unlike other studies (including ours), Bullock et al. (2011) do not base their housing cost attribute on either actual market value or participant estimates of market value. As a result, their housing cost variable potentially suffers from an added degree of hypothetical bias.

Unlike Bullock et al. (2011), Earnhart (2002) includes specific housing characteristics, such as an actual photo of the house in question, number of bedrooms and bathrooms, and square footage of internal space, in his choice experiment regarding residential preferences among households in Fairfield, Connecticut. Earnhart (2002) also accounts for a limited set of heterogeneous effects; effects attributable to baseline socio-demographic variables, e.g., marital status, household income, etc., as well as neighborhood characteristics such as the neighborhood's natural features, architectural style of homes in the neighborhood, flooding risk, and census tract. However, Earnhart (2002) does not estimate household preferences for commute times to work or proximity to local destinations. He ultimately finds that (1) households are more likely to select homes located adjacent to water- or land-based features than homes lacking a natural feature, (2) within the water-based features category households are more likely to select homes near rivers/streams and lakes/ponds, and (3) within the land-based features category households prefer forests over open fields.[6]

Kim et al. (2005) measure residential preferences in Oxfordshire, UK, in particular the implicit trade-off between commuting time to work and accessibility of social amenities, on the one hand, and housing and neighborhood characteristics on the other. However, rather than estimating marginal utilities associated with these residential attributes, the authors assess the marginal impacts on a household's intention to move. The authors find that a household's intention to move increases with increases in housing costs, longer travel times to work and shopping areas, higher population densities, and lower school quality, all in relation to the household's current residence. The marginal impacts of longer travel times on a household's probability of moving are disproportionately the largest among this set of attributes. These results lead the authors to conclude that urban planning can resolve job-housing mismatches through the promotion of compact cities.

Rouwendal and Meijer (2001) estimate the stated preferences of Dutch workers for different combinations of housing, employment, and commuting time in a contingent-ranking experiment. Similar to Bullock et al. (2011) and Kim et al. (2005), Rouwendal and Meijer (2001) find that workers exhibit relatively high (negative) marginal impacts associated with

[6] Earnhart (2002) generates a range of housing cost attribute levels for his choice experiment based upon market prices, rather than self-reported values as in Bullock et al. (2011).

longer commuting times to work. Nevertheless, the authors find evidence that workers are willing to trade-off longer commuting times for a more desired type of housing, in particular for residential neighborhoods located outside the centers of large cities. The authors conclude that commuting time is an important determinant of residential preferences, but at the same time is one of many key attributes considered in the residential decision process.

Wang and Li (2004) employ a choice experiment to investigate residential preferences in the nascent private housing market in Beijing, China. The authors find that in general the impacts of neighborhood attributes on household welfare are large, for the most part outweighing dwelling-specific effects, and that the effects of accessibility to public transportation and housing price exhibit diminishing marginal utility. Similar to Earnhart (2002), Wang and Li (2004) do not estimate household preferences for commute times to work. The set of statistically significant neighborhood attributes includes district location, accessibility to public transportation and daily goods markets, and security from potential crime. The set of dwelling characteristics includes housing price, house's cardinal direction (east, west, north, or south), housing type (detached house or apartment), interior layout, and how property is managed. Interestingly, the authors find that (1) white-collar workers care more about a district's reputation than do blue-collar workers, (2) younger and older respondents care more about their neighborhood's security, (3) accessibility of fresh and daily goods markets is more of a concern for middle-aged and older respondents than younger respondents, and (4) middle-aged respondents care more about access to public transportation than do younger and older respondents.

Lastly with respect to choice experiments, Wardman and Bristow (2004) estimate preferences for travel times by car and bus, reductions in traffic-related noise levels, and increases in local air quality in Edinburgh, Scotland, while controlling for a limited set of heterogeneous effects.[7] The authors find that decreases in air quality (i.e., increases in concentrations of Nitrogen Dioxide (NO_2)) and increases in ambient noise levels and car travel times reduce the average household's welfare (car travel time is defined as an all-inclusive attribute, accounting for travel to and from places of employment as well as local destinations). The marginal disutilities associated with decreases in air quality and increases in ambient noise levels are constant. All else equal, households with children exhibit larger marginal disutilities with respect to decreases in air quality and increases in noise level. As expected, willingness to pay to alleviate these disutilities rises with household income.

With respect to revealed-preference studies using secondary data sources, So et al. (2001) apply an MNL framework to 1990 US Census data for Iowa to examine how wages, housing prices, and commuting time affect a household's joint decision of where to live and where to work.[8] The authors find that, all else equal, (1) a household's probability of choosing to

[7]Wardman and Bristow (2004) depart from the norm of estimating either an MNL or ML model. Instead, the authors estimate a binary-choice logit model with jack-knifed standard errors (Cirillo et al., 2000).

[8]An interesting strand of the revealed-preference literature focuses on the relationship between households' residential preferences and the racial composition of their neighborhoods. For instance, in his study of households in the Los Angeles metropolitan area, Clark (1992) finds evidence that households express

commute to work is negatively related to the commuting distance, (2) older householders are less likely to commute and prefer to live in non-metropolitan areas, (3) number of children in the household does not have a statistically significant impact on probability of commuting, (4) more educated householders, those with more unearned income, and women prefer to reside in metropolitan areas, and (5) women are more averse to commuting than men.

With respect to measuring trade-offs households willingly make between residential location, wages, and commuting time, So et al. (2001) conclude that households tend to prefer to reside in lower-priced non-metropolitan areas and still earn urban wages, but with added commuting costs incurred that increase with distance from the city. Thus, improvements in transportation that lower commuting time lead to an increase in non-metropolitan populations and the number of non-metropolitan commuters to metropolitan markets. The authors' empirical findings are therefore consistent with the classic works of Alonso (1964), Muth (1969), and Mills (1967) regarding the equilibrium structure of a city, the housing choices of households, and the price of housing (Wheaton, 1974; Kulish et al., 2012).[9]

In sum, the empirical evidence reported in the previous literature suggests that in choosing where to live households weigh the relative benefits associated with myriad residential amenities. Particularly relevant to our study, Bullock et al. (2011) find that households generally value shorter commute times to work, and nearness to shops, social amenities, and schools. Kim et al. (2005) similarly find that a household's intention to move increases with increases in housing costs, longer travel times to work and shopping areas, higher population densities, and lower school quality. And Rouwendal and Meijer (2001) find that although they value shorter commute times, households willingly trade-off longer commuting times for a more desired type of housing and neighborhood location. As these studies demonstrate, shorter commuting time is considered by households to be a desirable residential amenity. However, commuting time is one among many neighborhood characteristics a household considers in its residential decision process. Our study adds to this literature by investigating the extent to which results such as these are influenced by inherent heterogeneity among households.

preferences for own-race combinations in the ethnicity of their neighborhoods, with Anglos expressing the strongest preferences. Using a novel dataset including a panel of housing-transaction data from the San Francisco metropolitan area, Bayer et al. (2016) find that households are forward-looking with respect to the state of their current neighborhood when making future location decisions. Their empirical results regarding households' preferences for own-race neighborhoods echo those of Clark (1992).

[9]As Kulish et al. (2012) point out, given the basic Alonso-Muth-Mills modeling assumptions of fixed population size and household incomes, and costly commuting effort that increases with distance from the city center, households choose, all else equal, to reside nearer the center. Naturally, the price and density of housing adjust to clear the housing market—housing becomes more expensive closer to the center, prompting the construction of more dwellings per unit of land. Households sort themselves—some choosing to live in centrally located, but smaller and more-expensive housing, others in more distant, but larger and less-expensive housing further from the city center. The overall size of the city is determined simultaneously by population size, transportation cost, and the value of land in alternative uses, such as agriculture.

3 Utah's Wasatch Front Region

Located in the north-central part of the state, comprised of Weber, Davis, Salt Lake, and Utah Counties, the Wasatch Front is Utah's largest metropolitan region (see Figure 1). The region stretches along, and is hemmed in by, the Wasatch Mountain range to the east and the Great Salt Lake to the west. Because of these geographical barriers, much of the land along the Wasatch Front has already been developed. The region has experienced considerable growth since the 1950s—its population increasing by over 300% to its current three million residents, with projections of the population reaching six million residents by 2065 (Perlich et al., 2017). Much of the remaining undeveloped land is rapidly being developed, forcing local governments and regional authorities to contend with problems of urban sprawl and related transportation issues.

According to Perlich et al.'s (2017) projections, just under 30% of Utah's population will reside in Utah County by 2065, as will 40% of new residents to the state during this 50-year time span. Just over 20% of new residents will reside in Salt Lake County, currently the region's most populous county. Forty and roughly 25% of those employed in the state are projected to be working in Salt Lake and Utah Counties, respectively, by 2065. Davis County is projected to experience the state's third highest employment growth rate during this same timeframe.

Envision Utah's (2015) survey of over 50,000 residents across the state of Utah—the vast majority of whom reside in the Wasatch Front region—reveals that, concomitant with the state's housing market shifting for decades to smaller lot sizes, townhomes, and apartments, over 80% of those surveyed stated preferences in favor of their communities being designed for more convenient travel and a diversity of housing choices. In support of these preferences, a supermajority of respondents express a willingness to build or restore mixed-use centers of jobs, compact housing, shopping, and recreation opportunities located in urban areas where it is convenient to walk, bike, use public transportation, or drive short distances. Respondents indicate that the days of building large "trophy homes" on large lot sizes should be over.

Taken together, these population and employment trends, along with the changing attitudes of a sizable majority of the region's residents regarding ideal housing and neighborhood characteristics, suggest that the Wasatch Front is itself an ideal location to study residential preferences. The combination of economic and population growth currently being experienced in the region, coupled with households' changing attitudes and residential preferences, present urban and regional planners with ample opportunities to design alternative neighborhood configurations, but with associated risk. Urban and regional planning strategies need to be aligned with the key determinants of residents' quality of life—transportation to and from places of employment, access to social amenities, related environmental impacts, and salient neighborhood characteristics. Impending population growth stands to exacerbate any misalignments. To hone their models and designs, planners require information about quality-of-life determinants directly from the region's households; information obtained through surveys and experiments, such as the choice experiment to which we now turn our attention.

4 The Choice Experiment and Data

As mentioned in Section 1, the choice experiment was conducted as part of a broader travel study (known as the Utah Travel Study (UTS)) undertaken in 2012 with the intention of informing regional and statewide transportation planning for the state of Utah (RSG, 2013). Household- and individual-level data provided by the UTS has since informed the Wasatch Choice 2050 long-range development and transportation plan, a collaborative approach involving multiple agencies interested in understanding Utah's transportation needs, and in identifying current and future funding priorities (WFRC, 2019).

Figure 2 depicts the survey approach developed for the UTS. Households were initially invited by first-class mail to participate in the Household Diary survey, which entailed the completion of a single-day travel diary for any trips made on a pre-selected Tuesday, Wednesday, or Thursday in 2012. Additionally, participants completing the Household Diary survey were invited to fill out one or more complementary surveys focusing on their long-distance travel behavior, bicycling and pedestrian behavior, as well as their overall attitudes and opinions regarding Utah's current transportation system. Household Diary participants were also invited to participate in the Stated Preference Residential Choice Survey, i.e., the choice experiment. College students were administered a separate travel diary and extended bicycling/pedestrian survey, but not invited to participate in the choice experiment. All participants completed their travel diaries and additional surveys using an online survey instrument, or by phoning a toll-free number and speaking with a trained operator. As an incentive, participants were awarded a $10 Amazon.com gift card for each survey completed.

Over 9,000 households participated in the Household Diary survey, representing over 18,000 adults and over 100,000 vehicle trips. Of these households, 2,795 agreed to participate in the residential-preferences choice experiment, resulting in a 30% response rate (RSG, 2013).[10] The experiment was administered online through the same website created for the UTS. Each participant was given a unique password to login onto the experiment's homepage. Participants had the option to leave the experiment at any point, and were able to log back on to complete it whenever convenient. Only one adult per household was invited to participate in the experiment. Survey questions in support of the experiment were borrowed from the National Association of Realtors' 2011 Community Preference and

[10] Our response rate compares favorably with the 23% and 27% rates reported by Earnhart (2002) and Kim et al. (2005), respectively, for their experiments (survey response rates are not reported in Bullock et al. (2011), Rouwendal and Meijer (2001), Wang and Li (2004), and Wardman and Bristow (2004)). Further, in their meta-analysis of response rates from choice experiment studies in general, Watson et al. (2017) report an average rate of roughly 37% for experiments consisting of seven or more attributes (based on our estimates of the information provided in the paper). Our study's response rate therefore compares favorably with the norm for choice experiment studies in general.

2007 Growth & Transportation Surveys, and RSG's previous research work for the National Academies of Science (RSG, 2013).

Following standard practice, the choice experiment instructed participants to make choice comparisons between two randomly chosen alternatives, i.e., sets of hypothetical neighborhood characteristics (Hensher et al., 2015).[11] Each alternative in a given choice comparison is distinguished by different attribute levels associated with type of neighborhood, home's distance from important destinations, home's distance from access to public transport, street design, parking availability, commute distance to work, and home or rental cost. Each participant was presented with a succession of 10 randomly chosen choice comparisons (each comparison consisting of two alternatives comprised of randomly ordered attributes and randomly chosen attribute levels) based on a D-optimality experimental design (RSG, 2013). The respective attributes, their levels, and their corresponding variable names for our subsequent regression analysis are provided in Table 1.

As indicated in Table 1, successive bullet points for the attribute Housing Composition generally correspond to larger lot sizes and less-dense housing. Variable *House1* defines the second-highest housing density and second-smallest lot-size combination, while variable *House3* defines the least-dense and largest lot size combination. The "left out", or baseline category represents the highest housing density and smallest lot size combination. In a similar manner, variables *Park1* and *Park2* correspond to less-convenient and more-expensive parking arrangements relative to the baseline category of parking in one's own garage or driveway, variables *Dest1*–*Dest3* correspond to progressively further distances from local destinations, *Transit1*–*Transit3* to progressively further distances from public transit stops or stations, *Street1* represents streets designed for a mix of transportation options rather than the baseline of exclusively for automobiles, and *Commute1*–*Commute3* correspond to progressively further commute distances to work. As indicated, the attribute levels for Home/Rental Cost are defined according to their respective decimal numeric values, e.g., "20% less" is defined as -0.2, "10% less" as -0.1, etc.

An example choice situation, as presented to participants, is provided in Figure 3 (RSG, 2013). Prior to being presented with a series of 10 separate choice comparisons, participants were instructed to select their most preferred alternative in each comparison. They were also instructed to assume that the only differences in residential characteristics across alternatives in any choice comparison are accounted for by the alternatives themselves. Two alternatives are presented in each choice situation; an opt-out option in favor of the status quo is not provided. The experiment's participants were thus precluded from indicating in-

[11]By presenting the participants with unlabeled alternatives we follow Kim et al. (2005), Rouwendal and Meijer (2001), and Wang and Li (2004). As pointed out in Blamey et al. (2000), although using alternative-specific labels helps familiarize participants with the context and can reduce the experiment's cognitive burden, this approach risks participants not adequately considering tradeoffs between attributes. An advantage of using unlabeled alternatives is that participants will therefore focus more on the attributes and their respective levels when considering trade-offs among alternatives. An unlabeled experiment is therefore the preferred approach when the emphasis of the study is on estimating marginal rates of substitution between attributes.

difference or uncertainty between the two alternatives, or if their current housing situation (the status quo) is preferred (Manski, 1999). As such, the choice experiment was geared more toward eliciting the household's preferences for its ideal, as opposed to its current, residential attributes. Further, potential distortionary effects are avoided that occur when a respondent interprets an opt-out option as being comprised of more attributes than those explicitly included in the two alternatives being compared (Stafford, 2018).[12]

As alluded to in Alpizar et al. (2003), to the extent that ideal attributes are relevant for policy making (particularly for longer-run planning horizons), trading off potential distortion in the measurement of shorter-run welfare measures of infra-marginal changes in attribute levels, on the one hand, for longer-run planning relevance on the other, could be preferable from an applied research perspective. We acknowledge this trade-off and, despite the plausibility and robustness of our econometric results reported in Section 6, nevertheless remain cognizant of the fact that the results are more reflective of the typical household's ideal, as opposed to what might be considered its more practical, residential preferences.

As mentioned in Section 1, socio-demographic information on household characteristics such as income and education levels, gender, and employment status (to name but a few) was collected for each participant in this study. Participants were also queried about a host of lifestyle characteristics, which as indicated in Figure 4 can be further categorized into location-specific and non-location-specific factors. Location-specific factors pertain to a household's current residential location, the number of years spent at this location, and the main reasons for having originally decided to reside there. Non-location-specific factors range from the number of motor vehicles and bicycles owned by the household to the household's views on residential amenities and disamenities, such as available sidewalks and bicycle lanes, traffic congestion, and land development. Our sample of the region's households and individuals within households is so large and dataset(s) so rich with potential control variables that we provide a separate appendix (Appendix A) devoted entirely to providing the reader with a flavor of household heterogeneity.

Table 2 provides the names, descriptions, and sample percentages for each of the socio-demographic variables included in our ensuing empirical analysis. The variables are associated with potential heterogeneous effects on the typical household's MWTP for the choice experiment's attributes and their respective levels taken from Table 1.[13] As indicated in

[12]Choice comparisons consisting solely of two alternatives are effectively immune from satisfying the restrictive Independence of Irrelevant Alternatives (IIA) assumption underscoring the MNL framework. Further, Hausman and McFadden (1984) advise that MNL models are appropriate when the alternatives are plausibly distinct and independently weighted in the eyes of the study's participants. Despite meeting these ameliorating conditions for estimating our data with an MNL model, we adopt the fully generalized ML model in order to retain the flexibility of estimating household-specific random parameters. As we show in Section 6.1, estimating these parameters in an ML framework generally improves the overall fit of the data.

[13]Because the Wasatch Front is classified as a single metropolitan region we do not control for jurisdictional differences across the region's cities and counties, e.g., in terms of provision of local public goods, that might otherwise influence households' residential preferences. See Ellickson (1971) for a theoretical perspective on how differences across metropolitan areas potentially influence these preferences, and Bayoh et al. (2006) for

Table 2, roughly three-quarters of the households included in our sample currently own their homes. The male-female split in our sample is roughly 50%-50%. Middle-aged and older participants make up almost 70% of the sample, and those households including a member with either a Bachelor, graduate, or post-graduate degree make up 65% of the sample. Roughly 65% of the sample is also either currently self-employed or working part- or fulltime, and only 6% classify as high-income households. The majority of households in our sample are middle-income. Further, 86% of the households are currently located in either an urban or suburban residential/commercial mix area, and just under three-quarters currently reside in a single-family, detached house.

Corresponding US Census data for the Wasatch Front region is also shown in Table 2, where respective percentages contained in the "Wasatch Front Census" column are population-weighted averages of the region's county-specific percentages (the corresponding county-specific percentages themselves are contained in Appendix Table B1).[14] As indicated in Table 2, our study's sample includes larger percentages of homeowners, middle-aged and older residents, and residents with Bachelors and graduate degrees relative to the Wasatch Front region as a whole. The sample also includes smaller percentages of high-income households as well as retirees and homemakers (i.e., non-participants in the labor force). Our empirical results should therefore be interpreted with these differences in mind.

Similar to Table 2, Table 3 provides the names, descriptions, and sample percentages for each of the lifestyle variables included in our ensuing empirical analysis. The variables are likewise associated with potential heterogeneous effects on the typical household's MWTP for the choice experiment's attributes and their respective levels. Corresponding to Figure 4, the lifestyle variables in Table 3 are categorized as either location- or non-location-specific. We see that the majority of the households in our sample reside in suburban areas, and housing cost was the most-cited primary reason for households choosing their current residential locations. More than half of sampled households agree or strongly agree with the statement that "a top transportation priority should be to promote infill land development and redevelopment", and less than half agree with the statements that "traffic congestion is just a way of life and something you learn to live with", and "I would be willing to pay higher taxes in order to build more sidewalks, trails, and bicycle lanes", respectively.

Because our sample includes homeowners and renters and the cost differential between the two groups is wide, we have chosen to divide the sample into two corresponding subsamples for the ensuing regression analyses. Table 4 compares the median self-reported housing costs for our two subsamples of homeowners and renters. It is important to note

an empirical estimation of the "flight from blight" suburbanization process that occurred in the Columbus, Ohio area in the mid-1990s.

[14] As indicated in Appendix Table B1, the percentages across the different Wasatch Front counties are generally uniform, with some exceptions. In specific, the rate of home ownership is slightly higher in Weber and Davis Counties than in Utah and Salt Lake Counties. Utah County has a relatively lower percentage of older residents and Weber County a lower percentage of residents with Bachelors and graduate degrees than the remaining three counties. Weber and Utah Counties have lower percentages of high-income households than Davis and Salt Lake Counties.

that homeowners' costs are denominated as once-off home values, while renters' costs are monthly rents, reflecting the wording of the House/Rental Cost attribute as presented to participants in the choice experiment (see Table 1). As indicated in Table 4, the subsample of homeowners is roughly three times the size of the renter subsample. The median home value reported by homeowners is \$200,000, while the median rental cost reported by renters is \$650 per month. The distributions of costs for the respective subgroups exhibit wide variations, as indicated by the relatively large standard deviations (Std. Dev.) and maximum and minimum values (Max / Min) in Table 4.[15]

Figure 5 displays the (log) home price and rental price distributions conditional on household income. We see that both distributions are slightly left-skewed. As expected, relatively more high- and medium-income households own homes and paid higher prices for their homes than lower-income households. The great majority of lower-income households rent and incur lower rental costs than medium- and higher-income renters.

For the ensuing empirical analysis presented in Section 6, we drop a total of 75 participant observations across the two sub-samples corresponding to (1) self-reported monthly rental costs less than \$50, and (2) self-reported home values less than \$20,000 and greater than \$10 million. These unlikely values betray potential measurement error. In addition, we drop a total of 101 observations corresponding to participants who answered either "other" or "prefer not to answer" when asked about their rental or homeowner status.

5 Theoretical and Empirical Models

Choice decisions in our experiment can be depicted by a random utility model (Hensher et al., 2015). The participant representing household i selects the alternative j in each choice comparison k that yields the highest utility level for the household, expressed as,

$$\max_{\mathbf{w}_{ijk}} U_{ijk}(\mathbf{w}_{ijk}) + \varepsilon_{ijk},\ i = 1, \ldots, N,\ j = 1, 2,\ k = 1, \ldots, 10. \tag{1}$$

Specifically, household i's utility $U_{ijk}(\mathbf{w}_{ijk})$ is a function of explanatory variables $\mathbf{w}_{ijk}$, where $j = 1, 2$ denotes that each choice comparison consists of two alternatives, $k = 1, \ldots, 10$ denotes that each participant is presented with 10 randomly provided choice comparisons, and a total of N households are represented in the choice experiment. Matrix $\mathbf{w}_{ijk}$ in turn consists of two sub-matrices, $\mathbf{x}_{ijk}$ and $(\mathbf{x}_{ijk} \times \mathbf{z}_{ijk})$, with $\mathbf{x}_{ijk}$ containing alternative-

[15] According to Moon and Miller (2018), the median Wasatch Front homeowner remains in his/her home for 12 years, implying an annual home-value equivalent of \$16,667, or approximately \$1,400 per month, which is more than double the monthly expense incurred by the median renter. By comparison, the median monthly mortgage payment made by Utah homeowners in 2012 (the year the UTS was conducted) was estimated to be \$1,460 (U.S. Census Bureau, 2012). It is also interesting to note that the median "purchase price-to-rent ratio" for our sample of homeowners and renters (calculated as the median home value divided by the median annual rent) is 25.64. This ratio is roughly in the middle of the Wasatch Front's lowest reported ratio of 20 (for West Valley City) and its highest reported ratio of 30.2 (for Salt Lake City) in 2017 (HomeArea.com, 2020).

specific attributes and their corresponding levels from Table 1 (including interactions among the different attributes in order to explicitly measure trade-offs existing among them), and $(\mathbf{x}_{ijk} \times \mathbf{z}_{ijk})$ containing household-specific socio-demographic and lifestyle variables taken from Tables 2 and 3 (denoted by matrix $\mathbf{z}_{ijk}$) interacted with a subset of attributes from $\mathbf{x}_{ijk}$ (the specific subset depending upon the particular regression equation being estimated).

Lastly, random component ε_{ijk} in equation (1) accounts for the econometrician's uncertainty in estimating household i's set of marginal utilities associated with matrices $\mathbf{x}_{ijk}$ and $(\mathbf{x}_{ijk} \times \mathbf{z}_{ijk})$. For estimation purposes, ε_{ijk} is assumed to be independently and identically distributed extreme value across all households and alternatives, and uncorrelated with matrices $\mathbf{x}_{ijk}$ and $(\mathbf{x}_{ijk} \times \mathbf{z}_{ijk})$. As pointed out by Williams and Ortúzar (1982), Hicks and Strand (2000), Louviere et al. (2005), and Guevara and Ben-Akiva (2006), to the extent that relevant attributes are included in, and irrelevant attributes are omitted from, the study's experimental design, this latter assumption of ε_{ijk} being uncorrelated with matrices $\mathbf{x}_{ijk}$ and $(\mathbf{x}_{ijk} \times \mathbf{z}_{ijk})$ is justifiable, i.e., under these conditions we can assume an absence of endogeneity in the empirical model that might otherwise bias estimates of the marginal utilities associated with $\mathbf{x}_{ijk}$ and $(\mathbf{x}_{ijk} \times \mathbf{z}_{ijk})$.

Within the ML framework we are able to control for preference heterogeneity in two dimensions. First, the coefficients associated with $\mathbf{x}_{ijk}$ are estimated as random parameters across individual households. Second, the coefficients associated with $(\mathbf{x}_{ijk} \times \mathbf{z}_{ijk})$ are estimated as constants. The first set of coefficients controls for latent, household-specific preference heterogeneity, while the second set identifies specific sources of the heterogeneity across different household types (Alpizar et al., 2003). Following Revelt and Train (1998) and Caplan et al. (2007), we specify the utility function in equation (1) in linear form,

$$U_{ijk}(\mathbf{w}_{ijk}) = \boldsymbol{\alpha}_i \mathbf{x}_{ijk} + \boldsymbol{\beta}(\mathbf{x}_{ijk} \times \mathbf{z}_{ijk}) + \varepsilon_{ijk}, \tag{2}$$

where matrix $\boldsymbol{\alpha}_i, i = 1, ..., N$, and vector $\boldsymbol{\beta}$ contain our empirical model's respective coefficient estimates. Specifically, $\boldsymbol{\alpha}_i$ represents the matrix of household-specific marginal utilities associated with the different attributes and attribute levels contained in Table 1, which in turn are represented by matrix $\mathbf{x}_{ijk}$. We assume that $\boldsymbol{\alpha}_i = \boldsymbol{\alpha} + \boldsymbol{\sigma}\boldsymbol{\nu}_i$, where $\boldsymbol{\alpha}$ represents a vector of constant mean coefficient estimates of $\boldsymbol{\alpha}_i$ (derived across households $i = 1, ..., N$ from an MNL specification of the model), $\boldsymbol{\sigma}$ denotes the vector of standard deviations of the corresponding attribute levels, and $\boldsymbol{\nu}_i$ is a vector of associated error terms, distributed standard normal (Hensher et al., 2015).[16] Vector $\boldsymbol{\beta}$ in equation (2) represents the average household's marginal utilities associated with the set of interaction terms included in matrix $(\mathbf{x}_{ijk} \times \mathbf{z}_{ijk})$. Equation (2) is estimated using the mlogit package for R (Croissant, 2020).

For future reference, we denote $\bar{\alpha}^c$ as the mean estimate of the marginal disutility of a 10% increase in Home/Rental Cost, and $\bar{\alpha}^a$ as the mean estimate of the marginal utility associated

[16] In line with the previous ML literature (c.f., Revelt and Train, 1998; Lusk and Schroeder, 2004), we assume that preferences for each attribute (except *Cost*) vary according to a normal distribution.

with attribute level a from Table 1 (each measured across their respective household-specific coefficient estimates contained in $\boldsymbol{\alpha}_i$). Similarly, coefficient β_z^c represents an estimate of the added marginal disutility of a 10% increase in Home/Rental Cost interacted with socio-demographic or lifestyle variable z, and β_z^a represents an estimate of the added marginal utility associated with the interaction between variable z and attribute level a.

Denoting the deterministic portion of equation (2) as V_{ijk}, i.e., $V_{ijk} = \boldsymbol{\alpha}_i \mathbf{x}_{ijk} + \boldsymbol{\beta}(\mathbf{x}_{ijk} \times \mathbf{z}_{ijk})$, the model defines household i's conditional choice probability for the first alternative, $j = 1$, in choice comparison k as,

$$p_{i1k}\left(\boldsymbol{\alpha}_i, \boldsymbol{\beta}\right) = \frac{e^{V_{i1k}}}{e^{V_{i1k}} + e^{V_{i2k}}} \tag{3}$$

where $p_{i1k}(\cdot)$ represents the conditional probability that household i ranks alternative 1 over alternative 2 in choice comparison k, and e is Euler's number (Rouwendal and Meijer, 2001).[17] Following Revelt and Train (1998), Rouwendal and Meijer (2001), and Hole (2007) the probability that household i ultimately makes the particular sequence of choices over the 10 choice comparisons conditional on knowing $\boldsymbol{\alpha}_i, i = 1, ..., N$, and $\boldsymbol{\beta}$ can be expressed as,

$$P_i\left(\boldsymbol{\alpha}_i, \boldsymbol{\beta}\right) = \prod_{k=1}^{10} p_{ij^*k}\left(\boldsymbol{\alpha}_i, \boldsymbol{\beta}\right), \tag{4}$$

where j^* represents the alternative ($j = 1$ or $j = 2$) actually chosen in choice comparison k.

The unconditional probability of the observed sequence of choices for household i is then conditional probability $P_i\left(\boldsymbol{\alpha}_i, \boldsymbol{\beta}\right)$ integrated over the distribution for $\boldsymbol{\alpha}_i$, with the $\boldsymbol{\beta}$ estimates effectively serving as constants of integration. This unconditional probability can be expressed as,

$$\mathcal{L}(\boldsymbol{\alpha}, \boldsymbol{\sigma}) = \int P_i\left(\boldsymbol{\alpha}_i, \boldsymbol{\beta}\right) f(\boldsymbol{\alpha}_i | \boldsymbol{\alpha}, \boldsymbol{\sigma}) d\boldsymbol{\alpha}_i, \tag{5}$$

where $f(\boldsymbol{\alpha}_i | \boldsymbol{\alpha}, \boldsymbol{\sigma})$ is household i's conditional density function for $\boldsymbol{\alpha}_i$, assumed standard normal via our previously stated distributional assumptions on $\boldsymbol{\nu}_i$. As Hole (2007) and Train (2009) show, this expression cannot be solved analytically across $i = 1, ..., N$, and is therefore approximated using simulation methods. The simulated log likelihood function, $\mathcal{LL}_S(\boldsymbol{\alpha}, \boldsymbol{\sigma})$, is expressed as,

$$\mathcal{LL}_S(\boldsymbol{\alpha}, \boldsymbol{\sigma}) = \sum_{i=1}^{N} \ln\left[\frac{1}{R}\sum_{r=1}^{R} P_i\left(\boldsymbol{\alpha}_i^r, \boldsymbol{\beta}\right)\right], \tag{6}$$

[17] In like fashion, household i's choice probability for the second alternative, $j = 2$, in choice comparison k is written as $p_{i2k}(\cdot) = 1 - p_{i1k}(\cdot) = \frac{e^{V_{i2k}}}{e^{V_{i1k}} + e^{V_{i2k}}}$.

where R is the number of replications for the simulation (in our case 500) and $\boldsymbol{\alpha}_i^r$ is the r^{th} draw from conditional density $f(\boldsymbol{\alpha}_i|\boldsymbol{\alpha}, \boldsymbol{\sigma})$.

Based upon previously defined $\bar{\alpha}^c$ and $\bar{\alpha}^a$, the marginal rate of substitution (MRS) of attribute level a with respect to a 10% increase in Home/Rental cost c can then be expressed as,[18]

$$MRS_{a,c} = -\frac{\bar{\alpha}^a}{\bar{\alpha}^c}. \tag{7}$$

For example, if attribute level a represents *House1* from Table 1, then $MRS_{a,c}$ measures the household's MRS (again, with respect to a 10% increase in Home/Rental Cost) for living in a neighborhood where a mixture of single-family detached houses (on 1/2 acre lots), townhomes, apartments, and condominiums are located within a half-mile of its home, as opposed to a neighborhood where the single-family houses are instead on 1/4 acre lots.

Further, using previously defined β_z^c and β_z^a, the associated MRS of attribute level a with respect to a 10% increase in Home/Rental cost c, adjusted to account for interaction term $(a \times z)$, is calculated as,

$$MRS_{az,c} = -\frac{\bar{\alpha}^a + \beta_z^a}{\bar{\alpha}^c + \beta_z^c}, \tag{8}$$

For example, if attribute level a again represents *House1* and demographic variable z represents *Highinc* from Table 2, then $MRS_{az,c}$ measures a high-income household's MRS for living in a neighborhood where a mixture of single-family detached houses (on 1/2 acre lots), townhomes, apartments, and condominiums are located within a half-mile of its home (again, as opposed to a neighborhood where the single-family houses are instead on 1/4 acre lots) relative to a low-income household's MRS for the same attribute level.[19]

To convert our respective MRS estimates to their corresponding marginal willingness-to-pay values we then multiply the respective MRS estimates in equations (7) and (8) by 10% of our sample's self-reported, median housing cost (denoted as $MHC_{10\%}$) from Table 4 (for homeowners and renters separately), resulting in,

$$MWTP_{a,c} = MRS_{a,c} \times MHC_{10\%}, \text{ and} \tag{9}$$

$$MWTP_{az,c} = MRS_{az,c} \times MHC_{10\%} \tag{10}$$

for attribute levels included in vector $\mathbf{x}_{ijk}$ and variables included in $(\mathbf{x}_{ijk} \times \mathbf{z}_{ijk})$, respectively.[20] In the Appendix, we describe an alternative method used to estimate $MWTP_{a,c}$ and $MWTP_{az,c}$. This method, which uses self-reported, continuous estimates of home values

[18] MRS can be calculated as the ratio of the two coefficients due to the linear-preference assumption expressed in equation (2). See Hensher et al. (2015) and Alpizar et al. (2003) for further details.

[19] Recall from Table 2 that low-income households are the baseline household income category for this study.

[20] Homeowners and renters self-reported their current home values and monthly rental costs, respectively, as part of a demographic survey conducted prior to administration of the choice experiment.

provided by each household, did not result in plausible marginal willingness-to-pay estimates for either our homeowner or renter subsamples. We discuss possible reasons for this result in Appendix C.[21] For future reference, we henceforth denote $MWTP_{a,c}$ simply as MWTP and $MWTP_{az,c}$ as DWTP, which denotes the differential in willingess-to-pay between the value of the interaction effect associated with variable z and that variable's reference level.

Given the relatively large number of different attributes and attribute levels chosen for this study, RSG's (2013) experimental design resulted in 200 different choice comparisons, and thus 200 degrees of freedom for our ensuing analysis (Hensher et al., 2015). Nevertheless, despite the apparently large degrees of freedom available for our regression analysis, we are precluded from estimating a single "giant" model that simultaneously includes all of the attribute levels and associated interaction terms. We therefore estimate separate regression models in Section 6.2 for each socio-demographic and lifestyle variable of interest, and in this way account for preference heterogeneity across household type for both homeowners and renters. For example, the gender variable *Female* from Table 2 is interacted with each attribute level from Table 1 in a model separate from the models interacting other attribute levels and socio-demographic/lifestyle variables for both homeowners and renters. Due to the large number of separate regression models we have been able to run with the data, specific empirical results for a selection of the interaction-term models are presented in the next section. The remainder of our empirical results are contained in Appendix D. We first present our results for "parsimonious" models of renter and homeowner preferences, followed by the interaction-term models.

6 Empirical Results

6.1 Parsimonious Models

We begin with a discussion of our results for the renter subsample, starting first with a benchmark parsimonious model, where none of the choice experiment's attributes' levels are interacted with renter socio-demographic and lifestyle variables. The parsimonious model provides baseline estimates that are later refined to account for heterogeneity among various household types.

Results are presented in Table 5, where, all else equal, a positive(negative) coefficient estimate for a given attribute indicates an increase(decrease) in the average respondent's utility level, i.e., that the attribute is favorable(unfavorable) relative to its base value. For comparison purposes, we present coefficient estimates for the MNL specification in column two and the ML specification in columns three through six. We note that the signs and statistical significance levels of the respective coefficient estimates are by-and-large the same across the two specifications, although the mean ML estimates in column three are generally

[21] Our empirical results using this method are available from the authors upon request.

larger in magnitude than the corresponding MNL estimates.[22] Although the MNL specification results in slightly lower AIC and BIC measures, the McFadden R^2 measures and Log Likelihood values favor the ML specification. In addition, the ML specification reports several statistically significant standard deviation measures in column four associated with the random parameter estimates (negative signs can be ignored). In light of these results we therefore advance the ML specification as our preferred modeling framework—all subsequent discussions pertain to ML model specifications.

The fifth column of Table 5 reports our MRS estimates for renters, calculated according to equation (7) from Section 5 using our mean ML coefficient estimates, with corresponding 95% confidence intervals calculated according to the Delta Method (Doob, 1935). These mean MRS measures are then converted to their corresponding MWTP values according to equation (9). As indicated in column six of Table 5, on average Wasatch Front renters exhibit MWTP values upwards of $30 per month to avoid commute distances of five to 20 miles or more to work, and to avoid traveling distances of 10 miles or more to local destinations. This MWTP value to avoid longer commute distances is more than twice the value renters obtain from living in less-congested neighborhoods, suggesting that Wasatch Front renters are implicitly willing to trade-off shorter commute distances for residing in less-congested neighborhoods. Renters are also willing to pay over $20 per month to live less than 10 miles from a transit stop for bus or rail, and to have access to a personal driveway or parking garage. All else equal, renters are willing to pay more to live in less-congested neighborhoods where single-family homes are situated on larger lots sizes and where streets are designed for mixed use of cars, bicyclers, and pedestrians.

It is interesting to note that each MWTP value for *Commute1–Commute3* is negative and becomes progressively more negative with longer commute distance. In fact, this same negative trend emerges for the variables measuring distance to transit (*Transit1–Transit3*) and local neighborhood destinations (*Dest1–Dest3*), as well as parking availability (*Park1* and *Park2*), where household utility is found to decrease when renters do not have access to a personal driveway or garage. In contrast, each MWTP value for *House1–House3* is positive and becomes progressively more positive with less-dense housing in a neighborhood.

As Table 5 reports, in terms of the ML model's summary and goodness-of-fit statistics, the renter subsample consists of roughly 6,700 observations. The likelihood ratio test indicates a statistically insignificant probability that all coefficients are simultaneously zero, and as is typical with logit regression models, the McFadden's R^2 measure is relatively low (17.6%) (McFadden, 1974).

Corresponding results from a parsimonious model specified for homeowners are reported in Table 6. Comparisons across the MNL and ML model specifications are essentially the

[22] The constant term for each specification equals one if the respondent chooses Option 1 in any given choice situation, zero otherwise (see Figure 3). This alternative-specific constant is included in order to account for potential idiosyncratic "left-hand choice bias", whereby, all else equal, respondents are neurologically drawn to choosing the first (left-hand) alternative in any given choice situation (Lebovich et al., 2019). The statistical insignificance of these coefficients suggests an absence of this bias in our sample of households.

same as those previously discussed for renters, leading us to similarly advance the ML specification as our preferred modeling framework for homeowners. We therefore proceed directly to our assessment of homeowner MWTP estimates from the ML specification. As pointed out in the table's footnotes, the MWTP estimates are converted from one-time payments to their monthly equivalents by first applying Moon and Miller (2018)'s estimate of the median number of years a Wasatch Front homeowner remains in his/her home—12 years—and then converting from years to months. As a result, homeowner one-time payments are divided by 144 to obtain their monthly equivalents.

As shown in column six of Table 6, Wasatch Front homeowners are willing to pay a monthly equivalent of almost \$90 to avoid having to commute more than 20 miles to work, and almost \$100 per month to avoid having to travel more than 10 miles to social amenities. They are also willing to pay an equivalent of over \$60 per month to be located less than 10 miles from a transit stop, and over \$190 per month for their own garage. Homeowners are willing to pay roughly \$50 per month to be located on a street designed for mixed use, and almost \$80 to reside in less-congested neighborhoods with half-acre lots and solely single-family homes. Interestingly, homeowners exhibit a slight preference for living in neighborhoods with half-acre lot sizes rather than one-acre lots. Further, homeowners' relatively large MWTP values for avoiding long distances associated with commuting to work and social amenities are outweighed only when the value obtained from residing in less-congested neighborhoods is combined with the value obtained from owning a garage. Thus, owning a garage is a crucial determinant of the implicit trade-off a typical Wasatch Front homeowner is willing to make between commuting distances and residing in a less-congested neighborhood.

Similar to renters, each MWTP value in Table 6 for *Commute1–Commute3* is negative and becomes progressively more negative with longer commute distance. The same negative trend emerges for the variables measuring distance to transit (*Transit1–Transit3*) and local neighborhood destinations (*Dest1–Dest3*), as well as parking availability (*Park1* and *Park2*). In terms of the ML model's summary and goodness-of-fit statistics, the homeowner subsample consists of roughly 19,500 observations. The likelihood ratio test indicates a statistically insignificant probability that all coefficients are simultaneously zero, and the McFadden's R^2 measure is roughly 20% (McFadden, 1974).

As these results suggest, residential preferences differ across homeowners and renters with respect to intensity rather than direction, e.g., while both homeowners and renters prefer living in neighborhoods composed of single-family residences on larger lot sizes, homeowner preferences for this attribute are stronger. For most attributes homeowners are willing to pay between two to five times more in monthly equivalent than renters. For having the option to park their vehicles in an attached garage, homeowners are willing to pay roughly seven times more than renters.

Although the two studies most closely related to ours—Bullock et al. (2011) and Rouwendal and Meijer (2001)—are based upon distinct household samples in terms of culture (the former was conducted in Ireland, the latter in The Netherlands) and, in the case of Rouwendal and Meijer (2001), a restricted population of Dutch workers, we can nevertheless compare our results concerning the value of reduced commuting distances. Unfortunately, Bullock et al. (2011)'s results do not lend themselves to MWTP calculations. However, the relative values of our coefficient estimates (i.e., our marginal-utility estimates) associated with the *Commute1–Commute3* and *Dest1–Dest3* attribute levels from the renter and homeowner models share some similarities with Bullock et al. (2011)'s. In particular, Bullock et al. (2011) find that the estimated marginal utilities associated with shorter commute times to work exceed those associated with residing within walking distance of social amenities (specifically with respect to shopping availability). The ratio of these two estimates range between 1.13 from an MNL specification using a subsample of households located in small villages to 2.55 from an ML specification using the study's entire sample of households. Based upon our coefficient estimates in Tables 5 and 6 for *Commute1* and *Dest1*, our corresponding ratio ranges from 1.08 for renters to 1.64 for homeowners.

Rouwendal and Meijer's (2001) MWTP estimates for a reduction in commuting time to work by one minute per trip equals roughly \$21 per month.[23] After converting our respective MWTP estimates of reduced commuting distances to their corresponding MWTP estimates for reduced commuting times, we find that Wasatch Front households are willing to pay far less per minute reduction than the households in Rouwendal and Meijer's (2001) sample. Based upon our MWTP estimate associated with attribute level *Commute1*, Wasatch Front homeowners are willing to pay slightly less than \$11 per month for a one-minute reduction in commuting time, while renters are willing to pay roughly \$3.30 for a one-minute reduction (our commuting time conversion factor is based upon estimates of 15 miles per commute and 21 minute commute times, for an average commuting rate of 1.4 minutes per mile (U.S. Department of Transportation, 2003; Bateman and Young, 2020).

A second comparison can be made between our results and estimated commuting-time marginal costs reported in the literature. Van Ommeren and Fosgerau (2009) estimate an average Dutch worker's marginal cost associated with one hour of commuting time at €17, which after adjusting for the exchange-rate differential and inflation converts to \$26.67, or roughly \$0.44 for an equivalent one minute of commuting time. If we assume a total of 40 commute trips are made each month (two trips per day × five days per week × four weeks per month), then on a monthly basis this amounts to a marginal cost of \$17.60. Similarly, Small (2012) estimate that the value of time for commute trips typically averages roughly one-half the mean gross wage rate. The mean hourly wage rate in the Wasatch Front during our study period was reported by U.S. Bureau of Labor Statistics (2020) as \$23.76. Dividing this hourly rate in half, and then by 60 results in a corresponding marginal cost estimate of roughly \$0.20 per minute, which when converted to its monthly equivalent equals \$8. These per-minute marginal cost estimates are in the ballpark of our previously mentioned MWTP

[23] We use Euronet Worldwide (2020) for exchange-rate conversions and the U.S. Inflation Calculator (2020) to adjust for inflation.

estimates of roughly \$11 and \$3.30 per month, respectively, for one-minute reductions in commute times for Wasatch Front homeowners and renters (which, as pointed out above, are themselves noticeably lower than that estimated by Rouwendal and Meijer (2001)).

Lastly, because our survey respondents—both renters and homeowners—may have suffered a "fatigue bias" by having participated in 10 separate choice situations, we tested for this bias by re-estimating the renter and homeowner parsimonious models using only the first five observations (i.e., choice situations) per respondent (which we henceforth call the "first-five regressions").[24] In addition to testing for fatigue bias, results from the first-five regressions serve as a convenient robustness check on the results from our original regressions. The results from the first-five regressions were qualitatively similar to those from our original regressions for both renters and homeowners, respectively, in terms of signs and statistical significance levels of the coefficients and their standard errors. However, the magnitudes of the coefficient estimates and corresponding MWTP estimates were consistently larger in the first-five regressions for renters and homeowners compared to our original MWTP estimates for these two groups. Results for the first-five regressions are included in Appendix E.

6.2 Heterogeneity Models

We divide this subsection into three sections according to Figure 4. Section 6.2.1 presents renter and homeowner results for the interaction effects between our socio-demographic variables and the choice experiment's respective attribute levels. Section 6.2.2 presents results for the interaction effects associated with our location-specific lifestyle variables, and Section 6.2.3 provides results associated with our non-location-specific lifestyle interaction effects. To save space, each of our empirical tables (located in the text and corresponding appendix) present results associated solely with the interaction-effect coefficient estimates and their corresponding MRS and DWTP values.[25] Further, in each section we have chosen to present empirical results for one interaction effect of interest, as well verbal descriptions of results for a smattering of different interaction effects. Empirical results for the full suite of our socio-demographic and lifestyle variables are included in Appendix D.

6.2.1 Socio-Demographic Effects

In Table 7, we see that among renters, middle-income households (*Medinc*) express an estimated DWTP value close to \$7 more per month than lower-income households to avoid having to park their vehicle(s) on the street or in a nearby lot. Middle-income renters also express DWTP of over \$11 per month more than lower-income households to avoid living 10 miles from the nearest rail station or bus stop. Among homeowners, Table 7 indicates that middle-income households express DWTP of approximately \$17 per month more than

[24]We thank an anonymous reviewer for recommending this approach to test for fatigue bias.

[25]The full results for our renter and homeowner interaction-effect models, which include estimates for the respective non-interacted attribute levels in each renter and homeowner model, are available from the authors upon request.

lower-income households to avoid a 10-to-20 minute commute to work, and surprisingly over $28 more per month to avoid a 5-to-10 minute commute. Middle-income homeowners also express DWTP of almost $23 more per month than lower-income homeowners for availability of driveway or garage parking. To the contrary, lower-income homeowners express DWTP of almost $22 more per month than middle-income homeowners to avoid living more than 10 miles from local destinations.[26] In general, therefore, we do not find uniform distinctions between middle- and low-income households. No clear patterns emerge concerning the values that middle-income renters and homeowners place on various residential attributes considered in our choice experiment vis-a-vis low-income renters and homeowners.

As shown in Appendix Table D1, more uniformity across renters and homeowners is found with respect to the gender of the respondent representing the household. Women in both renter and homeowner households express larger DWTP than men for driveway or garage parking (over $7 and $25 per month, respectively, to avoid off-street or monthly rental, and over $4 and $14 per month, respectively, to avoid on-street or free lot parking). Among homeowners, females also express higher DWTP than males to avoid 10-to-20-mile commutes to work and up to 10-mile commutes to local destinations, respectively.

Among the remaining socio-demographic interaction effects, we find the strongest distinctions among those households represented by a college graduate and including larger numbers of children, respectively. As shown in Appendix Table D4, both college-graduate renters and homeowners express higher DWTP, respectively, than corresponding non-college-graduate households to avoid longer commute distances to both work and local destinations. These differences are particularly large among college-graduate homeowners. Interestingly, DWTP estimates diverge between college-graduate homeowners and renters when it comes to the value of residing in less-densely populated neighborhoods. Whereas college-graduate renters express higher DWTP for less-dense housing than non-college-graduate renters, college-graduate homeowners express lower DWTP than their reference group of non-college-graduate homeowners. Lastly, college-graduate homeowners(renters) express higher(lower) DWTP for closer proximity to transit. These results suggest that relative to their respective non-college-graduate reference groups, college-graduate homeowners prefer a larger suite of amenities associated with higher-density housing than do college-graduate renters.

With respect to the role that the number of children plays in a household's valuation of residential amenities, Appendix Table D8 indicates that, regardless of whether the household is a renter or homeowner, as the number of children within the household increases its DWTPs for less-dense housing, driveway or garage parking, and distance from transit increase relative to households with fewer children. Interestingly, homeowners with more children under their roofs express larger DWTP for residing closer to local destinations,

[26] As shown in Appendix Table D5, the estimated DWTP values for high-income (*Highinc*) renters and homeowners are surprisingly large and generally lack statistical significance. This is likely the result of high-income households representing only 6% of all households in our sample (see Table 2). As a result, the high-income distinction does not generally add explanatory power to the distinction already established between middle- and lower-income households.

while renters with more children express lower DWTP. Renters with more children also express lower DWTP for shorter commute distance to work and streets designed for mixed use. There is slight evidence that homeowners with more children express larger DWTP for shorter commute distance to work, and mixed evidence regarding their DWTP for closer proximity to transit stops. In the end, therefore, it seems that households with more children prefer living in less-dense neighborhoods—and availing themselves of the amenities associated with lower density—than do households with fewer children.

Results for the remaining socio-demographic variables corresponding to age of respondent, employment status, and number of adults in household, are included in Appendix D.1. These additional results highlight the prevalence of socio-demographic heterogeneity present in our sample of Wasatch Front households.

6.2.2 Lifestyle Characteristics (Location-Specific Effects)

Perhaps our most compelling findings among the location-specific lifestyle interaction effects concerns households that have chosen to reside in urban rather than suburban or more-rural locations.[27] As shown in Table 8, urban renters and homeowners both express higher DWTP for more-dense housing than households residing in the suburbs or more-rural areas (as evidenced by homeowners' negative DWTP estimates for *House1*–*House3* and renters' negative MWTP estimates for *House2* and *House3*). In other words, urban households are not misplaced with respect to their preferences for housing density. Relatively speaking, urban homeowners also exhibit lower DWTP for longer commuting distances to work and local destinations, and higher DWTP for the availability of free parking on the street, closer proximity to transit, and multi-use street design. These values are also consistent with the urban household's choice to reside in an urban area.

As Table 9 indicates, we find some evidence that households that have resided at their current location for more than 10 years (*Longtime*) express lower DWTP for shorter commute distances to work than are households with less than 10 years of residence at their current locations. Longer-term homeowners also express lower DWTPs than shorter-term homeowners for shorter commute distances to local destinations and for driveway or garage parking, as well as for the least-dense housing option. Hence, with respect to commuting it seems that, all else equal, longer-term homeowners place less of a prerogative on shorter distances. Longer-term homeowners also express lower valuations for driveway/garage parking and the least-dense housing option.

Appendix D.2 contains our interaction-effect results for the remaining location-specific lifestyle characteristics associated with the main reasons households express for having chosen their current residential locations. For each of the reasons—commute distances, housing cost, proximity to family/friends, and living space—we find a smattering of statistically significant DWTP estimates across the various residential attributes included in our choice

[27] Results for the *Suburban* interaction effect are provided in Appendix Table D9.

experiment. These DWTP estimates generally align with our expectations concerning their signs and statistical significance. For example, renter and homeowner households that selected commuting distance to work or school as the primary reason for choosing their current residence express lower DWTP for longer commuting distances than households that did not list commuting distance as their primary reason. Similarly, households choosing housing cost as their primary reason are more (negatively) sensitive to higher housing costs (the coefficients estimated for attribute *Cost* are negative for both renters and homeowners). These consistency results mimic those obtained for households currently residing in urban areas.

6.2.3 Lifestyle Characteristics (Non-Location-Specific Effects)

Among the non-location-specific lifestyle characteristics listed in Table 3, number of motor vehicles owned by household (*#Vehicles*) and those households who either "strongly agree" or "agree" with the statement "traffic congestion is just a way of life and something you learn to live with" (*Attitude:Traffic* = 1) exhibit a plethora of statistically significant interactions with the study's residential attributes.

Table 10 presents our results for interaction effects with *#Vehicles*. We see that across both renters and homeowners, the more motor vehicles a household owns the lower its estimated DWTP for shorter commute distances to work and local destinations, as well as proximity to a transit stop, and the higher its DWTP for the availability of driveway/garage parking and lower-density housing. These results are as expected, but nevertheless evince the extent to which owning more motor vehicles correlates with a household's preferences for key residential attributes.[28]

Table 11 presents results for interaction effects with *Attitude:Traffic* = 1. Although we find no statistically significant interaction effects among renters, significant effects abound for homeowners. As anticipated, homeowners who at least agree with the statement that traffic congestion is a way of life express a lower DWTP for commuting distances to work, local destinations, and transit stops than homeowners who do not agree with the statement. There is also some evidence that *Attitude:Traffic* = 1 homeowners express higher DWTP for less-dense housing, but lower DWTP for driveway/garage parking. Similar to the previously discussed interaction effects, there is a consistency associated with the interactions of *Attitude:Traffic* among homeowners and the various residential attributes presented in our choice experiment. As expected, those homeowners who are most resigned to the belief that "traffic congestion as a way of life and something one learns to live with" are the same households that see less value in reduced commuting distances. Appendix D.3 contains the interaction-effect results for the remaining non-location-specific lifestyle characteristics.

[28]As shown in Appendix Table D15, the number of bicycles owned by homeowners is also highly correlated with a household's preference for neighborhoods with less-dense housing.

7 Summary and Conclusion

As mentioned in Section 1, this paper investigates residential preferences among homeowners and renters located in the Mountain West region of the US – in particular, heterogeneity in these preferences across different types of households. The choice experiment we have reported on is part of a larger survey of household travel behavior in the Wasatch Front region of Utah. This survey has furnished us with large samples of both homeowners and renters, as well as a rich set of socio-demographic and lifestyle controls enabling us to account for a wide variety of factors contributing to heterogeneity in residential preferences, with a higher degree of statistical power than is typically achieved in similar choice-experiment studies.

Our choice experiment was designed to elicit household preferences for ideal neighborhood characteristics, in particular for (1) commuting distances to work, (2) proximity to social amenities such as public transportation hubs, shopping, restaurants, and schools, (3) parking availability, (4) street design (e.g., primarily for car travel vs. more pedestrian friendly), and (5) neighborhood type (e.g., different lot sizes and mixtures of single- and multi-family residences). Housing cost was incorporated in the experiment by asking participants to value percentage changes in the prices they currently pay for their housing. We leveraged the participant's responses to obtain accurate and theoretically plausible estimates of a household's MWTP for various residential attributes and attribute levels included in our study. The method we adopt to convert the cost attribute measured in percentage terms to MWTP values denominated in dollars results in theoretically plausible estimates of household MWTP.

We find that on average Wasatch Front renters exhibit MWTP values upwards of $30 per month to avoid commute distances of five to 20 miles or more to work, and to avoid traveling distances of 10 miles or more to local destinations. This MWTP value to avoid longer commute distances is more than twice the value renters obtain from living in less-congested neighborhoods, suggesting that Wasatch Front renters are implicitly willing to trade-off shorter commute distances for residing in less-congested neighborhoods. Renters are also willing to pay over $20 per month to live less than 10 miles from a transit stop for bus or rail, and to have access to a personal driveway or parking garage. All else equal, renters are willing to pay more to live in less-congested neighborhoods where single-family homes are situated on larger lots sizes and where streets are designed for mixed use of cars, bicyclers, and pedestrians.

By comparison, Wasatch Front homeowners are willing to pay a monthly equivalent of almost $90 to avoid having to commute more than 20 miles to work, and almost $100 per month to avoid having to travel more than 10 miles to social amenities. They are also willing to pay an equivalent of over $60 per month to be located less than 10 miles from a transit stop, and over $190 per month for their own garage. Homeowners are willing to pay roughly $50 per month to be located on a street designed for mixed use, and almost $80 to reside in less-congested neighborhoods with half-acre lots and solely single-family homes. Interestingly, homeowners exhibit a slight preference for living in neighborhoods with half-acre lot sizes rather than one-acre lots. Further, homeowners' relatively large MWTP values for avoiding long distances associated with commuting to work and social amenities are outweighed only when the value obtained from residing in less-congested neighborhoods is combined with the value obtained from owning a garage. Thus, owning a garage is a crucial determinant of the implicit trade-off a typical Wasatch Front homeowner is willing to make between commuting distances and residing in a less-congested neighborhood.

As these results suggest, residential preferences differ across Wasatch Front homeowners and renters with respect to intensity rather than direction, e.g., while both homeowners and renters prefer living in neighborhoods composed of single-family residences on larger lot sizes, homeowner preferences for this attribute are stronger. For most attributes homeowners are willing to pay between two to five times more in monthly equivalent than renters. For having the option to park their vehicles in an attached garage, homeowners are willing to pay roughly seven times more than renters.

Controlling for a wide variety of socio-demographic interaction effects on the average household's MWTP for the different residential attributes— effects associated with household income, gender, age, and employment status of respondent, highest education level attained by a household member, number of adults and children comprising the household— we are able to quantify both expected and unexpected relationships in the data, and divergences between homeowners and renters. For example, while both middle-income renters and homeowners are willing to pay more than lower-income renters and homeowners, respectively, for driveway/garage parking, only the middle-income renters are willing to pay more for closer proximity to the nearest transit stop. Middle-income homeowners are willing to pay more(less) than their lower-income counterparts for shorter commute distances to work(local destinations).

Further, with respect to location-specific and non-location-specific lifestyle interaction effects—effects associated with the choice of urban or non-urban residential locations, number of years having resided in current location, main reason for having chosen current location, number of vehicles and bicycles owned, and attitudes about various aspects of residential development—we generally find consistency between the choices both renters and homeowners have actually made with those they indicate they would make under ideal circumstances. For example, urban households express higher willingness-to-pay than suburban and rural households to live in more-densely populated neighborhoods. Urban homeowners are also willing to pay more for closer proximity to the nearest transit stop and multi-use street design. Along these same lines, as both renters and homeowners acquire more motor vehicles the less they are willing to pay for shorter commuting distances to work, local destinations, and the nearest transit stop, and the more they are willing to pay for lower-density housing.

While in general they are not starkly different than results obtained in previous studies in different parts of the world, our basic, parsimonious empirical results nevertheless uncover key differences in residential preferences between homeowners and renters. Our quantitative estimates of these preferences provide urban and regional planners with precise monetary measures of the underlying attitudes of a sizable majority of the region's residents regarding ideal housing and neighborhood characteristics. In turn, these findings provide urban and regional planners with ample opportunities to design alternative neighborhood configurations that accommodate economic growth in our study area, the Wasatch Front of Utah.

As mentioned in Section 1, urban and regional planning strategies need to be aligned with the key determinants of residents' quality of life. To hone their models and designs, planners require information about quality-of-life determinants directly from the region's households; information obtained through surveys and experiments, such as the choice experiment we have analyzed in this paper. Since the Wasatch Front has been experiencing rapid and sustained growth during the past decade, it would seemingly make sense for the state of Utah to replicate within the next few years the Travel Study upon which this study is based. In this way, the findings from the present study might serve as a benchmark for how well urban and regional planning has kept pace with the evolution of residential preferences, and perhaps help identify how future planning efforts might improve to better accommodate those preferences.

There are several avenues for future research that could conceivably leverage our UTS choice-experiment data. One in particular pertains to testing Zuiches and Rieger's (1978) and Howell and Frese's (1983) twofold hypothesis concerning the size-of-place mobility process occurring over a household's life-cycle, i.e., the dynamic process through which "people come to like where they live". According to this hypothesis, (1) the main driver behind rural-urban migration is an individual's initial moves after leaving high school up until young adulthood, and (2) size-of-place preferences then determine the next move between young adulthood and adulthood. Although panel data is ideal for testing both parts of this hypothesis, our dataset can nevertheless shed light on the second part with respect to our particular study area. This is because the data includes information on each respondent's age, as well as current living arrangement. The extent to which respondents' preferences for different residential attributes correlates with their current living arrangements would then in turn suggest the extent to which they like where they live.

Compliance with Ethical Standards

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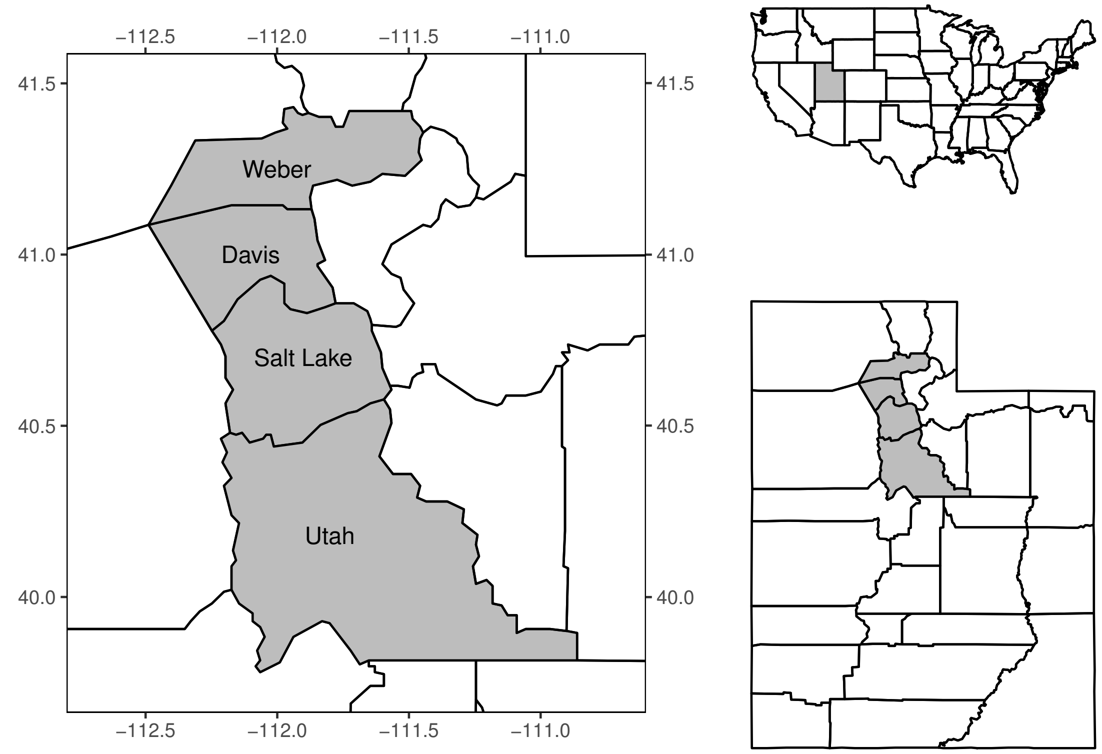
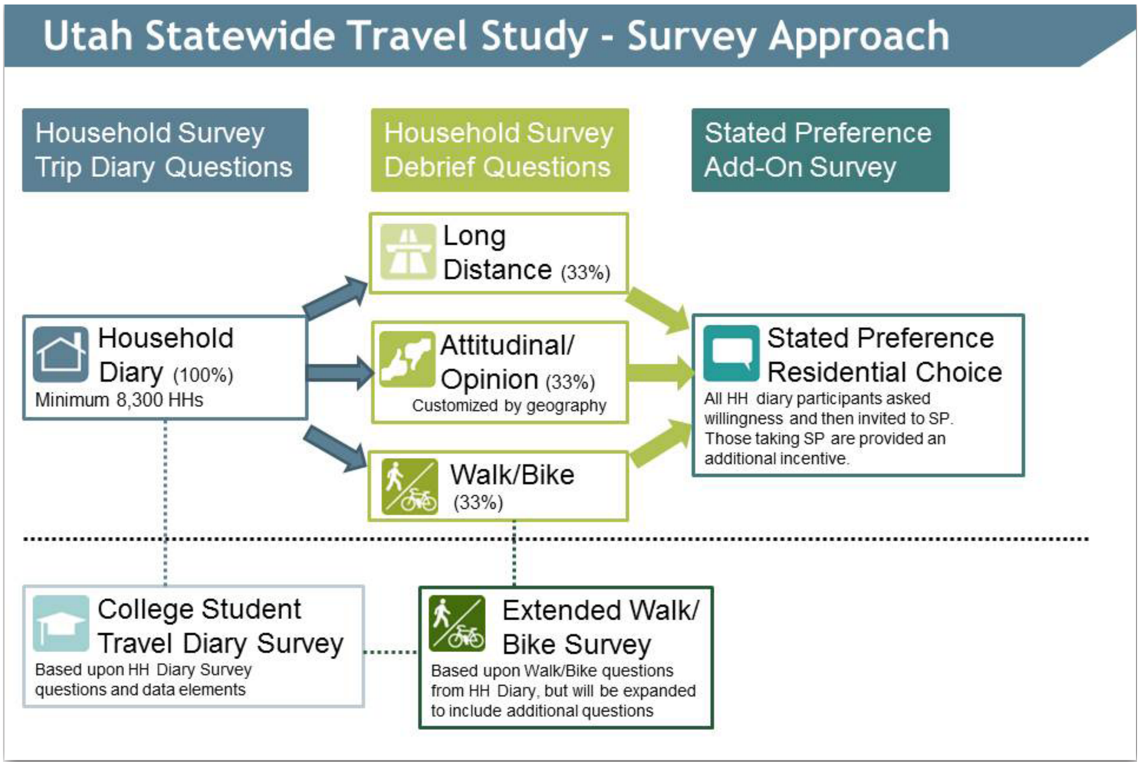
Figure 1: Utah's Wasatch Front region.



Notes: The Wasatch Front, Utah's largest metropolitan region, is located in the north-central part of Utah, and comprised of Weber, Davis, Salt Lake, and Utah Counties.

Figure 2: Survey approach for Utah Travel Study (UTS).



Source: RSG (2013)

Figure 3: Example choice comparison.

	Option 1	Option 2
Housing types within 1/2 mile of your home:	**Mix** of single family detached houses (on **1/2 acre** lots), townhomes, apartments, and condominiums	**Only single family houses** on **1/2 acre lots**
Distance from home to destinations such as shopping, restaurant, public library, school:	**Less than 10 miles**	**10+ miles**
Transit distance and type:	**Rail station and bus stop** are a **10-mile drive** from your home	**Rail station and bus stop** are a **10-mile drive** from your home
Street design:	Primarily for **cars**	**Cars, pedestrians, and bicycles**
Parking:	**On-street** or in a lot near your home (free parking)	**On-street** or in a lot near your home (free parking)
Distance to work:	**Less than 3 miles**	**10 miles**
Home prices compared to where you live now:	**10% more**	**20% less**
I prefer:	○	○

Source: RSG (2013)

Figure 4: Measures of household heterogeneity.

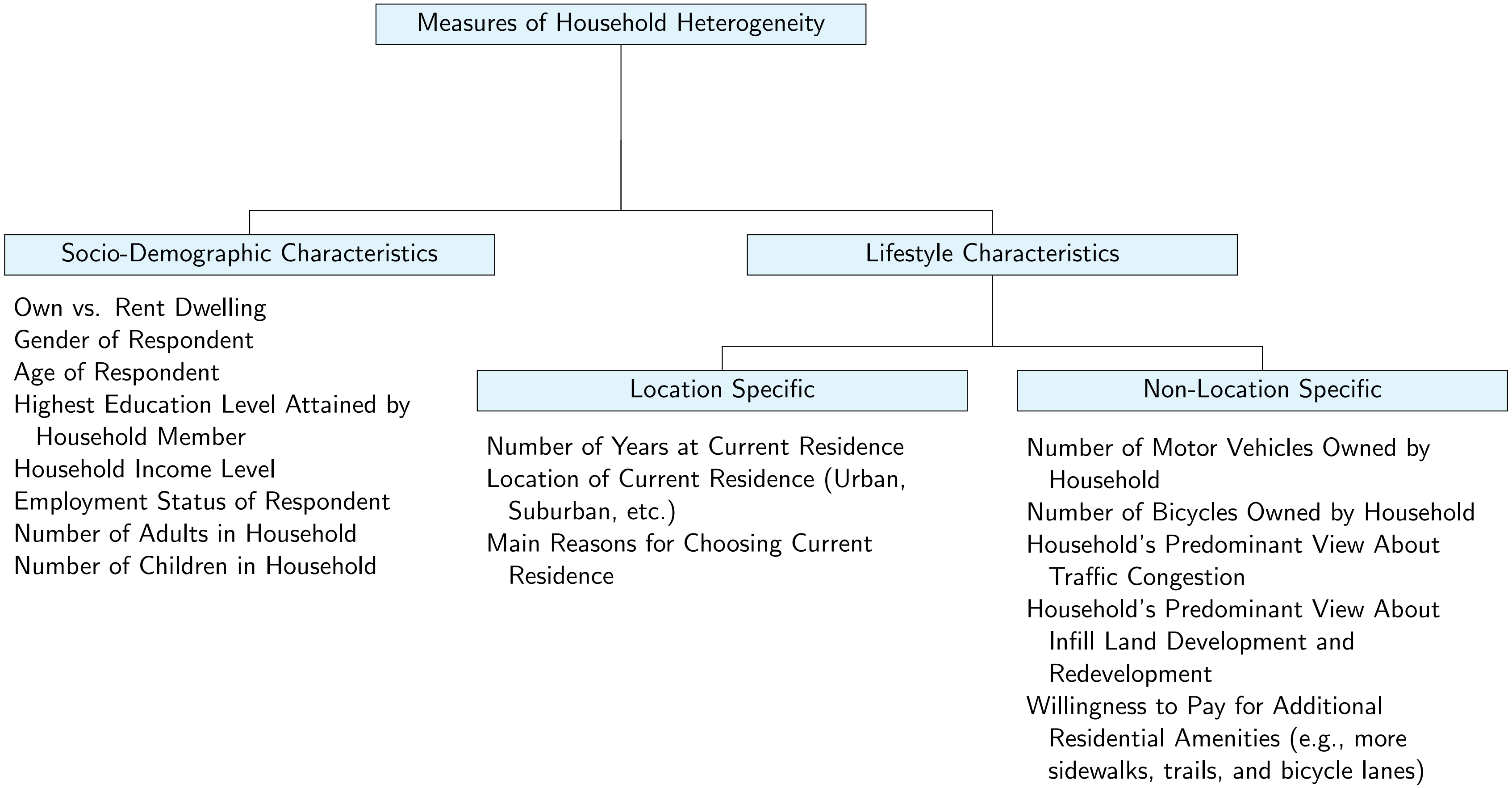
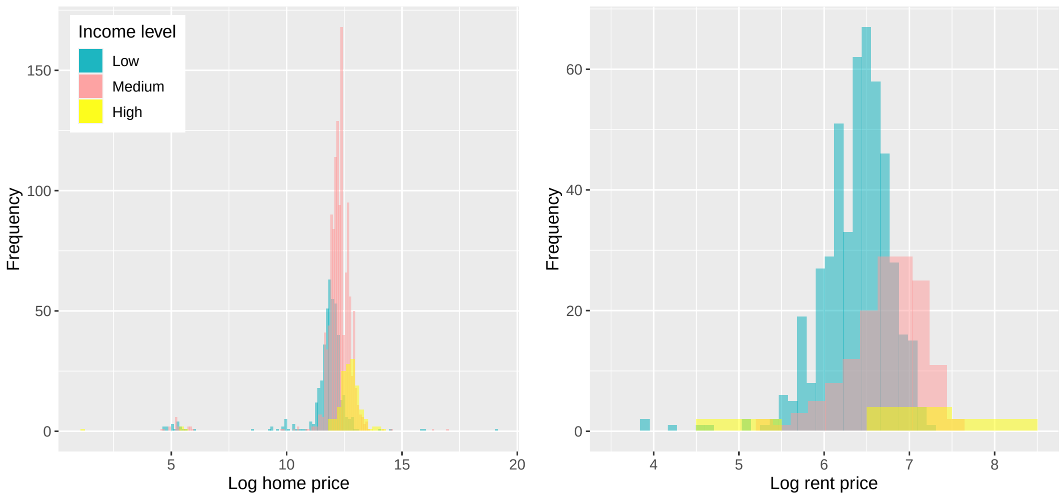


Figure 5: Distributions of log home price and rent price conditional on household income.



Notes: Low income level corresponds to annual income earned by a household member that is less than \$50,000. Medium income level corresponds to annual income earned by a household member that is between \$50,000 and \$150,000. High income level corresponds to annual income earned by a household member that is at least \$150,000.

Table 1: Choice experiment attributes and corresponding levels.

Housing Composition

- There is a mix of single-family detached houses (on 1/4 acre lots), townhomes, apartments, and condominiums within a half-mile of your home.
- There is a mix of single-family detached houses (on 1/2 acre lots), townhomes, apartments, and condominiums within a half-mile of your home (*House1*).
- There are only single-family houses on 1/2 acre lots within a half-mile of your home (*House2*).
- There are only single-family houses on 1+ acre lots within a half-mile of your home (*House3*).

Parking Availability

- Parking in your own driveway and/or garage.
- Parking on-street or in a lot near your home (free parking) (*Park1*).
- Parking is off-street (lot and/or garage) near your house (monthly rental) (*Park2*).*

Destinations

- Local destinations (such as shopping, a restaurant, a public library, and a school) are within walking distance of your home.**
- Local destinations (such as shopping, a restaurant, a public library, and a school) are within three miles of your home (*Dest1*).
- Local destinations (such as shopping, a restaurant, a public library, and a school) are within 10 miles of your home (*Dest2*).
- Local destinations (such as shopping, a restaurant, a public library, and a school) are within 10+ miles of your home (*Dest3*).

Proximity to Transit

- Rail station and bus stop are within walking distance of your home.
- Bus stop is within walking distance and rail station is five-mile drive from your home (*Transit1*).
- Rail station and bus stop are a five-mile drive from your home (*Transit2*).
- Rail station and bus stop are a 10-mile drive from your home (*Transit3*).

Street Design/Accessibility for Bicyclists and Pedestrians

- The streets are designed primarily for aut.
- The streets are designed to accommodate automobiles, pedestrians, and bicycles (*Street1*).

Proximity to Work

- Your one-way commute to work is less than three miles.
- Your one-way commute to work is between three and five miles (*Commute1*).
- Your one-way commute to work is between five and 10 miles (*Commute2*).
- Your one-way commute to work is between 10 and 20 miles or greater (*Commute3*).

Home/Rental Cost (*Cost*)

- Home prices/rent in this neighborhood are/is 20% less compared to your current neighborhood (-0.2).
- Home prices/rent in this neighborhood are/is 10% less compared to your current neighborhood (-0.1).
- Home prices/rent in this neighborhood are/is the same compared to your current neighborhood (0).
- Home prices/rent in this neighborhood are/is 10% more compared to your current neighborhood (0.1).
- Home prices/rent in this neighborhood are/is 20% more compared to your current neighborhood (0.2).

Notes: Abbreviated variable names are provided in parenthesis (in italics). Attribute levels without abbreviated variable names represent the baseline category. *Excluded from bullets three and four of the Housing Composition attribute. **Excluded from bullet four of the Housing Composition attribute.

Table 2: Demographic variable names, descriptions, and sample percentages.

Variable Name	Description	% of Sample	Wasatch Front Census
Own	=1 if household currently owns home, 0 otherwise.	74	69
Female	=1 if respondent is female, 0 otherwise.	49	50
Midage	=1 if respondent's age is between 35 and 54 years, 0 otherwise.	38	24
Old	=1 if respondent's age is 55 years or older, 0 otherwise.	28	18
Medinc	=1 if highest annual income earned by a household member is between $50,000 and $150,000, 0 otherwise.	52	56
Highinc	=1 if highest annual income earned by a household member is at least $150,000, 0 otherwise.	6	12
SomeColl	=1 if highest educated member of household has taken some college courses but not yet obtained a degree, or has taken some vocational courses, 0 otherwise.	22	26
Assoc	=1 if highest degree obtained by a household member is an Associates Degree, 0 otherwise.	9	10
Bach	=1 if highest degree obtained by a household member is a Bachelors Degree, 0 otherwise.	39	23
Grad	=1 if highest degree obtained a household member is a graduate or post-graduate degree, 0 otherwise.	26	12
Retired	=1 if household head is currently retired, 0 otherwise.	10	31
Hmkr	=1 if household head is currently a homemaker, 0 otherwise.	12	

Notes: Source of Wasatch Front Census data is U.S. Census Bureau (2019).

Table 3: Life-style variable names, descriptions, and sample percentages.

Variable Name	Description	% of Sample
Longtime	Number of years in current residence is greater than or equal to 11 years.	30
Urban	Type of current residence location is city, downtown with a mix of offices/apartments/shops or city, residential neighborhood.	32
Suburban	Type of current residence location is suburban neighborhood, with a mix of houses/shops/businesses or suburban neighborhood, with houses only.	54
CommuteDist	Primary reason that led to the choice of current residence is commute distance to job/school.	19
HomePrice	Primary reason that led to the choice of current residence is price of homes.	26
FamilyClose	Primary reason that led to the choice of current residence is proximity to family and/or friends.	11
MoreSpace	Primary reason that led to the choice of current residence is more living space.	10
Attitude:Traffic	Respondent either agrees or strongly agrees with the statement "traffic congestion is just a way of life and something you learn to live with."	43
Attitude:InfillLand	Respondent either agrees or strongly agrees with the statement "a top transportation priority should be to promote infill land development and redevelopment."	60
Attitude:Amenities	Respondent either agrees or strongly agrees with the statement "I would be willing to pay higher taxes in order to build more sidewalks, trails, and bicycle lanes."	42

Table 4: Median housing costs for homeowners and renters.

Subsample	Subsample Size	Median Cost ($)	Std. Dev. ($)	Max / Min ($)
Renters	671	650	300	2,500 / 50
Homeowners	1,948	200,000	284,208	8.4 mil / 21,500

Notes: Renters' costs are monthly rents paid, and homeowners' costs are denominated as once-off home values, reflecting the wording of the House/Rental Cost attribute as presented to participants in the choice experiment.

Table 5: Renter results (parsimonious model).

	MNL	ML		MRS	MWTP
		Mean	Std. Deviation		
Constant	0.022	0.010	—	—	—
	(0.028)	(0.038)	—	—	
Commute1	-0.101*	-0.192**	0.197	-0.071	-4.635
	(0.055)	(0.080)	(0.937)	(-0.128, -0.014)	
Commute2	-0.373***	-0.539***	-0.194	-0.201	-13.044
	(0.055)	(0.098)	(0.885)	(-0.258, -0.143)	
Commute3	-0.898***	-1.276***	-0.770*	-0.475	-30.875
	(0.054)	(0.175)	(0.463)	(-0.557, -0.393)	
Dest1	-0.120*	-0.178**	0.202	-0.066	-4.312
	(0.063)	(0.084)	(0.702)	(-0.128, -0.005)	
Dest2	-0.375***	-0.521***	0.791**	-0.194	-12.613
	(0.060)	(0.097)	(0.343)	(-0.256, -0.132)	
Dest3	-0.821***	-1.185***	1.162***	-0.441	-28.665
	(0.057)	(0.162)	(0.342)	(-0.523, -0.359)	
House1	0.269***	0.362***	-0.102	0.135	8.771
	(0.047)	(0.073)	(0.494)	(0.086, 0.184)	
House2	0.304***	0.419***	-0.723**	0.156	10.139
	(0.054)	(0.091)	(0.361)	(0.098, 0.214)	
House3	0.411***	0.604***	1.214***	0.225	14.604
	(0.057)	(0.108)	(0.329)	(0.159, 0.291)	
Park1	-0.645***	-0.894***	-0.522*	-0.333	-21.627
	(0.044)	(0.114)	(0.317)	(-0.391, -0.274)	
Park2	-0.832***	-1.125***	0.175	-0.419	-27.211
	(0.057)	(0.143)	(0.334)	(-0.492, -0.345)	
Street1	0.405***	0.569***	-0.090	0.212	13.761
	(0.039)	(0.084)	(0.285)	(0.164, 0.260)	
Transit1	-0.149**	-0.229***	0.127	-0.085	-5.544
	(0.060)	(0.086)	(0.372)	(-0.144, -0.026)	
Transit2	-0.367***	-0.527***	-0.157	-0.196	-12.743
	(0.060)	(0.101)	(0.397)	(-0.258, -0.134)	
Transit3	-0.619***	-0.853***	0.885**	-0.317	-20.636
	(0.062)	(0.125)	(0.372)	(-0.389, -0.246)	
Cost	-1.944***	-2.686***	—	—	—
	(0.133)	(0.355)	—	—	
Observations	6,710	6,710		—	—
AIC	7,722.527	7,724.845		—	—
BIC	7,838.320	7,942.808		—	—
McFadden R^2	0.173	0.176		—	—
Log Likelihood	-3,844.263	-3,830.423		—	—
LR Test	1,610.418*** (df = 17)	1,638.099*** (df = 32)		—	—

Notes: Estimation by maximum likelihood of the multinomial logit (MNL) and mixed logit (ML) models. Heteroskedasticity-robust standard errors in parenthesis. Marginal rate of substitution (MRS) and marginal willingness to pay (MWTP) estimates are computed from ML model. The 95% confidence intervals of MRS estimates are obtained using delta method. $^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$.

Table 6: Homeowner results (parsimonious model).

	MNL	ML		MRS	MWTP
		Mean	Std. Deviation		
Constant	0.021	0.020	—	—	—
	(0.017)	(0.020)	—	—	
Commute1	-0.065*	-0.120***	0.100	-0.108	-15.020
	(0.034)	(0.042)	(0.625)	(-0.184, -0.032)	
Commute2	-0.207***	-0.286***	-0.124	-0.257	-35.647
	(0.033)	(0.043)	(0.549)	(-0.334, -0.179)	
Commute3	-0.569***	-0.719***	-0.212	-0.645	-89.645
	(0.032)	(0.052)	(0.397)	(-0.767, -0.524)	
Dest1	-0.064*	-0.073	0.008	-0.065	-9.087
	(0.037)	(0.045)	(0.565)	(-0.144, 0.014)	
Dest2	-0.288***	-0.354***	0.155	-0.318	-44.167
	(0.035)	(0.045)	(0.279)	(-0.408, -0.228)	
Dest3	-0.631***	-0.796***	1.039***	-0.715	-99.319
	(0.034)	(0.056)	(0.156)	(-0.853, -0.577)	
House1	0.187***	0.217***	0.363	0.195	27.090
	(0.029)	(0.035)	(0.235)	(0.127, 0.263)	
House2	0.540***	0.632***	-0.545***	0.567	78.795
	(0.033)	(0.049)	(0.202)	(0.451, 0.684)	
House3	0.469***	0.627***	1.251***	0.563	78.160
	(0.034)	(0.053)	(0.156)	(0.443, 0.682)	
Park1	-1.071***	-1.337***	-0.114	-1.201	-166.774
	(0.027)	(0.065)	(0.188)	(-1.402, -0.999)	
Park2	-1.274***	-1.556***	0.346*	-1.397	-194.046
	(0.034)	(0.079)	(0.187)	(-1.638, -1.156)	
Street1	0.332***	0.402***	-0.159	0.361	50.181
	(0.024)	(0.033)	(0.153)	(0.281, 0.441)	
Transit1	-0.065*	-0.070	0.240	-0.063	-8.689
	(0.036)	(0.044)	(0.195)	(-0.138, 0.013)	
Transit2	-0.264***	-0.318***	0.007	-0.286	-39.658
	(0.036)	(0.045)	(0.222)	(-0.369, -0.202)	
Transit3	-0.415***	-0.501***	0.032	-0.450	-62.522
	(0.037)	(0.047)	(0.317)	(-0.553, -0.347)	
Cost	-0.869***	-1.114***	—	—	—
	(0.078)	(0.107)	—	—	
Observations	19,480	19,480		—	—
AIC	21,594.569	21,577.631		—	—
BIC	21,728.480	21,829.700		—	—
McFadden R^2	0.201	0.203		—	—
Log Likelihood	-10,780.280	-10,756.820		—	—
LR Test	5,439.639*** (df = 17)	5,486.576*** (df = 32)		—	—

Notes: Estimation by maximum likelihood of the multinomial logit (MNL) and mixed logit (ML) models. Heteroskedasticity-robust standard errors in parenthesis. Marginal rate of substitution (MRS) and marginal willingness to pay (MWTP) estimates are computed from ML model. The 95% confidence intervals of MRS estimates are obtained using delta method. The MWTP estimates are converted from one-time payments to their monthly equivalents by first applying Moon and Miller (2018)'s estimate of the median number of years a Wasatch Front homeowner remains in his/her home and then converting from years to months. *p<0.1; **p<0.05; ***p<0.01.

Table 7: Income-interaction results (medium income).

Attribute Level Interacted with *Medinc*	Renter			Homeowner		
	Coefficient	MRS	DWTP	Coefficient	MRS	DWTP
Commute1	0.085	0.031	1.986	-0.089	-0.086	-11.923
	(0.183)	(-0.099, 0.160)		(0.083)	(-0.243, 0.071)	
Commute2	-0.017	-0.006	-0.410	-0.212***	-0.206	-28.596
	(0.186)	(-0.138, 0.125)		(0.080)	(-0.374, -0.038)	
Commute3	-0.213	-0.077	-4.999	-0.129*	-0.126	-17.441
	(0.193)	(-0.212, 0.059)		(0.078)	(-0.279, 0.028)	
Dest1	0.214	0.077	5.020	0.018	0.018	2.469
	(0.214)	(-0.074, 0.228)		(0.091)	(-0.154, 0.190)	
Dest2	0.031	0.011	0.730	0.002	0.002	0.327
	(0.198)	(-0.128, 0.151)		(0.085)	(-0.159, 0.163)	
Dest3	0.231	0.083	5.410	0.163*	0.158	21.939
	(0.193)	(-0.052, 0.218)		(0.086)	(-0.010, 0.326)	
House1	0.164	0.059	3.856	-0.034	-0.033	-4.614
	(0.155)	(-0.050, 0.169)		(0.069)	(-0.164, 0.098)	
House2	0.158	0.057	3.704	0.002	0.002	0.281
	(0.180)	(-0.070, 0.184)		(0.079)	(-0.148, 0.152)	
House3	0.071	0.025	1.653	0.043	0.042	5.858
	(0.201)	(-0.116, 0.167)		(0.088)	(-0.126, 0.210)	
Park1	-0.285*	-0.103	-6.675	-0.040	-0.039	-5.441
	(0.156)	(-0.212, 0.007)		(0.067)	(-0.167, 0.089)	
Park2	-0.074	-0.027	-1.745	-0.174**	-0.168	-23.386
	(0.185)	(-0.158, 0.104)		(0.084)	(-0.336, -0.001)	
Street1	-0.147	-0.053	-3.436	0.072	0.070	9.735
	(0.134)	(-0.147, 0.041)		(0.057)	(-0.040, 0.180)	
Transit1	-0.285	-0.103	-6.675	0.077	0.075	10.410
	(0.196)	(-0.241, 0.036)		(0.088)	(-0.091, 0.240)	
Transit2	-0.056	-0.020	-1.309	-0.027	-0.026	-3.577
	(0.202)	(-0.163, 0.122)		(0.088)	(-0.194, 0.142)	
Transit3	-0.495**	-0.179	-11.610	-0.021	-0.020	-2.811
	(0.213)	(-0.327, -0.031)		(0.088)	(-0.188, 0.147)	
Cost	0.281	0.101	6.593	-0.122	-0.118	-16.390
	(0.440)	(-0.203, 0.406)		(0.191)	(-0.507, 0.271)	
Observations		6,710			19,480	
AIC		7,740.266			21,584.229	
BIC		8,067.211			21,962.332	
McFadden R^2		0.178			0.204	
Log Likelihood		-3,822.133			-10,744.110	
LR Test (df = 48)		1,654.679***			5,511.978***	

Notes: Estimation by maximum likelihood of the mixed logit (ML) model. *Medinc* is equal to 1 if income is between $50,000 and $150,000, and 0 otherwise. Heteroskedasticity-robust standard errors in parenthesis. Marginal rate of substitution (MRS) and differential in willingness to pay (DWTP) estimates are computed from ML model. The 95% confidence intervals of MRS estimates are obtained using delta method. The DWTP estimates for homeowners are converted from one-time payments to their monthly equivalents by first applying Moon and Miller (2018)'s estimate of the median number of years a Wasatch Front homeowner remains in his/her home and then converting from years to months. *p<0.1; **p<0.05; ***p<0.01.

Table 8: Location-interaction results (urban).

Attribute Level Interacted with *Urban*	Renter			Homeowner		
	Coefficient	MRS	DWTP	Coefficient	MRS	DWTP
Commute1	-0.121	-0.051	-3.308	-0.082	-0.100	-13.823
	(0.147)	(-0.174, 0.072)		(0.094)	(-0.332, 0.133)	
Commute2	-0.097	-0.041	-2.657	-0.190**	-0.230	-31.997
	(0.147)	(-0.162, 0.080)		(0.092)	(-0.463, 0.002)	
Commute3	-0.053	-0.022	-1.449	-0.270***	-0.328	-45.570
	(0.147)	(-0.144, 0.099)		(0.090)	(-0.580, -0.076)	
Dest1	-0.231	-0.097	-6.329	-0.101	-0.122	-16.990
	(0.168)	(-0.235, 0.041)		(0.105)	(-0.377, 0.132)	
Dest2	-0.136	-0.057	-3.716	-0.262***	-0.318	-44.098
	(0.156)	(-0.186, 0.072)		(0.101)	(-0.593, -0.042)	
Dest3	-0.152	-0.064	-4.171	-0.338***	-0.410	-56.956
	(0.158)	(-0.194, 0.066)		(0.100)	(-0.710, -0.110)	
House1	-0.064	-0.027	-1.743	-0.214***	-0.260	-36.061
	(0.127)	(-0.132, 0.078)		(0.080)	(-0.485, -0.035)	
House2	-0.506***	-0.213	-13.868	-0.557***	-0.676	-93.914
	(0.155)	(-0.342, -0.085)		(0.095)	(-1.059, -0.294)	
House3	-0.549***	-0.232	-15.059	-0.725***	-0.879	-122.100
	(0.174)	(-0.373, -0.090)		(0.105)	(-1.352, -0.407)	
Park1	0.166	0.070	4.558	0.287***	0.349	48.434
	(0.122)	(-0.032, 0.172)		(0.076)	(0.099, 0.598)	
Park2	0.234	0.099	6.410	0.140	0.170	23.630
	(0.152)	(-0.028, 0.225)		(0.096)	(-0.075, 0.416)	
Street1	0.090	0.038	2.480	0.140**	0.170	23.582
	(0.109)	(-0.051, 0.128)		(0.066)	(-0.010, 0.349)	
Transit1	0.159	0.067	4.359	0.011	0.014	1.893
	(0.160)	(-0.066, 0.200)		(0.101)	(-0.228, 0.255)	
Transit2	0.023	0.010	0.622	-0.017	-0.021	-2.894
	(0.160)	(-0.123, 0.142)		(0.101)	(-0.260, 0.219)	
Transit3	-0.207	-0.087	-5.677	-0.170*	-0.206	-28.565
	(0.169)	(-0.225, 0.051)		(0.100)	(-0.454, 0.043)	
Cost	0.680*	0.287	18.648	0.406*	0.492	68.351
	(0.358)	(-0.041, 0.615)		(0.222)	(-0.243, 1.227)	
Observations		6,710			19,480	
AIC		7,710.451			21,460.263	
BIC		8,037.396			21,838.366	
McFadden R^2		0.181			0.209	
Log Likelihood		-3,807.225			-10,682.130	
LR Test (df = 48)		1,684.494***			5,635.944***	

Notes: Estimation by maximum likelihood of the mixed logit (ML) model. *Urban* is equal to 1 if type of current residence location is city, downtown with a mix of offices/apartments/shops or city, residential neighborhood, and 0 otherwise. Heteroskedasticity-robust standard errors in parenthesis. Marginal rate of substitution (MRS) and differential in willingness to pay (DWTP) estimates are computed from ML model. The 95% confidence intervals of MRS estimates are obtained using delta method. The DWTP estimates for homeowners are converted from one-time payments to their monthly equivalents by first applying Moon and Miller (2018)'s estimate of the median number of years a Wasatch Front homeowner remains in his/her home and then converting from years to months. *p<0.1; **p<0.05; ***p<0.01.

Table 9: Number of years in current residence-interaction results (longtime).

Attribute Level Interacted with *Longtime*	Renter Coefficient	Renter MRS	Renter DWTP	Homeowner Coefficient	Homeowner MRS	Homeowner DWTP
Commute1	0.481	0.173	11.224	0.048	0.058	8.082
	(0.420)	(-0.122, 0.468)		(0.083)	(-0.138, 0.255)	
Commute2	1.191**	0.427	27.783	0.136*	0.165	22.848
	(0.490)	(0.091, 0.764)		(0.081)	(-0.041, 0.370)	
Commute3	0.319	0.114	7.429	0.119	0.144	19.943
	(0.435)	(-0.192, 0.420)		(0.078)	(-0.052, 0.339)	
Dest1	0.645	0.231	15.039	0.132	0.160	22.207
	(0.468)	(-0.094, 0.556)		(0.091)	(-0.064, 0.384)	
Dest2	0.623	0.224	14.541	0.190**	0.230	32.006
	(0.402)	(-0.056, 0.503)		(0.085)	(0.012, 0.448)	
Dest3	0.155	0.056	3.625	0.196**	0.237	32.963
	(0.434)	(-0.250, 0.361)		(0.086)	(0.018, 0.457)	
House1	0.167	0.060	3.886	0.021	0.025	3.482
	(0.355)	(-0.190, 0.309)		(0.069)	(-0.139, 0.190)	
House2	0.137	0.049	3.201	-0.128	-0.155	-21.576
	(0.424)	(-0.249, 0.347)		(0.080)	(-0.354, 0.044)	
House3	-0.137	-0.049	-3.193	-0.358***	-0.433	-60.122
	(0.470)	(-0.379, 0.281)		(0.090)	(-0.695, -0.171)	
Park1	0.349	0.125	8.141	0.119*	0.144	19.978
	(0.332)	(-0.108, 0.358)		(0.067)	(-0.027, 0.314)	
Park2	0.207	0.074	4.834	-0.034	-0.041	-5.732
	(0.397)	(-0.205, 0.354)		(0.084)	(-0.241, 0.158)	
Street1	-0.214	-0.077	-4.989	-0.026	-0.032	-4.456
	(0.300)	(-0.288, 0.134)		(0.058)	(-0.170, 0.105)	
Transit1	-0.113	-0.041	-2.639	0.079	0.096	13.351
	(0.437)	(-0.348, 0.267)		(0.089)	(-0.121, 0.313)	
Transit2	0.286	0.103	6.667	0.011	0.013	1.827
	(0.430)	(-0.200, 0.405)		(0.089)	(-0.199, 0.225)	
Transit3	-0.077	-0.028	-1.804	-0.085	-0.102	-14.231
	(0.501)	(-0.380, 0.324)		(0.088)	(-0.313, 0.108)	
Cost	0.615	0.221	14.337	0.500***	0.605	84.089
	(0.989)	(-0.469, 0.910)		(0.193)	(-0.031, 1.242)	
Observations		6,710			19,480	
AIC		7,740.827			21,573.300	
BIC		8,067.772			21,951.403	
McFadden R^2		0.178			0.205	
Log Likelihood		-3,822.413			-10,738.650	
LR Test (df = 48)		1,654.118***			5,522.907***	

Notes: Estimation by maximum likelihood of the mixed logit (ML) model. *Longtime* is equal to 1 if number of years in current residence is greater than or equal to 11 years, and 0 otherwise. Heteroskedasticity-robust standard errors in parenthesis. Marginal rate of substitution (MRS) and differential in willingness to pay (DWTP) estimates are computed from ML model. The 95% confidence intervals of MRS estimates are obtained using delta method. The DWTP estimates for homeowners are converted from one-time payments to their monthly equivalents by first applying Moon and Miller (2018)'s estimate of the median number of years a Wasatch Front homeowner remains in his/her home and then converting from years to months. *p<0.1; **p<0.05; ***p<0.01.

Table 10: Number of motor vehicles-interaction results.

Attribute Level Interacted with *#Vehicles*	Renter			Homeowner		
	Coefficient	MRS	DWTP	Coefficient	MRS	DWTP
Commute1	0.132	0.041	2.675	0.024	0.023	3.167
	(0.089)	(-0.015, 0.097)		(0.044)	(-0.061, 0.107)	
Commute2	0.161*	0.050	3.268	0.064	0.061	8.441
	(0.092)	(-0.005, 0.106)		(0.043)	(-0.020, 0.141)	
Commute3	0.225**	0.070	4.564	0.122***	0.116	16.115
	(0.096)	(0.013, 0.128)		(0.042)	(0.028, 0.205)	
Dest1	0.127	0.040	2.569	0.088*	0.084	11.606
	(0.099)	(-0.021, 0.100)		(0.047)	(-0.011, 0.178)	
Dest2	0.218**	0.068	4.419	0.116**	0.110	15.230
	(0.097)	(0.010, 0.126)		(0.045)	(0.013, 0.206)	
Dest3	0.310***	0.097	6.295	0.162***	0.154	21.334
	(0.103)	(0.036, 0.158)		(0.047)	(0.046, 0.262)	
House1	0.274***	0.086	5.566	0.130***	0.123	17.127
	(0.088)	(0.033, 0.139)		(0.038)	(0.035, 0.212)	
House2	0.207**	0.065	4.206	0.335***	0.317	44.097
	(0.092)	(0.009, 0.120)		(0.044)	(0.154, 0.481)	
House3	0.326***	0.102	6.614	0.463***	0.439	60.954
	(0.104)	(0.038, 0.165)		(0.052)	(0.221, 0.657)	
Park1	-0.228***	-0.071	-4.630	-0.222***	-0.211	-29.294
	(0.079)	(-0.121, -0.021)		(0.037)	(-0.330, -0.092)	
Park2	-0.288***	-0.090	-5.841	-0.198***	-0.187	-26.020
	(0.099)	(-0.152, -0.028)		(0.046)	(-0.308, -0.067)	
Street1	-0.053	-0.017	-1.079	-0.032	-0.030	-4.196
	(0.067)	(-0.057, 0.024)		(0.031)	(-0.089, 0.029)	
Transit1	0.093	0.029	1.896	0.021	0.020	2.721
	(0.094)	(-0.028, 0.086)		(0.047)	(-0.067, 0.106)	
Transit2	0.329***	0.103	6.673	0.138***	0.130	18.123
	(0.110)	(0.041, 0.164)		(0.048)	(0.032, 0.229)	
Transit3	0.362***	0.113	7.346	0.145***	0.138	19.143
	(0.111)	(0.050, 0.176)		(0.048)	(0.035, 0.241)	
Cost	0.159	0.050	3.225	-0.059	-0.056	-7.775
	(0.209)	(-0.069, 0.168)		(0.102)	(-0.268, 0.156)	
Observations		6,710			19,480	
AIC		7676.997			21358.228	
BIC		8003.942			21736.331	
McFadden R^2		0.185			0.213	
Log Likelihood		-3,790.498			-10,631.110	
LR Test (df = 48)		1,717.948***			5,737.979***	

Notes: Estimation by maximum likelihood of the mixed logit (ML) model. Heteroskedasticity-robust standard errors in parenthesis. Marginal rate of substitution (MRS) and differential in willingness to pay (DWTP) estimates are computed from ML model. The 95% confidence intervals of MRS estimates are obtained using delta method. The DWTP estimates for homeowners are converted from one-time payments to their monthly equivalents by first applying Moon and Miller (2018)'s estimate of the median number of years a Wasatch Front homeowner remains in his/her home and then converting from years to months. *p<0.1; **p<0.05; ***p<0.01.

Table 11: Traffic attitude-interaction results.

Attribute Level Interacted with *Attitude:Traffic*	Renter			Homeowner		
	Coefficient	MRS	DWTP	Coefficient	MRS	DWTP
Commute1	38.888	0.244	15.889	108.378***	0.392	54.413
	(52.751)	(-0.447, 0.935)		(24.874)	(-41.610, 42.393)	
Commute2	118.072	0.742	48.242	83.125***	0.300	41.734
	(89.685)	(-0.480, 1.964)		(26.232)	(-31.240, 31.841)	
Commute3	67.847	0.426	27.721	55.192**	0.200	27.710
	(60.852)	(-0.380, 1.233)		(21.572)	(-21.128, 21.527)	
Dest1	73.224	0.460	29.918	58.960**	0.213	29.602
	(73.170)	(-0.481, 1.401)		(26.960)	(-22.292, 22.718)	
Dest2	48.267	0.303	19.721	89.462***	0.323	44.916
	(60.281)	(-0.492, 1.099)		(26.159)	(-34.381, 35.027)	
Dest3	51.381	0.323	20.994	125.183***	0.453	62.850
	(70.614)	(-0.591, 1.237)		(25.711)	(-47.487, 48.392)	
House1	16.558	0.104	6.765	38.345*	0.139	19.252
	(53.380)	(-0.571, 0.779)		(22.554)	(-14.774, 15.051)	
House2	-16.994	-0.107	-6.943	75.318***	0.272	37.815
	(57.990)	(-0.817, 0.604)		(23.037)	(-28.807, 29.352)	
House3	-67.363	-0.423	-27.524	17.864	0.065	8.969
	(94.114)	(-1.590, 0.743)		(20.772)	(-7.347, 7.476)	
Park1	69.334	0.436	28.329	-96.957***	-0.350	-48.679
	(59.750)	(-0.355, 1.227)		(27.418)	(-37.488, 36.787)	
Park2	-5.627	-0.035	-2.299	-40.425	-0.146	-20.296
	(71.514)	(-0.916, 0.845)		(32.132)	(-15.853, 15.561)	
Street1	-24.939	-0.157	-10.190	-20.697	-0.075	-10.391
	(50.408)	(-0.779, 0.465)		(16.797)	(-8.393, 8.244)	
Transit1	-25.667	-0.161	-10.487	-32.527	-0.118	-16.331
	(78.306)	(-1.144, 0.821)		(24.976)	(-13.712, 13.477)	
Transit2	-86.440	-0.543	-35.318	-32.656	-0.118	-16.395
	(76.842)	(-1.549, 0.463)		(27.735)	(-13.458, 13.222)	
Transit3	-12.588	-0.079	-5.143	-64.745**	-0.234	-32.506
	(71.680)	(-0.960, 0.801)		(28.089)	(-25.265, 24.797)	
Cost	-159.451	-1.002	-65.149	153.190***	0.554	76.912
	(192.759)	(-3.635, 1.630)		(49.028)	(-52.752, 53.860)	
Observations		280			840	
AIC		324.264			900.261	
BIC		498.734			1,127.464	
McFadden R^2		0.411			0.308	
Log Likelihood		-114.132			-402.130	
LR Test (df = 48)		158.983***			357.706***	

Notes: Estimation by maximum likelihood of the mixed logit (ML) model. *Attitude:Traffic* is equal to 1 if respondent either agrees or strongly agrees with the statement "traffic congestion is just a way of life and something you learn to live with." Heteroskedasticity-robust standard errors in parenthesis. Marginal rate of substitution (MRS) and differential in willingness to pay (DWTP) estimates are computed from ML model. The 95% confidence intervals of MRS estimates are obtained using delta method. The DWTP estimates for homeowners are converted from one-time payments to their monthly equivalents by first applying Moon and Miller (2018)'s estimate of the median number of years a Wasatch Front homeowner remains in his/her home and then converting from years to months. *p<0.1; **p<0.05; ***p<0.01.

Appendix

A Description of Household Characteristics in the Choice Experiment Data

Figure A1: Distribution of years in current residence.

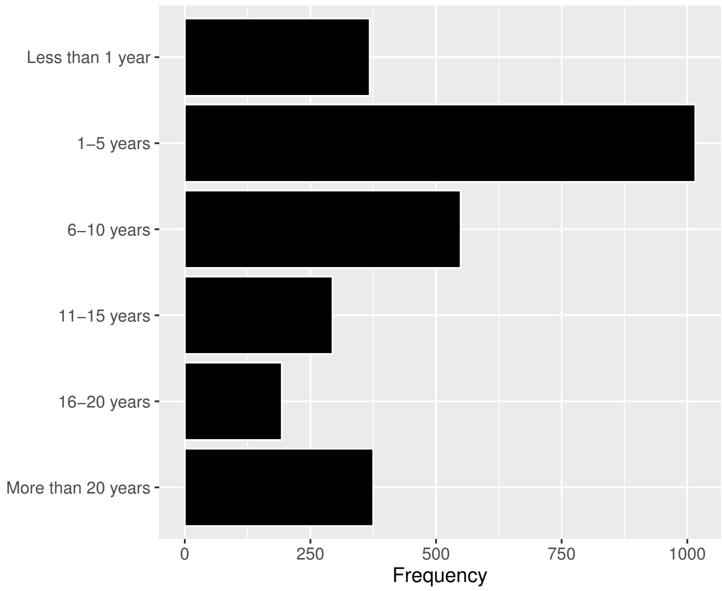


Figure A2: Distribution of residence location.

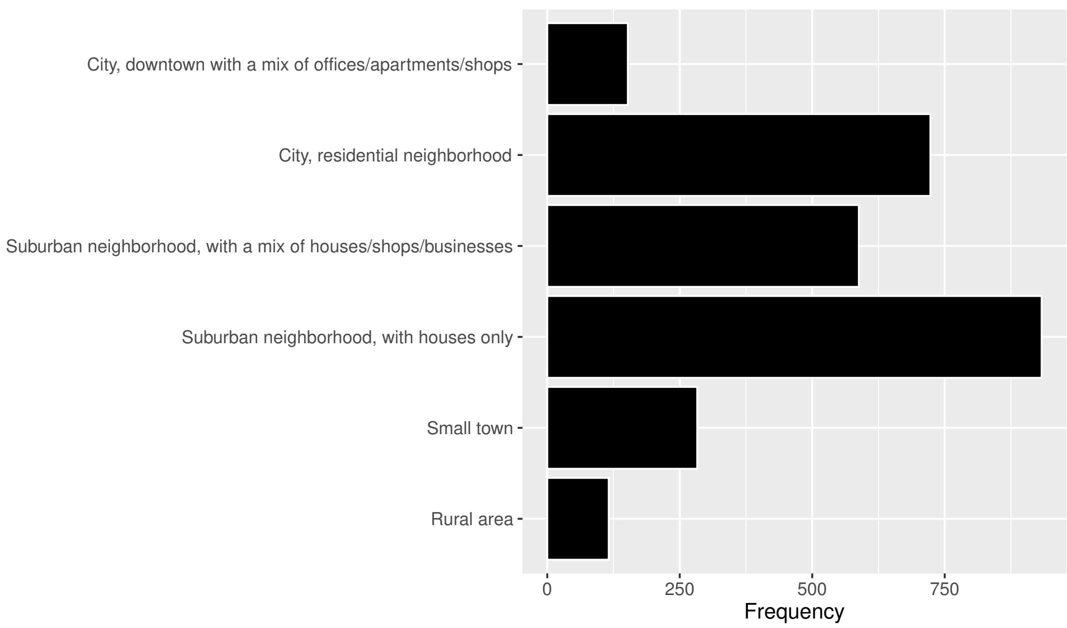


Figure A3: Distribution of primary reasons that led to current residence choice.

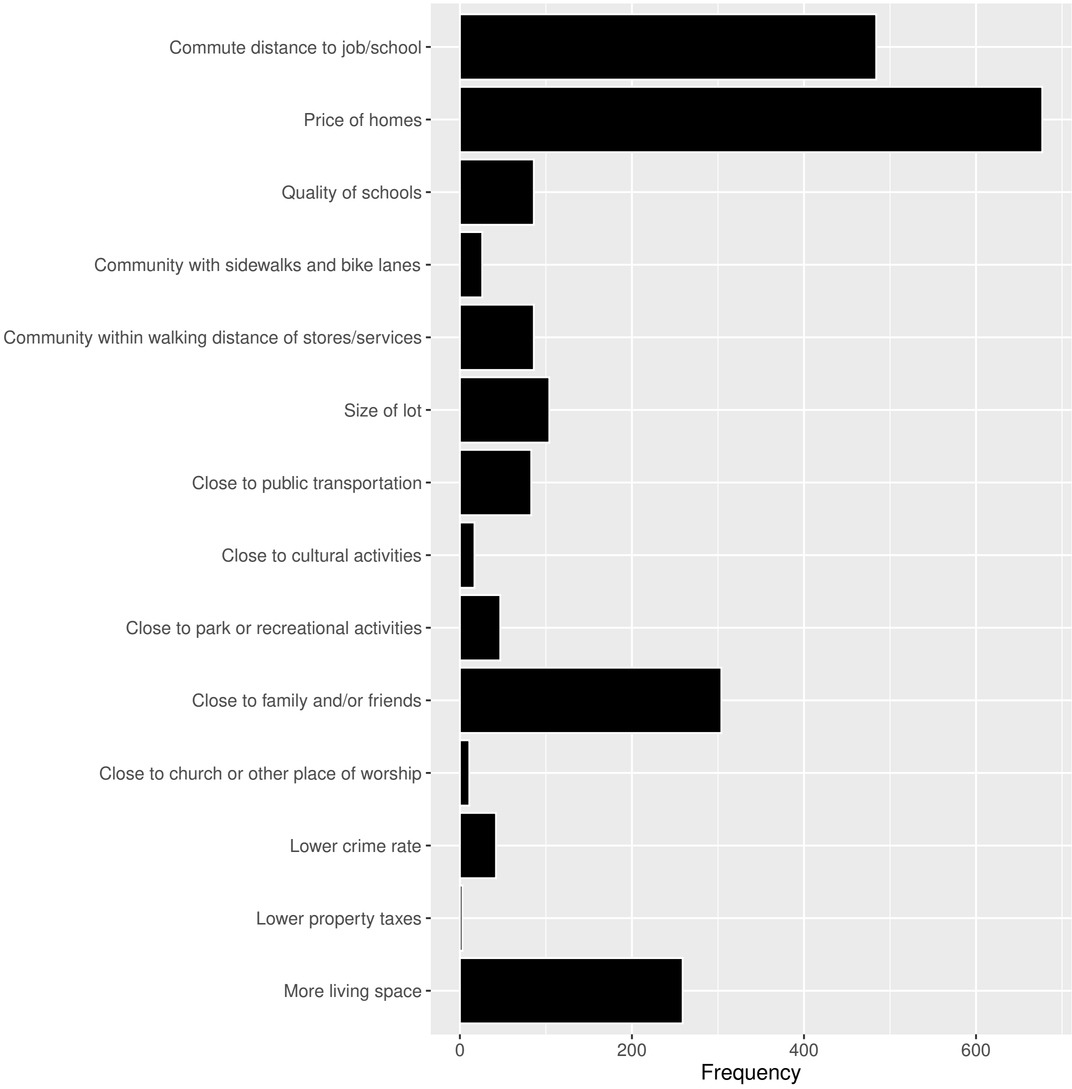


Figure A4: Distribution of number of adults in household.

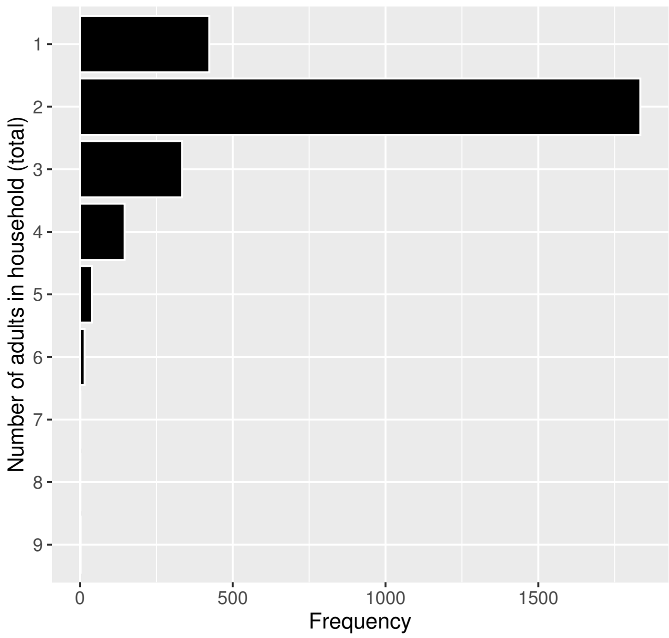


Figure A5: Distribution of number of children in household.

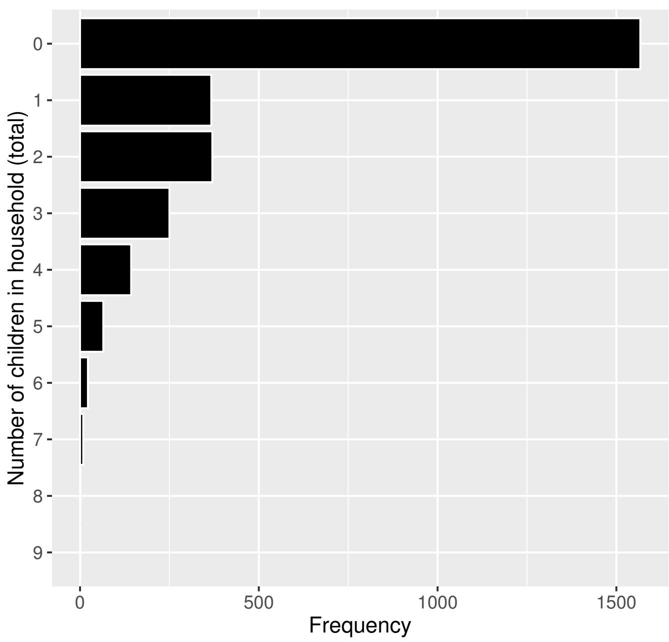


Figure A6: Distribution of number of motorized vehicles in household.

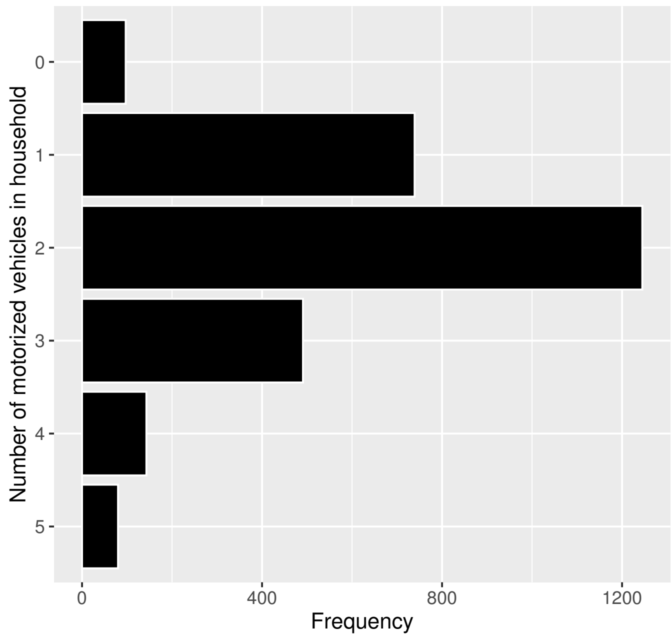


Figure A7: Distribution of adult and children's bikes in household.

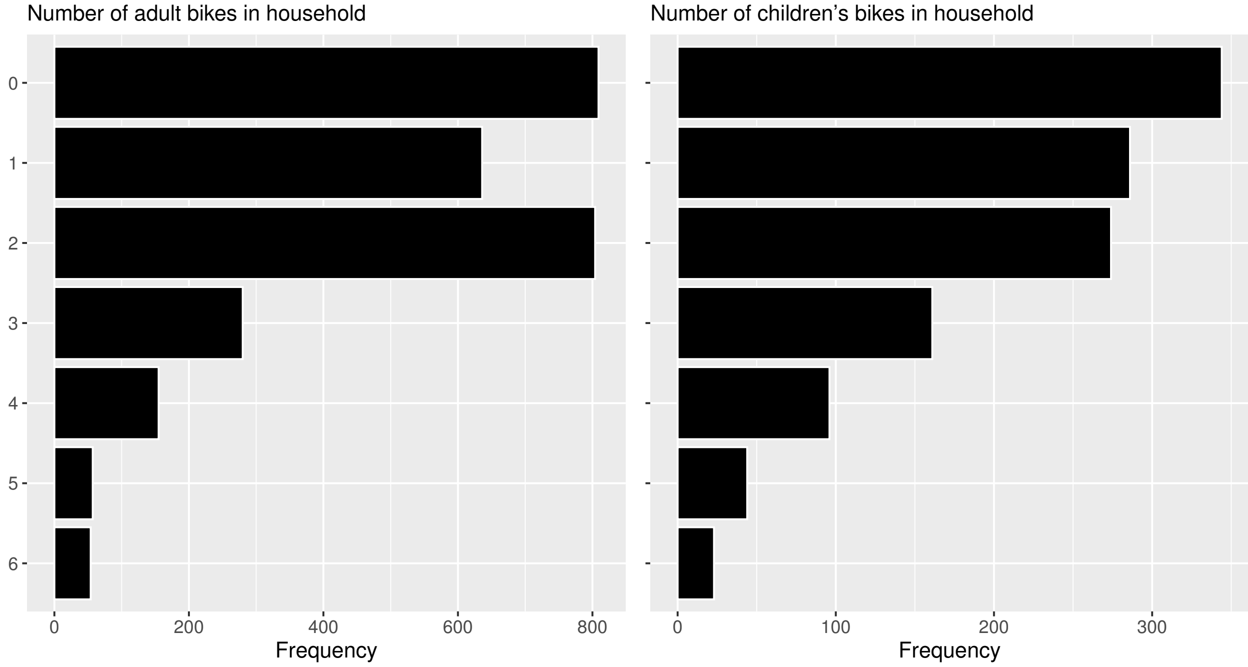


Figure A8: Distribution of typical commute mode to work (assuming individual is employed and commute >1/month).

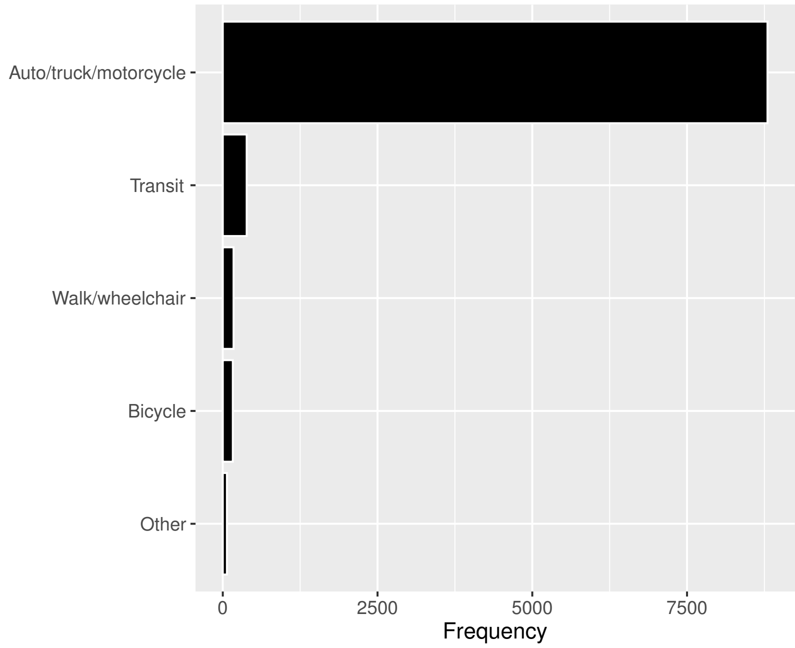


Figure A9: Distribution of ride transit frequency.

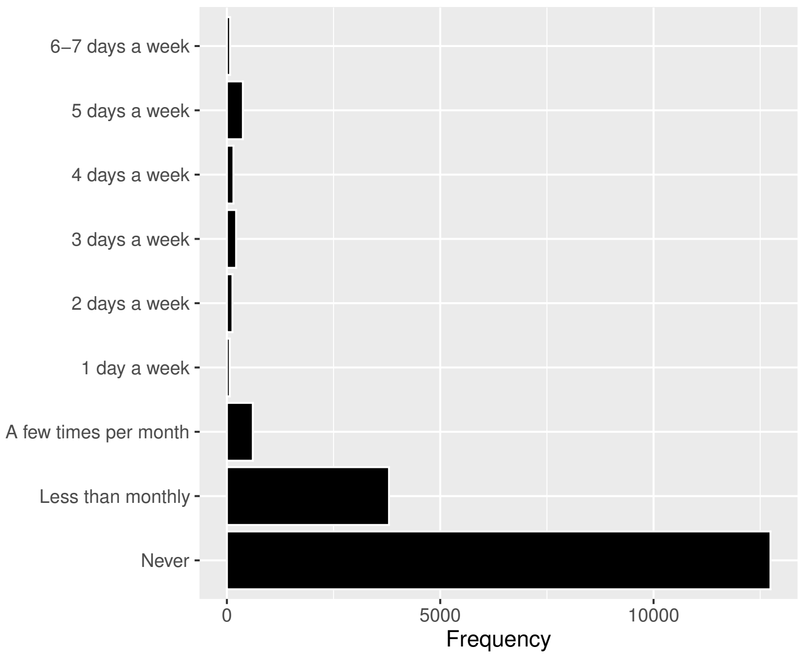


Figure A10: Distribution of attitude: Traffic congestion is just a way of life and something you learn to live with.

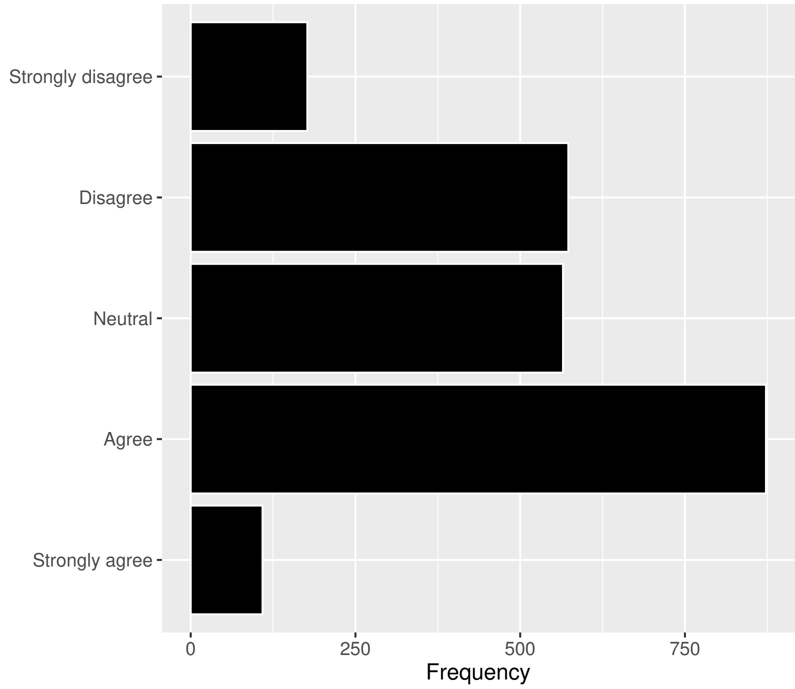


Figure A11: Distribution of attitude: When gas prices exceeded \$4/gallon, I carpooled, took transit, and otherwise reduced my driving.

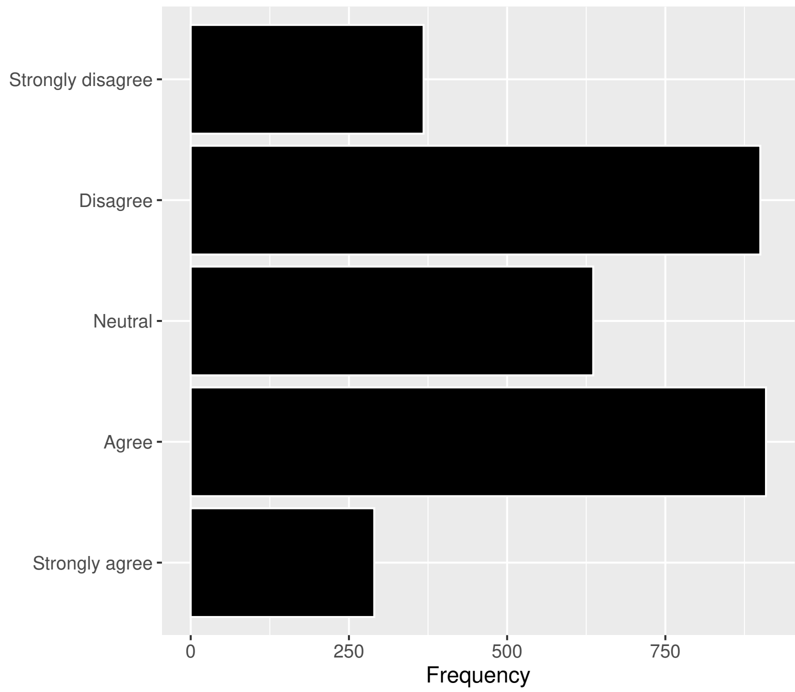


Figure A12: Distribution of attitude: A top transportation priority should be to promote infill land development and redevelopment.

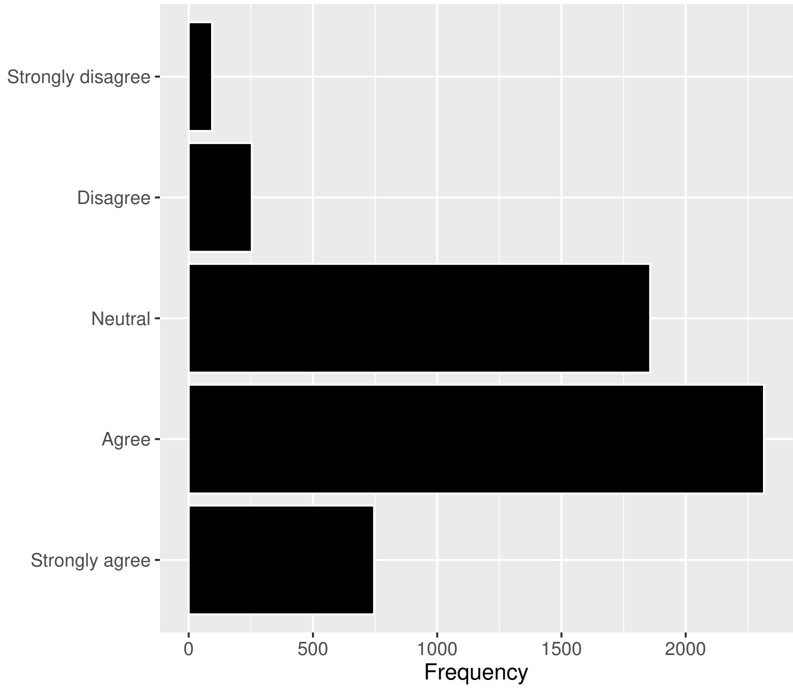


Figure A13: Distribution of attitude: I would be willing to pay higher taxes in order to build a transportation system that resulted in less traffic congestion.

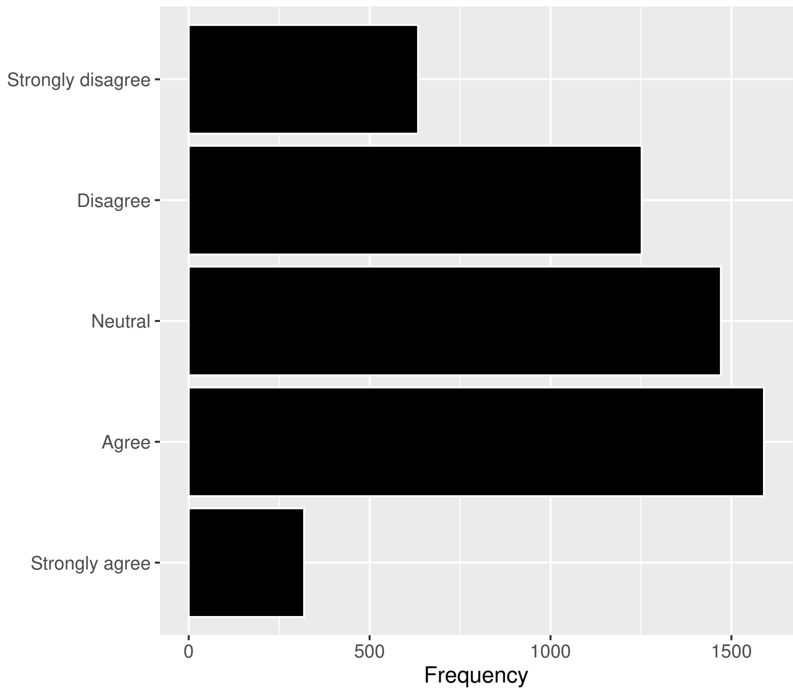


Figure A14: Distribution of attitude: I would be willing to pay higher taxes in order to build more sidewalks, trails, and bicycle lanes.

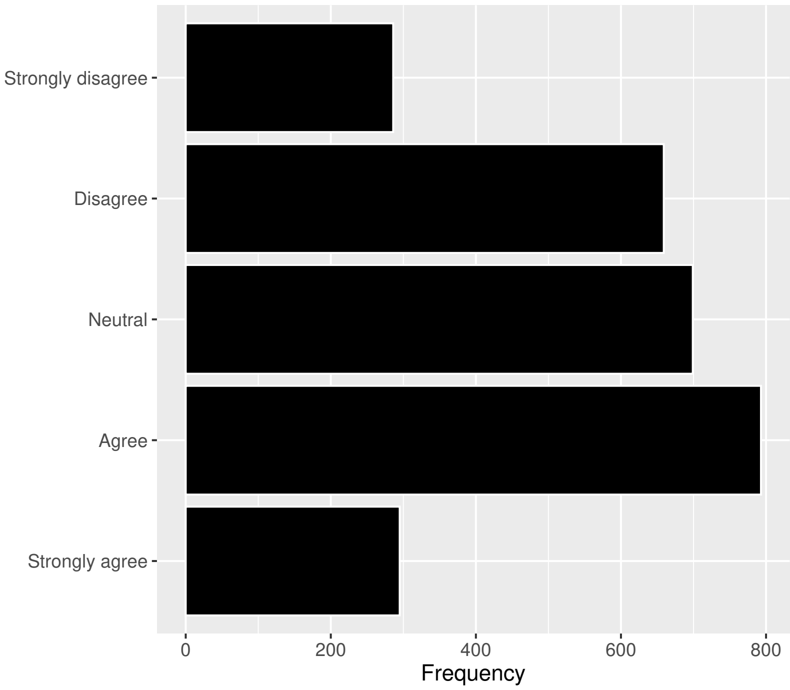


Figure A15: Distribution of years in current residence conditional on primary reason that led to current residence choice.

Figure A16: Distribution of current residence location conditional on respondent education.

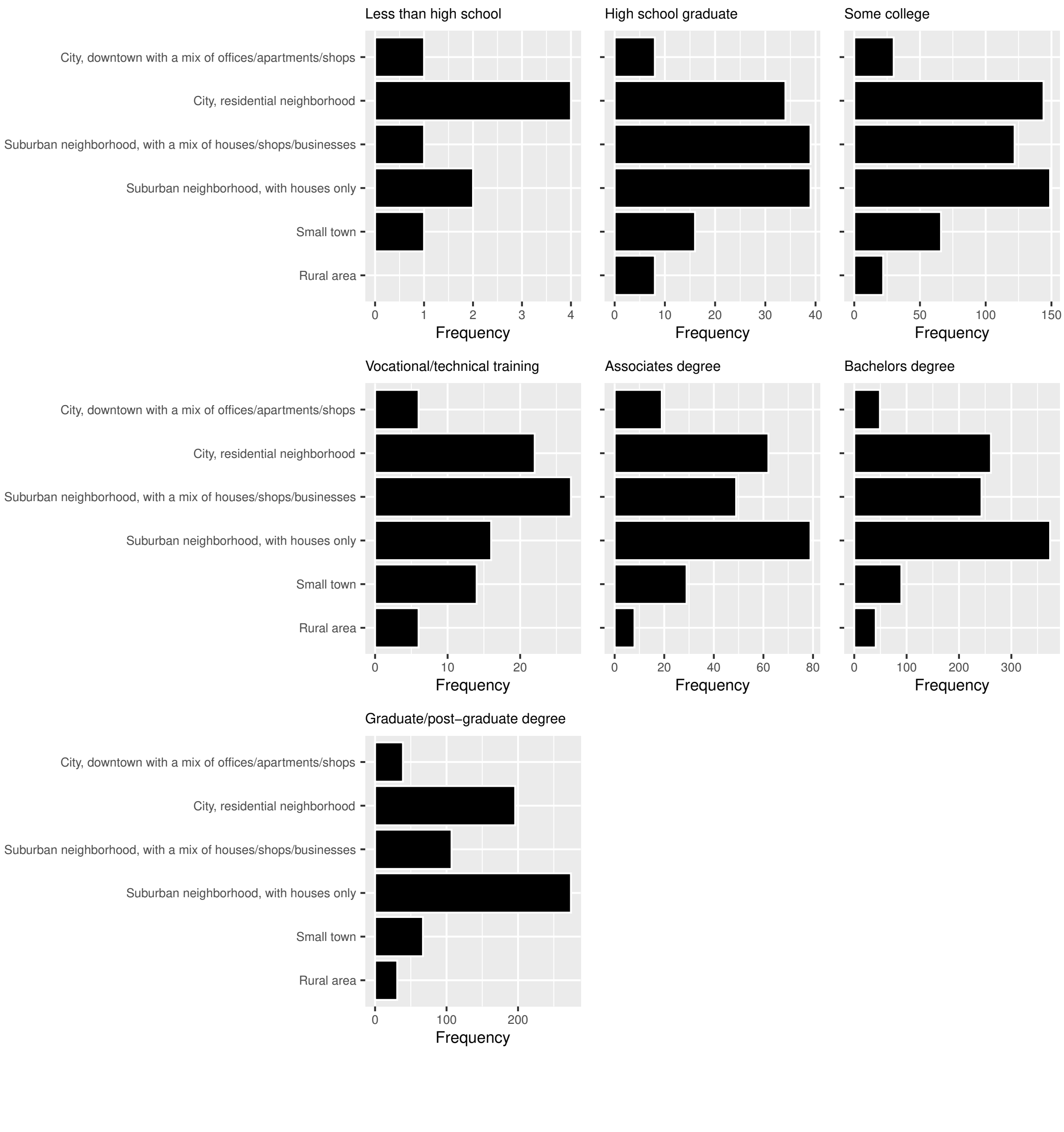


Figure A17: Distribution of respondent education conditional on ride transit frequency.

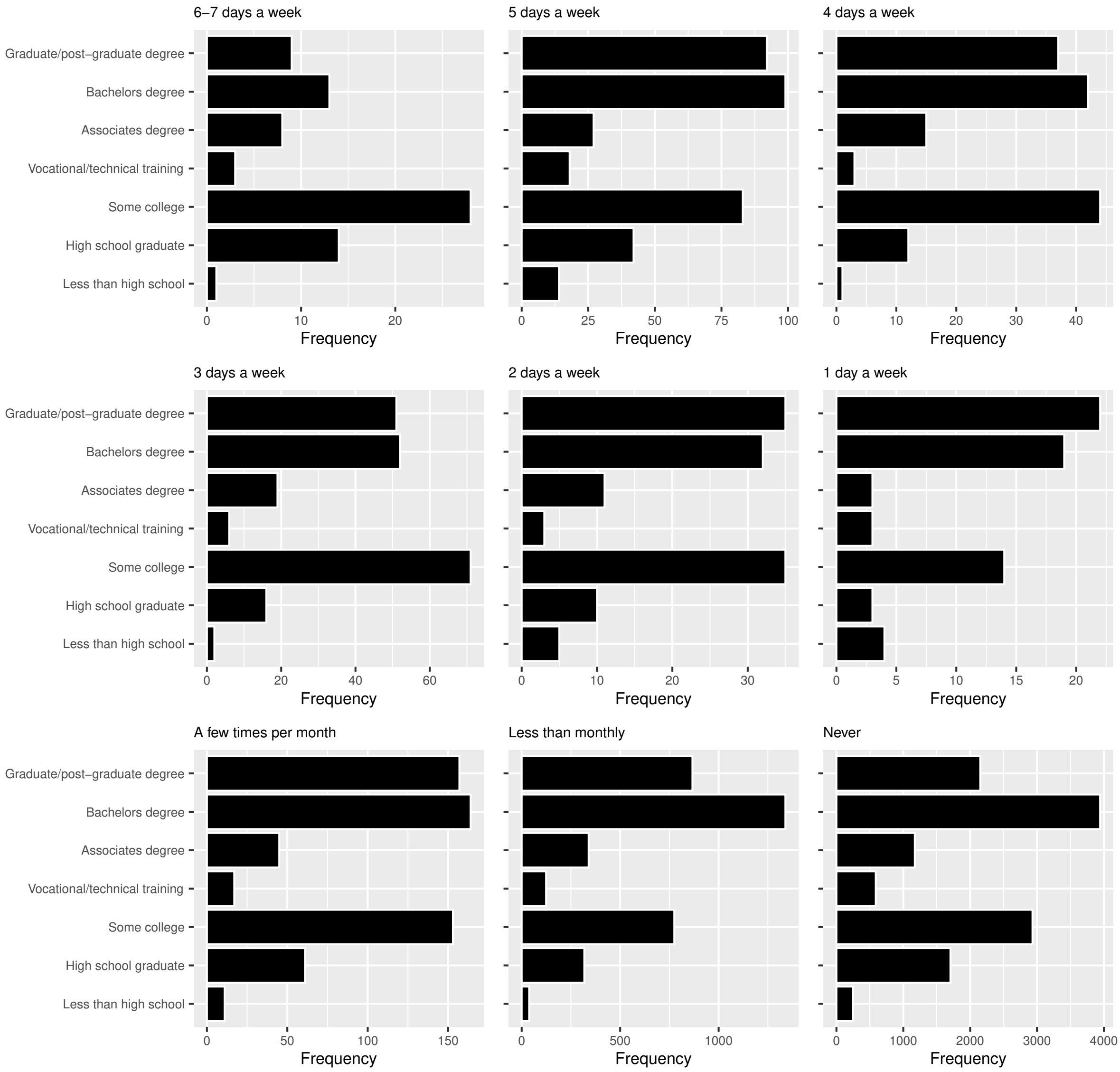
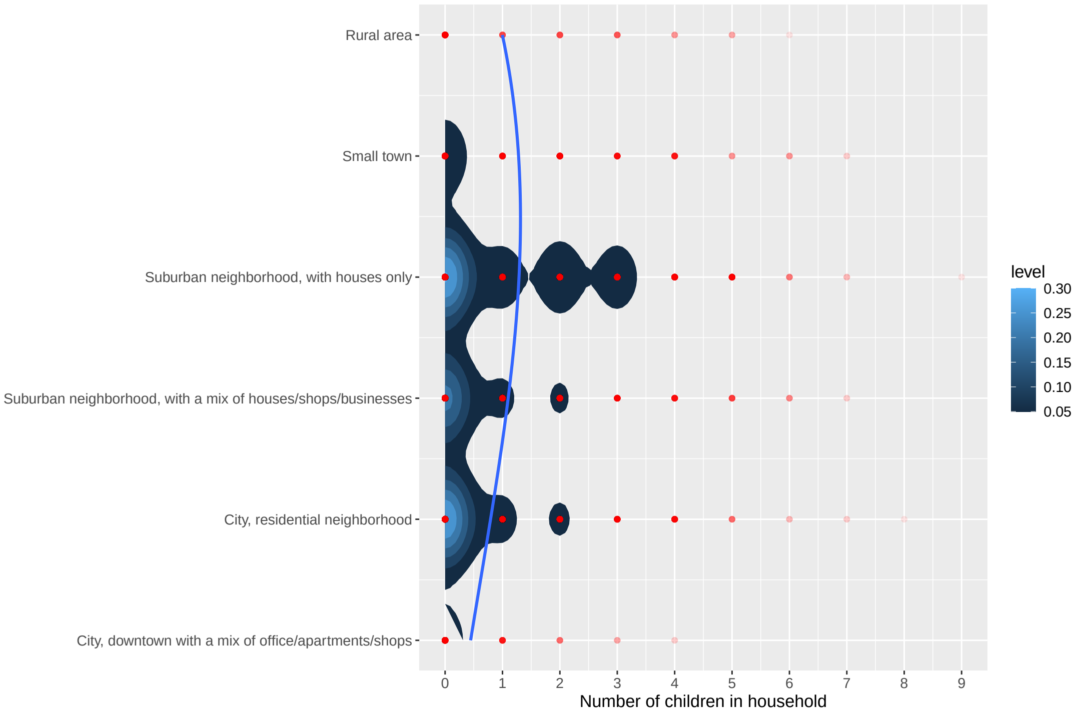
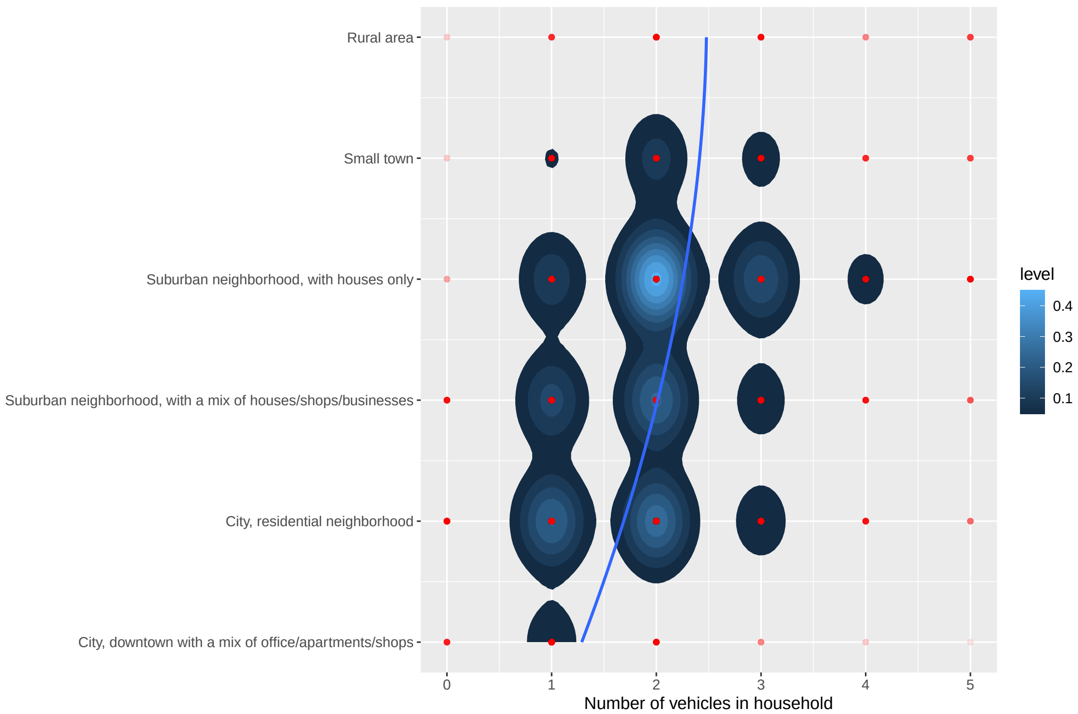


Figure A18: Current residence location conditional on number of children in household.



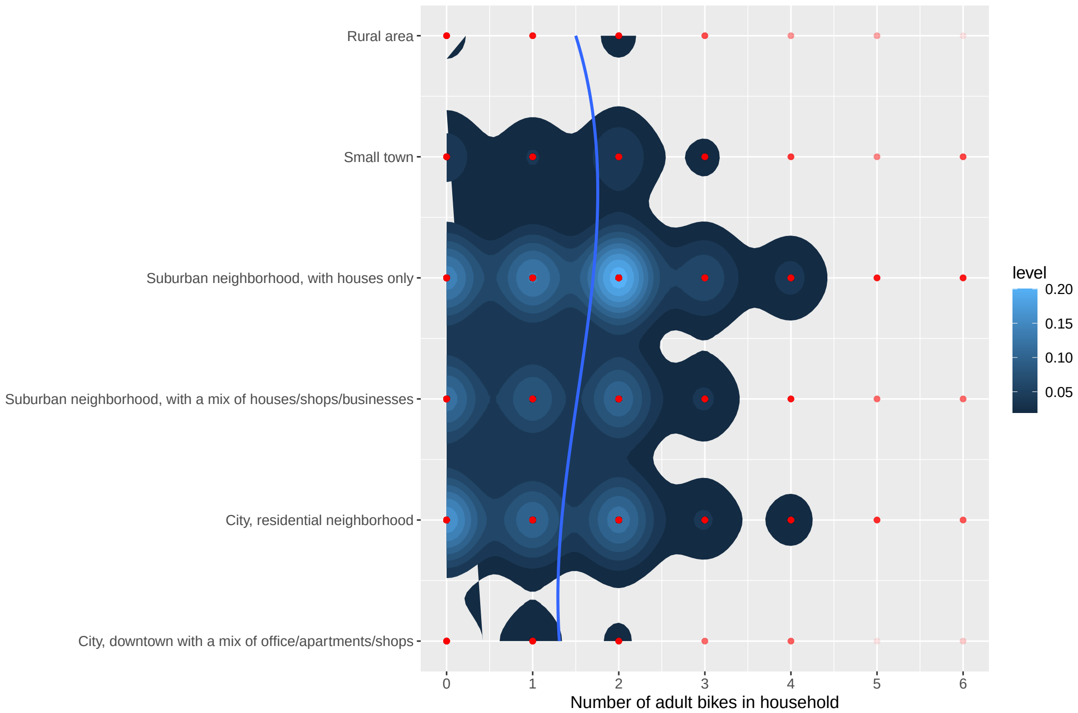
Notes: Red dots represent the scatter plot of current residence location against number of children in household, with lighter(darker) red corresponding to fewer(more) observations. The contour plot (with color level) represents a bivariate distribution of current residence location and number of children in household, and is obtained using 2-dimensional kernel density estimation with an axis-aligned bivariate normal kernel. The blue line represents the smoothed (spline) regression curve of current residence location against number of children in household.

Figure A19: Current residence location conditional on number of motorized vehicles in household.



Notes: Red dots represent the scatter plot of current residence location against number of vehicles in household, with lighter(darker) red corresponding to fewer(more) observations. The contour plot (with color level) represents a bivariate distribution of current residence location and number of vehicles in household, and is obtained using 2-dimensional kernel density estimation with an axis-aligned bivariate normal kernel. The blue line represents the smoothed (spline) regression curve of current residence location against number of vehicles in household.

Figure A20: Current residence location conditional on number of adult bicycles in household.



Notes: Red dots represent the scatter plot of current residence location against number of adult bikes in household, with lighter(darker) red corresponding to fewer(more) observations. The contour plot (with color level) represents a bivariate distribution of current residence location and number of adult bikes in household, and is obtained using 2-dimensional kernel density estimation with an axis-aligned bivariate normal kernel. The blue line represents the smoothed (spline) regression curve of current residence location against number of adult bikes in household.

B Additional Descriptive Statistics for the Study Region

Table B1: Census data for Wasatch Front counties (percentages).

	Wasatch Front Counties			
Variable Name	Weber	Davis	Salt Lake	Utah
Own	72	77	67	68
Female	50	50	50	50
Midage	24	24	26	21
Old	22	17	20	14
Medinc	53	59	57	54
Highinc	7	13	16	11
SomeColl	28	28	25	27
Assoc	9	11	9	11
Bach	16	25	21	29
Grad	8	11	12	13
Retired & Hmkr	33	32	29	32

Notes: Data source is U.S. Census Bureau (2019).

C An Alternative Method for Calculating MWTP

The alternative method mentioned in the text for estimating MWTP begins with a conversion of the respective percentage-change values that define the different levels of the Home/Rental Cost attribute in Table 1 to different numeric equivalents than those presented in the table. Specifically, "20% less" is converted to 0.8 (rather than -0.2), "10% less" is converted to 0.9 (rather than -0.1), "same" is converted to 1, "10% more" to 1.1, and "20% more" to 1.2. We then multiply these respective, alternative numeric equivalents by the participant's self-reported home value or rental cost, whichever the case may be, and then subtract that value from the self-reported home value or rental cost, resulting in a corresponding continuous, dollar-denominated change in value.

For example, consider a homeowner who self-reports her home value at $200,000. Table C1 demonstrates how the homeowner's housing cost for Section 5's empirical analysis would ultimately be derived for each of the Home/Rental Cost's possible attribute levels. The final changes-in-value reported in Table C1's final column are calculated as the respective values in column three minus the reported home value of $200,000.

Table C1: Calculations for a homeowner's self-reported housing cost of $200,000.

House/Rental Cost Attribute Level	Numeric Equivalent (NE)	NE × $200,000 ($)	Change in Value ($)
20% less	0.8	160,000	-40,000
10% less	0.9	180,000	-20,000
Same	1	200,000	0
10% more	1.1	220,000	20,000
20% more	1.2	240,000	40,000

Let the coefficient estimate included in vector $\boldsymbol{\beta}$ that represents the continuous dollar-denominated change in value under this method be denoted as β^c. And let $\bar{\alpha}^a$ represent any given coefficient estimate included in matrix $\boldsymbol{\alpha}_i$, which now does not include a coefficient estimate for the cost attribute. A typical household's MWTP for attribute level a can then be expressed as,

$$MWTP_a = -\frac{\bar{\alpha}^a}{\beta^c}. \tag{C1}$$

For example, if attribute level a represents *House1* from Table 2, then $MWTP_a$ measures the household's MWTP to live in a neighborhood where a mixture of single-family detached houses (on 1/2 acre lots), townhomes, apartments, and condominiums are located within a half-mile of its home, as opposed to a neighborhood where the single-family houses are instead on 1/4 acre lots.

Similarly, letting β_z^a represent any coefficient estimate included in vector $\boldsymbol{\beta}$ for interaction term (a x z) (other than interactions involving the cost attribute), and β_z^c represent the coefficient estimate in $\boldsymbol{\beta}$ corresponding to the interaction between socio-demographic or lifestyle variable z and cost c, i.e., interaction term (c x z), the associated MWTP for attribute level a interacted with z is calculated as,

$$MWTP_{a,z} = -\frac{\bar{\alpha}^a + \beta_z^a}{\beta^c + \beta_z^c}, \tag{C2}$$

For example, if attribute level a again represents *House1* and socio-demographic/lifestyle variable z represents *Highinc* from Table 2, then $MWTP_{a,z}$ measures a high-income household's MWTP to live in a neighborhood where a mixture of single-family detached houses (on 1/2 acre lots), townhomes, apartments, and condominiums are located within a half-mile of its home (again, as opposed to a neighborhood where the single-family houses are instead on 1/4 acre lots), but now also in relation to a low-income household's MWTP for the same attribute level.

As mentioned in the text, this method does not produce plausible MWTP estimates. In effect, the estimates "blow up" due to relatively small coefficient estimates of β^c in the numerators of equations (C1) and (C2). This problem has arisen in previous studies that have likewise used continuous levels of the cost attribute in their choice experiments, for example Guevara and Ben-Akiva (2006), Hensher and Green (2003), Scarpa and Train (2008), Train and Weeks (2005), Rowen et al. (2018), and Johnson et al. (2011). To our knowledge, this 'continuous-cost' problem itself presents an open research question. Here we propose one possible cause of our study's result, and leave further investigation into the general problem for further research.

One cause could be related to an imbalance introduced into the ML modeling framework as a result of using a continuous measure of cost in a choice experiment that imposes discrete levels for the remaining attributes. This imbalance could potentially be biasing in some way the model's simulated parameter estimates due to the restriction that the estimates' distributions are each asymptotically normal (Carson and Czajkowski (2019)). It turns out that the model blows up for both homeowners and renters alike. Thus, another possible cause—extensive measurement error associated with households' self-reported housing costs—can be discarded. If measurement error were a cause, we would expect it to occur solely in the homeowner subgroup. This is because homeowners were asked to estimate the current market value of their homes, while renters were asked to state their monthly rents.

D Additional Estimation Results for Interaction-Term Models

D.1 Socio-Demographic Effects

Table D1: Gender-interaction results (female).

Attribute Level Interacted with *Female*	Renter			Homeowner		
	Coefficient	MRS	DWTP	Coefficient	MRS	DWTP
Commute1	-0.011	-0.004	-0.265	-0.071	-0.065	-9.070
	(0.149)	(-0.111, 0.103)		(0.081)	(-0.212, 0.082)	
Commute2	0.057	0.021	1.362	-0.081	-0.074	-10.329
	(0.148)	(-0.085, 0.127)		(0.079)	(-0.219, 0.071)	
Commute3	-0.030	-0.011	-0.713	-0.131*	-0.120	-16.729
	(0.150)	(-0.120, 0.098)		(0.077)	(-0.263, 0.022)	
Dest1	0.216	0.079	5.166	0.014	0.013	1.840
	(0.169)	(-0.042, 0.201)		(0.089)	(-0.148, 0.174)	
Dest2	0.094	0.035	2.250	0.076	0.070	9.675
	(0.159)	(-0.080, 0.149)		(0.083)	(-0.081, 0.221)	
Dest3	0.076	0.028	1.811	-0.171**	-0.157	-21.868
	(0.158)	(-0.086, 0.142)		(0.085)	(-0.315, 0.000)	
House1	0.075	0.028	1.803	-0.001	-0.001	-0.106
	(0.129)	(-0.065, 0.121)		(0.068)	(-0.123, 0.122)	
House2	0.001	0.000	0.025	-0.011	-0.011	-1.469
	(0.149)	(-0.107, 0.107)		(0.078)	(-0.151, 0.130)	
House3	0.222	0.082	5.310	0.101	0.093	12.934
	(0.166)	(-0.037, 0.201)		(0.086)	(-0.064, 0.250)	
Park1	-0.204*	-0.075	-4.884	-0.112*	-0.103	-14.343
	(0.124)	(-0.166, 0.015)		(0.065)	(-0.225, 0.019)	
Park2	-0.318**	-0.117	-7.600	-0.199**	-0.184	-25.526
	(0.155)	(-0.229, -0.005)		(0.083)	(-0.340, -0.028)	
Street1	0.055	0.020	1.304	0.070	0.065	8.969
	(0.111)	(-0.060, 0.100)		(0.057)	(-0.038, 0.167)	
Transit1	0.042	0.015	0.995	0.076	0.070	9.757
	(0.160)	(-0.100, 0.131)		(0.087)	(-0.086, 0.226)	
Transit2	-0.062	-0.023	-1.477	0.034	0.032	4.412
	(0.163)	(-0.140, 0.095)		(0.086)	(-0.124, 0.187)	
Transit3	0.249	0.091	5.943	0.142	0.131	18.144
	(0.173)	(-0.031, 0.214)		(0.087)	(-0.028, 0.289)	
Cost	0.028	0.010	0.676	-0.069	-0.064	-8.896
	(0.352)	(-0.242, 0.263)		(0.187)	(-0.413, 0.285)	
Observations		6,710			19,480	
AIC		7,738.598			21,579.675	
BIC		8,065.543			21,957.778	
McFadden R^2		0.178			0.204	
Log Likelihood		-3,821.299			-10,741.840	
LR Test (df = 48)		1,656.347***			5,516.532***	

Notes: Estimation by maximum likelihood of the mixed logit (ML) model. Heteroskedasticity-robust standard errors in parenthesis. Marginal rate of substitution (MRS) and differential in willingness to pay (DWTP) estimates are computed from ML model. The 95% confidence intervals of MRS estimates are obtained using delta method. The DWTP estimates for homeowners are converted from one-time payments to their monthly equivalents by first applying Moon and Miller (2018)'s estimate of the median number of years a Wasatch Front homeowner remains in his/her home and then converting from years to months. *p<0.1; **p<0.05; ***p<0.01.

Table D2: Age-interaction results (mid-age).

Attribute Level Interacted with *Midage*	Renter			Homeowner		
	Coefficient	MRS	DWTP	Coefficient	MRS	DWTP
Commute1	-0.020	-0.008	-0.497	-0.031	-0.028	-3.877
	(0.172)	(-0.137, 0.121)		(0.082)	(-0.173, 0.117)	
Commute2	0.083	0.032	2.061	-0.099	-0.090	-12.530
	(0.172)	(-0.096, 0.159)		(0.080)	(-0.235, 0.054)	
Commute3	0.313*	0.119	7.764	-0.072	-0.065	-9.085
	(0.175)	(-0.009, 0.248)		(0.078)	(-0.205, 0.074)	
Dest1	-0.222	-0.085	-5.501	-0.063	-0.057	-7.903
	(0.191)	(-0.228, 0.059)		(0.090)	(-0.217, 0.103)	
Dest2	-0.154	-0.059	-3.828	-0.121	-0.110	-15.232
	(0.181)	(-0.194, 0.076)		(0.084)	(-0.261, 0.042)	
Dest3	-0.193	-0.074	-4.779	-0.107	-0.097	-13.436
	(0.186)	(-0.213, 0.066)		(0.085)	(-0.250, 0.056)	
House1	-0.114	-0.043	-2.826	0.093	0.085	11.780
	(0.148)	(-0.154, 0.067)		(0.069)	(-0.038, 0.208)	
House2	0.226	0.086	5.607	0.072	0.066	9.113
	(0.168)	(-0.040, 0.213)		(0.079)	(-0.076, 0.207)	
House3	-0.179	-0.068	-4.432	0.238***	0.216	30.032
	(0.185)	(-0.206, 0.070)		(0.088)	(0.054, 0.379)	
Park1	-0.047	-0.018	-1.177	-0.051	-0.046	-6.426
	(0.142)	(-0.124, 0.088)		(0.066)	(-0.165, 0.072)	
Park2	0.340*	0.130	8.421	-0.177**	-0.161	-22.340
	(0.178)	(-0.003, 0.262)		(0.083)	(-0.313, -0.008)	
Street1	0.165	0.063	4.079	0.040	0.037	5.104
	(0.129)	(-0.033, 0.159)		(0.057)	(-0.065, 0.139)	
Transit1	-0.063	-0.024	-1.567	-0.278***	-0.252	-35.014
	(0.184)	(-0.162, 0.114)		(0.089)	(-0.422, -0.082)	
Transit2	0.019	0.007	0.463	-0.141	-0.128	-17.717
	(0.189)	(-0.134, 0.148)		(0.088)	(-0.288, 0.033)	
Transit3	-0.260	-0.099	-6.443	-0.090	-0.082	-11.330
	(0.203)	(-0.250, 0.052)		(0.088)	(-0.240, 0.077)	
Cost	0.193	0.074	4.790	-0.061	-0.056	-7.732
	(0.407)	(-0.225, 0.373)		(0.190)	(-0.401, 0.290)	
Observations		6,710			19,480	
AIC		7,734.925			21,580.052	
BIC		8,061.870			21,958.155	
McFadden R^2		0.179			0.204	
Log Likelihood		-3,819.462			-10,742.030	
LR Test (df = 48)		1,660.020***			5,516.155***	

Notes: Estimation by maximum likelihood of the mixed logit (ML) model. *Midage* is equal to 1 if 35-54 years of age, and 0 otherwise. Heteroskedasticity-robust standard errors in parenthesis. Marginal rate of substitution (MRS) and differential in willingness to pay (DWTP) estimates are computed from ML model. The 95% confidence intervals of MRS estimates are obtained using delta method. The DWTP estimates for homeowners are converted from one-time payments to their monthly equivalents by first applying Moon and Miller (2018)'s estimate of the median number of years a Wasatch Front homeowner remains in his/her home and then converting from years to months. *p<0.1; **p<0.05; ***p<0.01.

Table D3: Age-interaction results (old).

Attribute Level Interacted with *Old*	Renter			Homeowner		
	Coefficient	MRS	DWTP	Coefficient	MRS	DWTP
Commute1	0.775**	0.259	16.843	0.031	0.049	6.793
	(0.306)	(0.066, 0.452)		(0.085)	(-0.214, 0.311)	
Commute2	0.026	0.009	0.564	0.186**	0.294	40.856
	(0.301)	(-0.189, 0.206)		(0.083)	(-0.011, 0.599)	
Commute3	0.613**	0.205	13.310	0.349***	0.553	76.781
	(0.304)	(0.011, 0.399)		(0.080)	(0.183, 0.923)	
Dest1	0.331	0.111	7.186	0.168*	0.266	37.013
	(0.311)	(-0.092, 0.313)		(0.093)	(-0.049, 0.582)	
Dest2	0.079	0.026	1.722	0.243***	0.385	53.537
	(0.308)	(-0.175, 0.228)		(0.087)	(0.061, 0.710)	
Dest3	0.272	0.091	5.910	0.244***	0.387	53.734
	(0.294)	(-0.101, 0.283)		(0.089)	(0.057, 0.717)	
House1	-0.330	-0.110	-7.171	-0.152**	-0.241	-33.514
	(0.255)	(-0.275, 0.054)		(0.071)	(-0.490, 0.007)	
House2	-1.173***	-0.392	-25.492	-0.217***	-0.343	-47.696
	(0.322)	(-0.583, -0.201)		(0.081)	(-0.648, -0.039)	
House3	-1.375***	-0.460	-29.888	-0.614***	-0.973	-135.196
	(0.383)	(-0.687, -0.232)		(0.095)	(-1.525, -0.422)	
Park1	0.430*	0.144	9.352	-0.006	-0.009	-1.299
	(0.248)	(-0.015, 0.303)		(0.068)	(-0.221, 0.202)	
Park2	0.588**	0.197	12.776	0.249***	0.394	54.787
	(0.297)	(0.008, 0.385)		(0.087)	(0.063, 0.726)	
Street1	0.142	0.048	3.089	-0.154***	-0.244	-33.832
	(0.210)	(-0.090, 0.185)		(0.059)	(-0.456, -0.032)	
Transit1	0.130	0.043	2.819	0.218**	0.346	48.036
	(0.300)	(-0.153, 0.240)		(0.090)	(0.004, 0.687)	
Transit2	-0.362	-0.121	-7.867	0.157*	0.248	34.450
	(0.330)	(-0.337, 0.095)		(0.091)	(-0.069, 0.565)	
Transit3	-0.593*	-0.198	-12.891	-0.039	-0.061	-8.509
	(0.319)	(-0.401, 0.004)		(0.090)	(-0.340, 0.218)	
Cost	0.406	0.136	8.816	0.803***	1.272	176.674
	(0.676)	(-0.301, 0.572)		(0.198)	(0.116, 2.428)	
Observations		6,710			19,480	
AIC		7,684.681			21,481.161	
BIC		8,011.626			21,859.263	
McFadden R^2		0.184			0.208	
Log Likelihood		-3,794.340			-10,692.580	
LR Test (df = 48)		1,710.264***			5,615.047***	

Notes: Estimation by maximum likelihood of the mixed logit (ML) model. *Old* is equal to 1 if 55 years of age and older, and 0 otherwise. Heteroskedasticity-robust standard errors in parenthesis. Marginal rate of substitution (MRS) and differential in willingness to pay (DWTP) estimates are computed from ML model. The 95% confidence intervals of MRS estimates are obtained using delta method. The DWTP estimates for homeowners are converted from one-time payments to their monthly equivalents by first applying Moon and Miller (2018)'s estimate of the median number of years a Wasatch Front homeowner remains in his/her home and then converting from years to months. *p<0.1; **p<0.05; ***p<0.01.

Table D4: Education-interaction results (college graduate).

Attribute Level Interacted with *Collegegrad*	Renter			Homeowner		
	Coefficient	MRS	DWTP	Coefficient	MRS	DWTP
Commute1	-0.125	-0.047	-3.062	-0.048	-0.046	-6.376
	(0.144)	(-0.153, 0.059)		(0.089)	(-0.215, 0.123)	
Commute2	-0.173	-0.065	-4.214	-0.259***	-0.249	-34.606
	(0.146)	(-0.173, 0.044)		(0.087)	(-0.416, -0.082)	
Commute3	-0.376**	-0.141	-9.194	-0.421***	-0.406	-56.410
	(0.150)	(-0.252, -0.031)		(0.085)	(-0.581, -0.231)	
Dest1	-0.044	-0.017	-1.078	-0.044	-0.043	-5.943
	(0.162)	(-0.136, 0.103)		(0.098)	(-0.228, 0.142)	
Dest2	-0.205	-0.077	-5.007	-0.295***	-0.284	-39.449
	(0.156)	(-0.191, 0.037)		(0.092)	(-0.466, -0.102)	
Dest3	-0.294*	-0.110	-7.174	-0.321***	-0.309	-42.962
	(0.155)	(-0.225, 0.004)		(0.093)	(-0.495, -0.124)	
House1	0.188	0.071	4.589	-0.044	-0.042	-5.835
	(0.125)	(-0.022, 0.163)		(0.074)	(-0.183, 0.098)	
House2	-0.147	-0.055	-3.584	-0.183**	-0.176	-24.473
	(0.144)	(-0.161, 0.051)		(0.085)	(-0.341, -0.012)	
House3	0.317**	0.119	7.734	-0.164*	-0.158	-21.952
	(0.160)	(0.001, 0.237)		(0.095)	(-0.341, 0.025)	
Park1	-0.101	-0.038	-2.470	0.105	0.102	14.102
	(0.119)	(-0.126, 0.050)		(0.072)	(-0.037, 0.240)	
Park2	-0.195	-0.073	-4.769	0.209**	0.202	27.997
	(0.148)	(-0.184, 0.037)		(0.090)	(0.025, 0.378)	
Street1	-0.034	-0.013	-0.832	0.032	0.031	4.317
	(0.106)	(-0.091, 0.065)		(0.062)	(-0.086, 0.148)	
Transit1	0.403**	0.152	9.855	-0.173*	-0.167	-23.165
	(0.160)	(0.037, 0.266)		(0.095)	(-0.346, 0.013)	
Transit2	0.277*	0.104	6.758	-0.141	-0.136	-18.854
	(0.159)	(-0.011, 0.219)		(0.095)	(-0.315, 0.044)	
Transit3	0.312*	0.117	7.626	-0.090	-0.087	-12.051
	(0.168)	(-0.004, 0.238)		(0.095)	(-0.266, 0.093)	
Cost	0.068	0.025	1.653	0.339*	0.327	45.426
	(0.343)	(-0.224, 0.274)		(0.206)	(-0.103, 0.757)	
Observations		6,710			19,480	
AIC		7,724.816			21,523.104	
BIC		8,051.761			21,901.207	
McFadden R^2		0.180			0.206	
Log Likelihood		-3,814.408			-10,713.550	
LR Test (df = 48)		1,670.129***			5,573.103***	

Notes: Estimation by maximum likelihood of the mixed logit (ML) model. *Collegegrad* is equal to 1 if education level is Bachelors and/or Graduate/Post-doc, and 0 otherwise. Heteroskedasticity-robust standard errors in parenthesis. Marginal rate of substitution (MRS) and differential in willingness to pay (DWTP) estimates are computed from ML model. The 95% confidence intervals of MRS estimates are obtained using delta method. The DWTP estimates for homeowners are converted from one-time payments to their monthly equivalents by first applying Moon and Miller (2018)'s estimate of the median number of years a Wasatch Front homeowner remains in his/her home and then converting from years to months. *p<0.1; **p<0.05; ***p<0.01.

Table D5: Income-interaction results (high income).

Attribute Level Interacted with *Highinc*	Renter			Homeowner		
	Coefficient	MRS	DWTP	Coefficient	MRS	DWTP
Commute1	0.305	0.101	6.547	0.080	1.687	234.238
	(1.453)	(-0.838, 1.039)		(0.161)	(-24.901, 28.274)	
Commute2	1.258	0.415	26.962	-0.023	-0.479	-66.564
	(1.026)	(-0.237, 1.067)		(0.158)	(-9.662, 8.704)	
Commute3	2.720*	0.897	58.316	-0.068	-1.429	-198.497
	(1.407)	(0.019, 1.775)		(0.156)	(-23.682, 20.823)	
Dest1	-0.396	-0.131	-8.485	0.124	2.610	362.442
	(1.400)	(-1.035, 0.774)		(0.176)	(-38.679, 43.898)	
Dest2	-0.084	-0.028	-1.794	-0.135	-2.858	-396.923
	(1.402)	(-0.934, 0.879)		(0.174)	(-47.558, 41.842)	
Dest3	-0.534	-0.176	-11.442	-0.130	-2.754	-382.505
	(1.130)	(-0.906, 0.554)		(0.171)	(-46.083, 40.575)	
House1	0.019	0.006	0.408	0.202	4.277	594.027
	(1.139)	(-0.730, 0.742)		(0.133)	(-62.738, 71.292)	
House2	-0.612	-0.202	-13.119	0.273*	5.777	802.333
	(1.023)	(-0.862, 0.459)		(0.152)	(-84.756, 96.309)	
House3	-1.047	-0.345	-22.434	0.200	4.218	585.830
	(1.404)	(-1.247, 0.557)		(0.163)	(-62.015, 70.451)	
Park1	-1.897	-0.626	-40.665	-0.080	-1.692	-234.957
	(1.335)	(-1.472, 0.221)		(0.127)	(-28.351, 24.967)	
Park2	-0.934	-0.308	-20.031	0.146	3.086	428.648
	(1.154)	(-1.049, 0.433)		(0.164)	(-45.789, 51.961)	
Street1	0.619	0.204	13.269	0.077	1.621	225.199
	(0.889)	(-0.366, 0.775)		(0.110)	(-24.337, 27.580)	
Transit1	1.658	0.547	35.548	-0.173	-3.659	-508.195
	(1.283)	(-0.274, 1.367)		(0.174)	(-60.136, 52.818)	
Transit2	1.898	0.626	40.677	-0.009	-0.181	-25.138
	(1.816)	(-0.537, 1.789)		(0.168)	(-7.338, 6.976)	
Transit3	0.646	0.213	13.846	-0.284*	-6.004	-833.942
	(1.241)	(-0.587, 1.013)		(0.171)	(-99.531, 87.522)	
Cost	-2.133	-0.703	-45.716	1.150***	24.300	3375.060
	(2.377)	(-2.223, 0.817)		(0.391)	(-370.090, 418.691)	
Observations		6,710			19,480	
AIC		7,734.781			21,581.904	
BIC		8,061.726			21,960.007	
McFadden R^2		0.179			0.204	
Log Likelihood		-3,819.391			10,742.950	
LR Test (df = 48)		1,660.163***			5,514.303***	

Notes: Estimation by maximum likelihood of the mixed logit (ML) model. *Highinc* is equal to 1 if income is equal to or greater than $150,000, and 0 otherwise. Heteroskedasticity-robust standard errors in parenthesis. Marginal rate of substitution (MRS) and differential in willingness to pay (DWTP) estimates are computed from ML model. The 95% confidence intervals of MRS estimates are obtained using delta method. The DWTP estimates for homeowners are converted from one-time payments to their monthly equivalents by first applying Moon and Miller (2018)'s estimate of the median number of years a Wasatch Front homeowner remains in his/her home and then converting from years to months. *p<0.1; **p<0.05; ***p<0.01.

Table D6: Employment-interaction results (full-time employed).

Attribute Level Interacted with *Employed*	Renter			Homeowner		
	Coefficient	MRS	DWTP	Coefficient	MRS	DWTP
Commute1	-0.018	-0.007	-0.438	0.013	0.014	1.879
	(0.153)	(-0.122, 0.108)		(0.081)	(-0.154, 0.181)	
Commute2	-0.019	-0.007	-0.478	-0.121	-0.126	-17.564
	(0.154)	(-0.123, 0.108)		(0.079)	(-0.296, 0.044)	
Commute3	-0.374**	-0.143	-9.308	-0.183**	-0.191	-26.534
	(0.162)	(-0.263, -0.024)		(0.077)	(-0.361, -0.021)	
Dest1	0.011	0.004	0.266	-0.128	-0.134	-18.572
	(0.171)	(-0.125, 0.133)		(0.089)	(-0.321, 0.053)	
Dest2	-0.201	-0.077	-4.997	-0.074	-0.078	-10.778
	(0.163)	(-0.199, 0.045)		(0.083)	(-0.250, 0.095)	
Dest3	-0.152	-0.058	-3.782	0.032	0.034	4.681
	(0.163)	(-0.181, 0.064)		(0.084)	(-0.139, 0.207)	
House1	0.069	0.026	1.717	-0.052	-0.054	-7.498
	(0.129)	(-0.071, 0.124)		(0.068)	(-0.194, 0.086)	
House2	-0.133	-0.051	-3.320	-0.010	-0.010	-1.407
	(0.153)	(-0.165, 0.063)		(0.078)	(-0.169, 0.149)	
House3	-0.150	-0.057	-3.733	-0.036	-0.038	-5.300
	(0.168)	(-0.183, 0.068)		(0.086)	(-0.214, 0.138)	
Park1	-0.236*	-0.090	-5.872	-0.024	-0.025	-3.490
	(0.131)	(-0.188, 0.007)		(0.065)	(-0.160, 0.110)	
Park2	-0.247	-0.095	-6.143	0.140*	0.147	20.364
	(0.158)	(-0.213, 0.024)		(0.083)	(-0.028, 0.321)	
Street1	-0.164	-0.063	-4.076	-0.054	-0.057	-7.854
	(0.114)	(-0.147, 0.022)		(0.057)	(-0.175, 0.061)	
Transit1	-0.081	-0.031	-2.029	-0.051	-0.053	-7.362
	(0.165)	(-0.156, 0.093)		(0.086)	(-0.233, 0.127)	
Transit2	0.068	0.026	1.696	-0.140	-0.147	-20.377
	(0.166)	(-0.098, 0.150)		(0.086)	(-0.333, 0.040)	
Transit3	-0.281	-0.108	-7.000	-0.202**	-0.211	-29.293
	(0.179)	(-0.242, 0.026)		(0.087)	(-0.401, -0.020)	
Cost	-0.273	-0.105	-6.797	-0.275	-0.288	-40.009
	(0.369)	(-0.392, 0.183)		(0.187)	(-0.737, 0.161)	
Observations		6,710			19,480	
AIC		7,735.216			21,587.456	
BIC		8,062.161			21,965.559	
McFadden R^2		0.178			0.204	
Log Likelihood		-3,819.608			-10,745.730	
LR Test (df = 48)		1,659.729***			5,508.751***	

Notes: Estimation by maximum likelihood of the mixed logit (ML) model. *Employed* is equal to 1 if employed full time, and 0 otherwise. Heteroskedasticity-robust standard errors in parenthesis. Marginal rate of substitution (MRS) and differential in willingness to pay (DWTP) estimates are computed from ML model. The 95% confidence intervals of MRS estimates are obtained using delta method. The DWTP estimates for homeowners are converted from one-time payments to their monthly equivalents by first applying Moon and Miller (2018)'s estimate of the median number of years a Wasatch Front homeowner remains in his/her home and then converting from years to months. *p<0.1; **p<0.05; ***p<0.01.

Table D7: Household composition-interaction results (number of adults).

Attribute Level Interacted with *#Adults*	Renter			Homeowner		
	Coefficient	MRS	DWTP	Coefficient	MRS	DWTP
Commute1	0.075	0.027	1.757	0.053	0.068	9.376
	(0.083)	(-0.034, 0.088)		(0.051)	(-0.066, 0.201)	
Commute2	0.079	0.029	1.853	0.068	0.087	12.143
	(0.084)	(-0.031, 0.088)		(0.049)	(-0.035, 0.210)	
Commute3	0.122	0.044	2.877	0.138***	0.178	24.661
	(0.081)	(-0.013, 0.101)		(0.050)	(0.036, 0.319)	
Dest1	0.020	0.007	0.474	-0.033	-0.042	-5.865
	(0.097)	(-0.061, 0.076)		(0.057)	(-0.187, 0.102)	
Dest2	0.059	0.021	1.378	-0.037	-0.047	-6.525
	(0.093)	(-0.045, 0.087)		(0.054)	(-0.186, 0.092)	
Dest3	0.210**	0.076	4.943	-0.033	-0.042	-5.872
	(0.090)	(0.010, 0.142)		(0.053)	(-0.178, 0.094)	
House1	0.117	0.042	2.747	0.072*	0.092	12.808
	(0.073)	(-0.012, 0.096)		(0.043)	(-0.022, 0.207)	
House2	0.012	0.004	0.288	0.082*	0.106	14.673
	(0.082)	(-0.054, 0.063)		(0.049)	(-0.030, 0.241)	
House3	-0.011	-0.004	-0.247	0.204***	0.262	36.386
	(0.088)	(-0.066, 0.059)		(0.058)	(0.077, 0.447)	
Park1	-0.002	-0.001	-0.052	0.001	0.001	0.144
	(0.071)	(-0.051, 0.049)		(0.042)	(-0.105, 0.107)	
Park2	-0.135	-0.049	-3.167	0.030	0.038	5.276
	(0.093)	(-0.118, 0.021)		(0.051)	(-0.091, 0.167)	
Street1	-0.025	-0.009	-0.583	-0.015	-0.020	-2.746
	(0.063)	(-0.054, 0.036)		(0.036)	(-0.110, 0.070)	
Transit1	0.054	0.019	1.265	0.055	0.070	9.785
	(0.091)	(-0.044, 0.083)		(0.057)	(-0.072, 0.213)	
Transit2	0.001	0.000	0.021	0.035	0.045	6.207
	(0.096)	(-0.067, 0.068)		(0.057)	(-0.097, 0.187)	
Transit3	-0.183*	-0.066	-4.310	0.009	0.012	1.686
	(0.100)	(-0.143, 0.010)		(0.054)	(-0.124, 0.148)	
Cost	0.050	0.018	1.179	-0.343***	-0.441	-61.263
	(0.198)	(-0.117, 0.153)		(0.125)	(-0.920, 0.037)	
Observations		6,710			19,480	
AIC		7,733.447			21,576.515	
BIC		8,060.392			21,954.617	
McFadden R^2		0.179			0.204	
Log Likelihood		-3,818.723			-10,740.260	
LR Test (df = 48)		1,661.498***			5,519.693***	

Notes: Estimation by maximum likelihood of the mixed logit (ML) model. Heteroskedasticity-robust standard errors in parenthesis. Marginal rate of substitution (MRS) and differential in willingness to pay (DWTP) estimates are computed from ML model. The 95% confidence intervals of MRS estimates are obtained using delta method. The DWTP estimates for homeowners are converted from one-time payments to their monthly equivalents by first applying Moon and Miller (2018)'s estimate of the median number of years a Wasatch Front homeowner remains in his/her home and then converting from years to months. *p<0.1; **p<0.05; ***p<0.01.

Table D8: Household composition-interaction results (number of children).

Attribute Level Interacted with *#Children*	Renter			Homeowner		
	Coefficient	MRS	DWTP	Coefficient	MRS	DWTP
Commute1	-0.025	-0.009	-0.611	-0.014	-0.012	-1.677
	(0.062)	(-0.055, 0.036)		(0.028)	(-0.059, 0.035)	
Commute2	0.117*	0.044	2.868	-0.046*	-0.040	-5.575
	(0.066)	(-0.004, 0.092)		(0.027)	(-0.087, 0.006)	
Commute3	0.199***	0.075	4.874	-0.041	-0.036	-5.011
	(0.070)	(0.025, 0.125)		(0.027)	(-0.082, 0.010)	
Dest1	-0.015	-0.006	-0.364	-0.076**	-0.067	-9.248
	(0.074)	(-0.060, 0.049)		(0.031)	(-0.120, -0.013)	
Dest2	0.118*	0.044	2.882	-0.103***	-0.090	-12.487
	(0.066)	(-0.004, 0.093)		(0.029)	(-0.141, -0.039)	
Dest3	0.146**	0.055	3.575	-0.132***	-0.115	-15.955
	(0.075)	(0.001, 0.109)		(0.030)	(-0.168, -0.061)	
House1	-0.023	-0.009	-0.571	0.048**	0.041	5.760
	(0.057)	(-0.051, 0.033)		(0.023)	(0.001, 0.082)	
House2	0.214***	0.081	5.243	0.164***	0.143	19.886
	(0.069)	(0.031, 0.130)		(0.028)	(0.093, 0.194)	
House3	0.346***	0.130	8.458	0.248***	0.217	30.071
	(0.085)	(0.070, 0.190)		(0.032)	(0.154, 0.279)	
Park1	-0.128**	-0.048	-3.122	-0.066***	-0.057	-7.951
	(0.055)	(-0.089, -0.007)		(0.023)	(-0.097, -0.018)	
Park2	-0.136**	-0.051	-3.321	-0.133***	-0.116	-16.158
	(0.069)	(-0.102, 0.000)		(0.029)	(-0.169, -0.064)	
Street1	-0.087*	-0.033	-2.123	-0.001	-0.001	-0.153
	(0.049)	(-0.068, 0.003)		(0.019)	(-0.034, 0.032)	
Transit1	-0.019	-0.007	-0.463	-0.060**	-0.053	-7.318
	(0.073)	(-0.061, 0.047)		(0.030)	(-0.104, -0.001)	
Transit2	0.026	0.010	0.644	-0.014	-0.012	-1.685
	(0.071)	(-0.042, 0.062)		(0.030)	(-0.063, 0.038)	
Transit3	0.142*	0.053	3.466	0.053*	0.046	6.414
	(0.074)	(0.000, 0.106)		(0.030)	(-0.006, 0.098)	
Cost	-0.167	-0.063	-4.074	-0.407***	-0.355	-49.303
	(0.163)	(-0.187, 0.061)		(0.067)	(-0.483, -0.227)	
Observations		6,710			19,480	
AIC		7,661.541			21,416.866	
BIC		7,988.486			21,794.968	
McFadden R^2		0.186			0.210	
Log Likelihood		-3,782.771			-10,660.430	
LR Test (df = 48)		1,733.403***			5,679.342***	

Notes: Estimation by maximum likelihood of the mixed logit (ML) model. Heteroskedasticity-robust standard errors in parenthesis. Marginal rate of substitution (MRS) and differential in willingness to pay (DWTP) estimates are computed from ML model. The 95% confidence intervals of MRS estimates are obtained using delta method. The DWTP estimates for homeowners are converted from one-time payments to their monthly equivalents by first applying Moon and Miller (2018)'s estimate of the median number of years a Wasatch Front homeowner remains in his/her home and then converting from years to months. *p<0.1; **p<0.05; ***p<0.01.

D.2 Lifestyle Characteristics (Location-Specific Effects)

Table D9: Location-interaction results (suburban).

Attribute Level Interacted with *Suburban*	Renter			Homeowner		
	Coefficient	MRS	DWTP	Coefficient	MRS	DWTP
Commute1	0.273*	0.078	5.081	0.017	0.017	2.404
	(0.155)	(-0.008, 0.165)		(0.082)	(-0.143, 0.178)	
Commute2	0.109	0.031	2.024	0.047	0.047	6.545
	(0.152)	(-0.055, 0.118)		(0.080)	(-0.108, 0.202)	
Commute3	0.045	0.013	0.847	0.089	0.088	12.262
	(0.155)	(-0.074, 0.100)		(0.078)	(-0.063, 0.240)	
Dest1	0.146	0.042	2.719	0.090	0.090	12.435
	(0.175)	(-0.057, 0.141)		(0.090)	(-0.088, 0.267)	
Dest2	-0.0004	0.000	-0.008	0.124	0.124	17.169
	(0.165)	(-0.093, 0.093)		(0.085)	(-0.044, 0.291)	
Dest3	-0.013	-0.004	-0.244	-0.020	-0.020	-2.793
	(0.164)	(-0.096, 0.088)		(0.085)	(-0.187, 0.147)	
House1	0.008	0.002	0.141	0.047	0.047	6.487
	(0.133)	(-0.073, 0.077)		(0.069)	(-0.088, 0.181)	
House2	0.334**	0.096	6.223	0.101	0.101	14.019
	(0.157)	(0.010, 0.182)		(0.079)	(-0.057, 0.258)	
House3	0.385**	0.110	7.173	0.066	0.066	9.118
	(0.174)	(0.016, 0.205)		(0.087)	(-0.105, 0.236)	
Park1	-0.083	-0.024	-1.553	-0.193***	-0.193	-26.737
	(0.127)	(-0.095, 0.047)		(0.066)	(-0.335, -0.050)	
Park2	-0.155	-0.044	-2.882	-0.138*	-0.137	-19.023
	(0.159)	(-0.132, 0.043)		(0.083)	(-0.304, 0.030)	
Street1	-0.165	-0.047	-3.081	-0.087	-0.087	-12.090
	(0.114)	(-0.111, 0.016)		(0.057)	(-0.203, 0.028)	
Transit1	-0.122	-0.035	-2.276	0.077	0.077	10.697
	(0.166)	(-0.128, 0.058)		(0.087)	(-0.092, 0.247)	
Transit2	-0.052	-0.015	-0.969	0.100	0.100	13.861
	(0.168)	(-0.109, 0.079)		(0.087)	(-0.070, 0.269)	
Transit3	0.173	0.050	3.228	-0.007	-0.007	-0.962
	(0.177)	(-0.050, 0.149)		(0.087)	(-0.177, 0.163)	
Cost	-1.227***	-0.352	-22.856	-0.195	-0.195	-27.025
	(0.395)	(-0.516, -0.188)		(0.189)	(-0.608, 0.219)	
Observations		6,710			19,480	
AIC		7,724.245			21,590.104	
BIC		8,051.190			21,968.207	
McFadden R^2		0.180			0.204	
Log Likelihood		-3,814.123			-10,747.050	
LR Test (df = 48)		1,670.699***			5,506.103***	

Notes: Estimation by maximum likelihood of the mixed logit (ML) model. *Suburban* is equal to 1 if type of current residence location is suburban neighborhood, with a mix of houses/shops/businesses or suburban neighborhood, with houses only, and 0 otherwise. Heteroskedasticity-robust standard errors in parenthesis. Marginal rate of substitution (MRS) and differential in willingness to pay (DWTP) estimates are computed from ML model. The 95% confidence intervals of MRS estimates are obtained using delta method. The DWTP estimates for homeowners are converted from one-time payments to their monthly equivalents by first applying Moon and Miller (2018)'s estimate of the median number of years a Wasatch Front homeowner remains in his/her home and then converting from years to months. *p<0.1; **p<0.05; ***p<0.01.

Table D10: Primary reason-interaction results (commute distance).

Attribute Level Interacted with *CommuteDist*	Renter			Homeowner		
	Coefficient	MRS	DWTP	Coefficient	MRS	DWTP
Commute1	-0.269	-0.084	-5.465	-0.197*	-0.382	-53.113
	(0.206)	(-0.208, 0.040)		(0.114)	(-0.957, 0.192)	
Commute2	-0.246	-0.077	-4.986	-0.369***	-0.714	-99.157
	(0.204)	(-0.203, 0.049)		(0.112)	(-1.453, 0.026)	
Commute3	-0.669***	-0.209	-13.580	-0.550***	-1.065	-147.852
	(0.225)	(-0.342, -0.075)		(0.112)	(-2.103, -0.026)	
Dest1	0.051	0.016	1.039	-0.051	-0.098	-13.630
	(0.225)	(-0.122, 0.154)		(0.125)	(-0.579, 0.383)	
Dest2	0.223	0.070	4.534	-0.124	-0.239	-33.246
	(0.218)	(-0.062, 0.202)		(0.116)	(-0.723, 0.244)	
Dest3	-0.337	-0.105	-6.848	-0.041	-0.079	-10.937
	(0.215)	(-0.237, 0.026)		(0.119)	(-0.536, 0.378)	
House1	0.276	0.086	5.607	0.037	0.072	9.957
	(0.173)	(-0.019, 0.192)		(0.096)	(-0.298, 0.441)	
House2	0.266	0.083	5.395	-0.074	-0.143	-19.807
	(0.207)	(-0.043, 0.209)		(0.107)	(-0.573, 0.288)	
House3	0.074	0.023	1.505	0.039	0.075	10.461
	(0.228)	(-0.116, 0.163)		(0.119)	(-0.381, 0.532)	
Park1	-0.180	-0.056	-3.662	0.072	0.139	19.240
	(0.167)	(-0.159, 0.046)		(0.091)	(-0.234, 0.511)	
Park2	-0.164	-0.051	-3.324	0.172	0.334	46.324
	(0.204)	(-0.177, 0.074)		(0.116)	(-0.204, 0.871)	
Street1	0.097	0.030	1.973	0.050	0.096	13.369
	(0.157)	(-0.065, 0.126)		(0.081)	(-0.230, 0.422)	
Transit1	-0.201	-0.063	-4.078	-0.122	-0.237	-32.934
	(0.219)	(-0.198, 0.072)		(0.123)	(-0.723, 0.249)	
Transit2	0.267	0.083	5.427	-0.216*	-0.418	-57.997
	(0.220)	(-0.049, 0.216)		(0.122)	(-0.978, 0.143)	
Transit3	0.128	0.040	2.589	-0.221*	-0.428	-59.396
	(0.228)	(-0.099, 0.179)		(0.120)	(-1.012, 0.157)	
Cost	-0.104	-0.033	-2.120	0.706***	1.368	189.938
	(0.478)	(-0.328, 0.263)		(0.263)	(-0.821, 3.556)	
Observations		6,330			18,560	
AIC		7,310.400			20,456.950	
BIC		7,634.546			20,832.731	
McFadden R^2		0.178			0.209	
Log Likelihood		-3,607.200			-10,180.480	
LR Test (df = 48)		1,559.507***			5,363.759***	

Notes: Estimation by maximum likelihood of the mixed logit (ML) model. *CommuteDist* is equal to 1 if primary reason that led to the choice of current residence is commute distance to job/school, and 0 otherwise. Heteroskedasticity-robust standard errors in parenthesis. Marginal rate of substitution (MRS) and differential in willingness to pay (DWTP) estimates are computed from ML model. The 95% confidence intervals of MRS estimates are obtained using delta method. The DWTP estimates for homeowners are converted from one-time payments to their monthly equivalents by first applying Moon and Miller (2018)'s estimate of the median number of years a Wasatch Front homeowner remains in his/her home and then converting from years to months. *p<0.1; **p<0.05; ***p<0.01.

Table D11: Primary reason-interaction results (home price).

Attribute Level Interacted with *HomePrice*	Renter			Homeowner		
	Coefficient	MRS	DWTP	Coefficient	MRS	DWTP
Commute1	-0.115	-0.029	-1.863	0.074	0.045	6.265
	(0.197)	(-0.125, 0.068)		(0.098)	(-0.071, 0.162)	
Commute2	-0.170	-0.042	-2.753	0.020	0.012	1.686
	(0.199)	(-0.138, 0.053)		(0.096)	(-0.102, 0.126)	
Commute3	-0.315	-0.078	-5.085	0.079	0.048	6.677
	(0.211)	(-0.179, 0.022)		(0.092)	(-0.063, 0.159)	
Dest1	0.006	0.001	0.095	-0.020	-0.012	-1.688
	(0.232)	(-0.112, 0.114)		(0.107)	(-0.140, 0.115)	
Dest2	-0.042	-0.010	-0.680	0.041	0.025	3.488
	(0.218)	(-0.116, 0.096)		(0.100)	(-0.094, 0.144)	
Dest3	0.597***	0.148	9.639	0.018	0.011	1.546
	(0.225)	(0.040, 0.256)		(0.101)	(-0.109, 0.131)	
House1	-0.257	-0.064	-4.146	-0.097	-0.059	-8.160
	(0.172)	(-0.148, 0.020)		(0.082)	(-0.158, 0.040)	
House2	0.231	0.057	3.729	-0.024	-0.015	-2.025
	(0.206)	(-0.042, 0.157)		(0.093)	(-0.125, 0.096)	
House3	0.636***	0.158	10.266	-0.175*	-0.106	-14.715
	(0.239)	(0.045, 0.271)		(0.104)	(-0.233, 0.021)	
Park1	-0.061	-0.015	-0.989	-0.139*	-0.084	-11.720
	(0.161)	(-0.093, 0.063)		(0.079)	(-0.178, 0.009)	
Park2	-0.250	-0.062	-4.046	-0.227**	-0.138	-19.144
	(0.205)	(-0.160, 0.035)		(0.101)	(-0.260, -0.016)	
Street1	-0.206	-0.051	-3.324	-0.095	-0.057	-7.981
	(0.149)	(-0.123, 0.021)		(0.068)	(-0.139, 0.024)	
Transit1	0.108	0.027	1.737	-0.142	-0.086	-11.970
	(0.222)	(-0.082, 0.136)		(0.103)	(-0.208, 0.035)	
Transit2	-0.271	-0.067	-4.384	-0.023	-0.014	-1.915
	(0.224)	(-0.173, 0.039)		(0.105)	(-0.138, 0.110)	
Transit3	0.265	0.066	4.280	0.002	0.001	0.192
	(0.231)	(-0.047, 0.179)		(0.106)	(-0.125, 0.127)	
Cost	-0.998**	-0.248	-16.127	-0.712***	-0.432	-60.042
	(0.498)	(-0.444, -0.053)		(0.227)	(-0.619, -0.246)	
Observations		6,330			18,560	
AIC		7,279.003			20,478.215	
BIC		7,603.150			20,853.996	
McFadden R^2		0.181			0.208	
Log Likelihood		-3,591.501			-10,191.110	
LR Test (df = 48)		1,590.903***			5,342.494***	

Notes: Estimation by maximum likelihood of the mixed logit (ML) model. *HomePrice* is equal to 1 if primary reason that led to the choice of current residence is price of homes, and 0 otherwise. Heteroskedasticity-robust standard errors in parenthesis. Marginal rate of substitution (MRS) and differential in willingness to pay (DWTP) estimates are computed from ML model. The 95% confidence intervals of MRS estimates are obtained using delta method. The DWTP estimates for homeowners are converted from one-time payments to their monthly equivalents by first applying Moon and Miller (2018)'s estimate of the median number of years a Wasatch Front homeowner remains in his/her home and then converting from years to months. *p<0.1; **p<0.05; ***p<0.01.

Table D12: Primary reason-interaction results (family/friends).

Attribute Level Interacted with *FamilyClose*	Renter			Homeowner		
	Coefficient	MRS	DWTP	Coefficient	MRS	DWTP
Commute1	-0.088	-0.018	-1.158	-0.094	-0.087	-12.024
	(0.563)	(-0.240, 0.204)		(0.126)	(-0.315, 0.141)	
Commute2	0.484	0.098	6.347	0.071	0.066	9.138
	(0.558)	(-0.119, 0.314)		(0.120)	(-0.152, 0.283)	
Commute3	-0.086	-0.017	-1.122	-0.029	-0.026	-3.658
	(0.608)	(-0.257, 0.223)		(0.120)	(-0.244, 0.191)	
Dest1	1.070*	0.216	14.029	0.091	0.084	11.636
	(0.642)	(-0.021, 0.452)		(0.140)	(-0.169, 0.337)	
Dest2	1.213*	0.245	15.906	0.200	0.185	25.701
	(0.633)	(0.015, 0.475)		(0.128)	(-0.049, 0.419)	
Dest3	0.395	0.080	5.174	0.138	0.128	17.727
	(0.616)	(-0.161, 0.321)		(0.130)	(-0.109, 0.364)	
House1	0.814	0.164	10.668	-0.105	-0.097	-13.455
	(0.545)	(-0.039, 0.367)		(0.107)	(-0.292, 0.098)	
House2	0.681	0.137	8.930	0.016	0.015	2.027
	(0.545)	(-0.073, 0.348)		(0.124)	(-0.209, 0.239)	
House3	0.979	0.198	12.838	0.064	0.059	8.251
	(0.618)	(-0.036, 0.431)		(0.133)	(-0.181, 0.300)	
Park1	-1.201**	-0.242	-15.753	-0.072	-0.066	-9.209
	(0.515)	(-0.420, -0.065)		(0.104)	(-0.255, 0.122)	
Park2	-0.494	-0.100	-6.476	-0.027	-0.025	-3.411
	(0.610)	(-0.336, 0.137)		(0.128)	(-0.257, 0.208)	
Street1	0.063	0.013	0.821	0.081	0.075	10.439
	(0.399)	(-0.145, 0.170)		(0.090)	(-0.088, 0.238)	
Transit1	-0.158	-0.032	-2.075	0.072	0.067	9.242
	(0.568)	(-0.256, 0.192)		(0.133)	(-0.175, 0.308)	
Transit2	0.770	0.155	10.099	0.169	0.156	21.684
	(0.601)	(-0.073, 0.384)		(0.133)	(-0.085, 0.397)	
Transit3	0.646	0.130	8.470	0.417***	0.385	53.500
	(0.610)	(-0.105, 0.366)		(0.139)	(0.127, 0.643)	
Cost	-2.146	-0.433	-28.135	-0.086	-0.080	-11.067
	(1.420)	(-0.980, 0.114)		(0.287)	(-0.604, 0.445)	
Observations		6,330			18,560	
AIC		7,312.645			20,482.945	
BIC		7,636.791			20,858.726	
McFadden R^2		0.177			0.207	
Log Likelihood		-3,608.322			-10,193.470	
LR Test (df = 48)		1,557.262***			5,337.764***	

Notes: Estimation by maximum likelihood of the mixed logit (ML) model. *FamilyClose* is equal to 1 if primary reason that led to the choice of current residence is proximity to family and/or friends, and 0 otherwise. Heteroskedasticity-robust standard errors in parenthesis. Marginal rate of substitution (MRS) and differential in willingness to pay (DWTP) estimates are computed from ML model. The 95% confidence intervals of MRS estimates are obtained using delta method. The DWTP estimates for homeowners are converted from one-time payments to their monthly equivalents by first applying Moon and Miller (2018)'s estimate of the median number of years a Wasatch Front homeowner remains in his/her home and then converting from years to months. *p<0.1; **p<0.05; ***p<0.01.

Table D13: Primary reason-interaction results (more space).

Attribute Level Interacted with *MoreSpace*	Renter Coefficient	Renter MRS	Renter DWTP	Homeowner Coefficient	Homeowner MRS	Homeowner DWTP
Commute1	0.304	0.075	4.845	0.086	0.079	10.950
	(0.482)	(-0.157, 0.307)		(0.135)	(-0.163, 0.321)	
Commute2	0.339	0.083	5.404	0.174	0.159	22.073
	(0.499)	(-0.156, 0.322)		(0.127)	(-0.068, 0.386)	
Commute3	-0.058	-0.014	-0.930	0.333***	0.304	42.234
	(0.606)	(-0.305, 0.277)		(0.125)	(0.077, 0.531)	
Dest1	0.195	0.048	3.109	0.013	0.012	1.654
	(0.511)	(-0.196, 0.292)		(0.145)	(-0.247, 0.271)	
Dest2	0.107	0.026	1.700	0.003	0.003	0.374
	(0.521)	(-0.224, 0.276)		(0.136)	(-0.241, 0.246)	
Dest3	0.197	0.048	3.137	-0.022	-0.020	-2.780
	(0.549)	(-0.215, 0.312)		(0.134)	(-0.261, 0.221)	
House1	0.734	0.180	11.685	0.097	0.088	12.233
	(0.486)	(-0.047, 0.406)		(0.110)	(-0.110, 0.286)	
House2	0.134	0.033	2.138	0.128	0.117	16.254
	(0.444)	(-0.181, 0.247)		(0.122)	(-0.103, 0.337)	
House3	0.914	0.224	14.565	0.025	0.023	3.182
	(0.590)	(-0.051, 0.500)		(0.143)	(-0.234, 0.280)	
Park1	-0.298	-0.073	-4.752	-0.264**	-0.241	-33.519
	(0.380)	(-0.256, 0.109)		(0.110)	(-0.443, -0.039)	
Park2	-1.081*	-0.265	-17.224	-0.226*	-0.207	-28.705
	(0.595)	(-0.538, 0.008)		(0.136)	(-0.453, 0.039)	
Street1	0.002	0.000	0.030	0.014	0.013	1.786
	(0.374)	(-0.179, 0.180)		(0.091)	(-0.150, 0.176)	
Transit1	0.781	0.191	12.440	0.242*	0.221	30.714
	(0.578)	(-0.078, 0.461)		(0.138)	(-0.026, 0.468)	
Transit2	0.611	0.150	9.725	0.122	0.111	15.405
	(0.565)	(-0.117, 0.416)		(0.141)	(-0.141, 0.363)	
Transit3	0.738	0.181	11.762	0.223	0.204	28.321
	(0.561)	(-0.081, 0.443)		(0.142)	(-0.052, 0.459)	
Cost	1.353	0.332	21.550	-0.013	-0.012	-1.622
	(1.261)	(-0.259, 0.922)		(0.298)	(-0.545, 0.522)	
Observations		6,330			18,560	
AIC		7,316.787			20,481.153	
BIC		7,640.934			20,856.934	
McFadden R^2		0.177			0.208	
Log Likelihood		-3,610.394			-10,192.580	
LR Test (df = 48)		1,553.119***			5,339.556***	

Notes: Estimation by maximum likelihood of the mixed logit (ML) model. *MoreSpace* is equal to 1 if primary reason that led to the choice of current residence is more living space, and 0 otherwise. Heteroskedasticity-robust standard errors in parenthesis. Marginal rate of substitution (MRS) and differential in willingness to pay (DWTP) estimates are computed from ML model. The 95% confidence intervals of MRS estimates are obtained using delta method. The DWTP estimates for homeowners are converted from one-time payments to their monthly equivalents by first applying Moon and Miller (2018)'s estimate of the median number of years a Wasatch Front homeowner remains in his/her home and then converting from years to months. *p<0.1; **p<0.05; ***p<0.01.

D.3 Lifestyle Characteristics (Non-Location-Specific Effects)

Table D14: Home value-interaction results.

Attribute Level Interacted with *HomeValue*	Homeowner		
	Coefficient	MRS	DWTP
Commute1	-0.023	-0.003	-0.400
	(0.084)	(-0.024, 0.018)	
Commute2	-0.034	-0.004	-0.589
	(0.084)	(-0.026, 0.017)	
Commute3	0.054	0.007	0.956
	(0.081)	(-0.013, 0.027)	
Dest1	0.038	0.005	0.675
	(0.096)	(-0.019, 0.029)	
Dest2	0.066	0.008	1.153
	(0.092)	(-0.015, 0.031)	
Dest3	0.061	0.008	1.064
	(0.090)	(-0.015, 0.030)	
House1	0.033	0.004	0.571
	(0.073)	(-0.014, 0.022)	
House2	0.227***	0.029	3.989
	(0.082)	(0.003, 0.055)	
House3	0.136	0.017	2.387
	(0.090)	(-0.007, 0.042)	
Park1	-0.123*	-0.016	-2.169
	(0.069)	(-0.036, 0.004)	
Park2	0.017	0.002	0.295
	(0.089)	(-0.020, 0.024)	
Street1	-0.052	-0.007	-0.918
	(0.060)	(-0.022, 0.009)	
Transit1	-0.087	-0.011	-1.533
	(0.095)	(-0.036, 0.014)	
Transit2	0.120	0.015	2.103
	(0.094)	(-0.008, 0.038)	
Transit3	0.085	0.011	1.496
	(0.093)	(-0.012, 0.034)	
Cost	0.598***	0.076	10.502
	(0.205)	(0.068, 0.083)	
Observations	19,480		
AIC	21,579.056		
BIC	21,957.159		
McFadden R^2	0.204		
Log Likelihood	-10,741.530		
LR Test (df = 48)	5,517.151***		

Notes: Estimation by maximum likelihood of the mixed logit (ML) model. *HomeValue* is the natural logarithm of respondent (homeowner) estimated value of home. Heteroskedasticity-robust standard errors in parenthesis. Marginal rate of substitution (MRS) and differential in willingness to pay (DWTP) estimates are computed from ML model. The 95% confidence intervals of MRS estimates are obtained using delta method. The DWTP estimates for homeowners are converted from one-time payments to their monthly equivalents by first applying Moon and Miller (2018)'s estimate of the median number of years a Wasatch Front homeowner remains in his/her home and then converting from years to months. *p<0.1; **p<0.05; ***p<0.01.

Table D15: Number of bicycles-interaction results.

Attribute Level Interacted with *#Bicycles*	Renter			Homeowner		
	Coefficient	MRS	DWTP	Coefficient	MRS	DWTP
Commute1	8.538*	0.051	3.298	-0.004	-0.002	-0.245
	(4.422)	(-0.002, 0.103)		(0.033)	(-0.030, 0.026)	
Commute2	2.421	0.014	0.935	0.004	0.002	0.229
	(3.743)	(-0.029, 0.058)		(0.032)	(-0.026, 0.029)	
Commute3	0.907	0.005	0.350	0.006	0.003	0.352
	(3.608)	(-0.037, 0.047)		(0.034)	(-0.027, 0.032)	
Dest1	4.762	0.028	1.839	-0.030	-0.013	-1.866
	(4.277)	(-0.022, 0.078)		(0.039)	(-0.047, 0.021)	
Dest2	0.151	0.001	0.058	-0.029	-0.013	-1.767
	(3.737)	(-0.043, 0.044)		(0.036)	(-0.045, 0.019)	
Dest3	-2.352	-0.014	-0.908	-0.032	-0.014	-1.982
	(4.837)	(-0.071, 0.043)		(0.038)	(-0.047, 0.019)	
House1	-0.446	-0.003	-0.172	0.066**	0.029	4.018
	(3.437)	(-0.043, 0.037)		(0.028)	(0.004, 0.054)	
House2	-4.480	-0.027	-1.730	0.106***	0.047	6.485
	(3.661)	(-0.070, 0.016)		(0.034)	(0.015, 0.079)	
House3	2.604	0.015	1.006	0.153***	0.068	9.395
	(4.259)	(-0.035, 0.066)		(0.040)	(0.028, 0.107)	
Park1	-5.529*	-0.033	-2.136	-0.010	-0.004	-0.597
	(3.021)	(-0.069, 0.003)		(0.027)	(-0.028, 0.019)	
Park2	-4.985	-0.030	-1.926	0.013	0.006	0.792
	(3.922)	(-0.077, 0.018)		(0.034)	(-0.024, 0.035)	
Street1	5.992**	0.036	2.314	0.002	0.001	0.125
	(2.933)	(0.001, 0.071)		(0.023)	(-0.01, 0.020)	
Transit1	4.110	0.024	1.588	-0.010	-0.004	-0.619
	(4.828)	(-0.031, 0.080)		(0.037)	(-0.037, 0.028)	
Transit2	-5.341	-0.032	-2.063	0.042	0.019	2.580
	(4.158)	(-0.082, 0.018)		(0.037)	(-0.012, 0.050)	
Transit3	-7.594	-0.045	-2.933	0.079**	0.035	4.827
	(4.750)	(-0.102, 0.011)		(0.037)	(0.002, 0.067)	
Cost	-8.382	-0.050	-3.237	0.039	0.017	2.373
	(9.206)	(-0.168, 0.069)		(0.081)	(-0.048, 0.083)	
Observations		2,390			9,190	
AIC		2739.272			9616.350	
BIC		3016.666			9958.392	
McFadden R^2		0.202			0.252	
Log Likelihood		-1,321.636			-4,760.175	
LR Test (df = 48)		669.234***			3,206.965***	

Notes: Estimation by maximum likelihood of the mixed logit (ML) model. *#Bicycles* is the sum of adult and children bikes in household. Heteroskedasticity-robust standard errors in parenthesis. Marginal rate of substitution (MRS) and differential in willingness to pay (DWTP) estimates are computed from ML model. The 95% confidence intervals of MRS estimates are obtained using delta method. The DWTP estimates for homeowners are converted from one-time payments to their monthly equivalents by first applying Moon and Miller (2018)'s estimate of the median number of years a Wasatch Front homeowner remains in his/her home and then converting from years to months. *p<0.1; **p<0.05; ***p<0.01.

Table D16: Infill land attitude-interaction results.

Attribute Level Interacted with *Attitude:Infill*	Renter			Homeowner		
	Coefficient	MRS	DWTP	Coefficient	MRS	DWTP
Commute1	-58.747	-0.300	-19.505	-15.548	-0.241	-33.442
	(64.875)	(-0.914, 0.314)		(56.046)	(-0.714, 0.233)	
Commute2	-44.751	-0.229	-14.858	0.446	0.007	0.960
	(57.128)	(-0.785, 0.328)		(13.507)	(-0.397, 0.411)	
Commute3	17.856	0.091	5.929	5.621	0.087	12.090
	(50.904)	(-0.432, 0.615)		(23.528)	(-0.312, 0.487)	
Dest1	-6.977	-0.036	-2.316	-17.360	-0.269	-37.339
	(44.792)	(-0.469, 0.398)		(62.220)	(-0.788, 0.250)	
Dest2	-84.841	-0.433	-28.169	-37.074	-0.574	-79.743
	(68.057)	(-0.903, 0.037)		(129.328)	(-1.286, 0.138)	
Dest3	-66.353	-0.339	-22.030	-2.222	-0.034	-4.779
	(66.164)	(-0.860, 0.182)		(16.155)	(-0.472, 0.404)	
House1	4.608	0.024	1.530	36.115	0.559	77.681
	(45.842)	(-0.442, 0.489)		(126.851)	(-0.017, 1.135)	
House2	49.424	0.252	16.410	-1.793	-0.028	-3.858
	(58.389)	(-0.360, 0.865)		(14.504)	(-0.421, 0.366)	
House3	153.167	0.782	50.854	-22.088	-0.342	-47.510
	(106.596)	(-0.208, 1.773)		(78.156)	(-0.828, 0.144)	
Park1	75.120	0.384	24.941	5.548	0.086	11.933
	(49.140)	(-0.070, 0.838)		(22.715)	(-0.253, 0.425)	
Park2	27.252	0.139	9.048	28.418	0.440	61.124
	(39.344)	(-0.276, 0.554)		(101.227)	(-0.115, 0.996)	
Street1	56.467	0.288	18.748	16.744	0.259	36.015
	(48.570)	(-0.117, 0.694)		(59.455)	(-0.084, 0.603)	
Transit1	45.305	0.231	15.042	3.107	0.048	6.683
	(41.127)	(-0.167, 0.629)		(18.935)	(-0.413, 0.509)	
Transit2	55.238	0.282	18.340	-10.610	-0.164	-22.820
	(47.911)	(-0.236, 0.800)		(39.904)	(-0.609, 0.281)	
Transit3	142.483	0.728	47.307	-4.286	-0.066	-9.218
	(112.699)	(-0.335, 1.790)		(21.217)	(-0.513, 0.380)	
Cost	-27.742	-0.142	-9.211	-35.066	-0.543	-75.424
	(123.307)	(-1.373, 1.090)		(126.161)	(-1.980, 0.894)	
Observations		540			1,970	
AIC		624.225			2,181.599	
BIC		830.221			2,449.717	
McFadden R^2		0.294			0.236	
Log Likelihood		-264.113			-1,042.799	
LR Test (df = 48)		219.633***			642.468***	

Notes: Estimation by maximum likelihood of the mixed logit (ML) model. *Attitude:Infill* is equal to 1 if respondent either agrees or strongly agrees with the statement "a top transportation priority should be to promote infill land development and redevelopment." Heteroskedasticity-robust standard errors in parenthesis. Marginal rate of substitution (MRS) and differential in willingness to pay (DWTP) estimates are computed from ML model. The 95% confidence intervals of MRS estimates are obtained using delta method. The DWTP estimates for homeowners are converted from one-time payments to their monthly equivalents by first applying Moon and Miller (2018)'s estimate of the median number of years a Wasatch Front homeowner remains in his/her home and then converting from years to months. *p<0.1; **p<0.05; ***p<0.01.

Table D17: Amenities attitude-interaction results.

Attribute Level Interacted with *Attitude:Amenities*	Renter			Homeowner		
	Coefficient	MRS	DWTP	Coefficient	MRS	DWTP
Commute1	9.563	0.049	3.162	-45.318	-0.452	-62.831
	(45.986)	(-0.415, 0.512)		(246.445)	(-1.049, 0.144)	
Commute2	-24.544	-0.125	-8.115	-12.182	-0.122	-16.889
	(46.324)	(-0.595, 0.346)		(70.879)	(-0.590, 0.347)	
Commute3	35.833	0.182	11.847	-64.303	-0.642	-89.155
	(48.821)	(-0.324, 0.689)		(346.206)	(-1.267, -0.017)	
Dest1	-12.884	-0.066	-4.260	8.651	0.086	11.994
	(52.945)	(-0.593, 0.462)		(51.454)	(-0.412, 0.585)	
Dest2	19.187	0.098	6.344	-34.919	-0.349	-48.414
	(45.071)	(-0.357, 0.552)		(189.287)	(-0.931, 0.233)	
Dest3	0.636	0.003	0.210	-51.317	-0.512	-71.150
	(55.153)	(-0.547, 0.554)		(275.290)	(-1.123, 0.098)	
House1	-107.784**	-0.548	-35.636	-25.701	-0.257	-35.634
	(46.162)	(-1.059, -0.038)		(138.581)	(-0.693, 0.180)	
House2	1.486	0.008	0.491	-25.763	-0.257	-35.720
	(41.866)	(-0.412, 0.427)		(138.748)	(-0.684, 0.169)	
House3	-57.098	-0.290	-18.878	13.465	0.134	18.669
	(47.952)	(-0.761, 0.180)		(74.476)	(-0.332, 0.601)	
Park1	5.137	0.026	1.699	38.541	0.385	53.436
	(32.451)	(-0.299, 0.351)		(207.620)	(-0.049, 0.819)	
Park2	80.785*	0.411	26.710	58.676	0.586	81.353
	(46.587)	(-0.142, 0.964)		(314.917)	(-0.029, 1.201)	
Street1	8.578	0.044	2.836	27.844	0.278	38.605
	(32.708)	(-0.289, 0.376)		(146.943)	(-0.149, 0.704)	
Transit1	67.564	0.344	22.339	44.712	0.446	61.991
	(56.541)	(-0.245, 0.932)		(241.881)	(-0.059, 0.952)	
Transit2	-2.692	-0.014	-0.890	26.675	0.266	36.984
	(46.624)	(-0.477, 0.450)		(144.808)	(-0.273, 0.806)	
Transit3	-29.982	-0.153	-9.913	30.257	0.302	41.950
	(49.717)	(-0.652, 0.347)		(166.623)	(-0.266, 0.870)	
Cost	33.161	0.169	10.964	33.498	0.334	46.444
	(101.080)	(-0.790, 1.128)		(184.037)	(-0.531, 1.199)	
Observations		390			1,060	
AIC		463.699			1,175.079	
BIC		654.074			1,413.448	
McFadden R^2		0.319			0.264	
Log Likelihood		-183.849			-539.539	
LR Test (df = 48)		172.300***			387.218***	

Notes: Estimation by maximum likelihood of the mixed logit (ML) model. *Attitude:Amenities* is equal to 1 if respondent either agrees or strongly agrees with the statement "I would be willing to pay higher taxes in order to build more sidewalks, trails, and bicycle lanes." Heteroskedasticity-robust standard errors in parenthesis. Marginal rate of substitution (MRS) and differential in willingness to pay (DWTP) estimates are computed from ML model. The 95% confidence intervals of MRS estimates are obtained using delta method. The DWTP estimates for homeowners are converted from one-time payments to their monthly equivalents by first applying Moon and Miller (2018)'s estimate of the median number of years a Wasatch Front homeowner remains in his/her home and then converting from years to months. *p<0.1; **p<0.05; ***p<0.01.

E Robustness Check with the First-Five Choice Scenarios

Table E1: Renter results (parsimonious model).

	MNL	ML		MRS	MWTP
		Mean	Std. Deviation		
Constant	0.045	2.037	—	—	—
	(0.040)	(2.124)	—	—	
Commute1	-0.075	-13.161***	-70.368***	-0.092	-5.952
	(0.078)	(4.251)	(5.794)	(-0.150, -0.033)	
Commute2	-0.445***	-44.768***	-35.113***	-0.311	-20.245
	(0.078)	(4.237)	(4.880)	(-0.377, -0.246)	
Commute3	-0.956***	-84.884***	-37.361***	-0.591	-38.385
	(0.079)	(5.065)	(4.889)	(-0.685, -0.496)	
Dest1	-0.079	-9.860**	43.922***	-0.069	-4.459
	(0.090)	(4.554)	(5.526)	(-0.132, -0.005)	
Dest2	-0.396***	-37.209***	34.191***	-0.259	-16.826
	(0.085)	(4.215)	(4.386)	(-0.324, -0.193)	
Dest3	-0.820***	-73.467***	83.090***	-0.511	-33.222
	(0.081)	(4.470)	(6.285)	(-0.594, -0.428)	
House1	0.335***	28.883***	17.516***	0.201	13.061
	(0.068)	(3.971)	(3.739)	(0.150, 0.252)	
House2	0.338***	25.187***	22.433***	0.175	11.390
	(0.077)	(4.052)	(4.073)	(0.122, 0.229)	
House3	0.438***	41.548***	147.376***	0.289	18.788
	(0.081)	(5.140)	(9.416)	(0.216, 0.363)	
Park1	-0.609***	-45.931***	-24.893***	-0.320	-20.770
	(0.063)	(3.719)	(3.649)	(-0.377, -0.262)	
Park2	-0.802***	-65.049***	-56.471***	-0.453	-29.416
	(0.080)	(5.011)	(5.201)	(-0.529, -0.376)	
Street1	0.473***	38.681***	-67.575***	0.269	17.492
	(0.057)	(4.076)	(4.465)	(0.212, 0.326)	
Transit1	-0.157*	-14.801***	37.585***	-0.103	-6.693
	(0.086)	(4.153)	(4.951)	(-0.162, -0.044)	
Transit2	-0.500***	-45.552***	7.892*	-0.317	-20.599
	(0.086)	(4.808)	(4.087)	(-0.395, -0.239)	
Transit3	-0.732***	-64.955***	-103.156***	-0.452	-29.373
	(0.089)	(4.752)	(7.303)	(-0.540, -0.364)	
Cost	-1.785***	-143.739***	—	—	—
	(0.190)	(6.133)	—	—	
Observations	3,355	3,355		—	—
AIC	3,823.516	3,799.481		—	—
BIC	3,927.525	3,995.263		—	—
McFadden R^2	0.185	0.196		—	—
Log Likelihood	-1,894.758	-1,867.740		—	—
LR Test	858.580*** (df = 17)	912.615*** (df = 32)		—	—

Notes: Estimation by maximum likelihood of the multinomial logit (MNL) and mixed logit (ML) models using the first-five choice situations per respondent. Heteroskedasticity-robust standard errors in parenthesis. Marginal rate of substitution (MRS) and marginal willingness to pay (MWTP) estimates are computed from ML model. The 95% confidence intervals of MRS estimates are obtained using delta method. $^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$.

Table E2: Homeowner results (parsimonious model).

	MNL	ML		MRS	MWTP
		Mean	Std. Deviation		
Constant	0.037	0.050	—	—	—
	(0.024)	(0.031)	—	—	
Commute1	-0.142***	-0.242***	-0.003	-0.223	-31.034
	(0.048)	(0.066)	(0.984)	(-0.355, -0.092)	
Commute2	-0.173***	-0.269***	0.293	-0.248	-34.512
	(0.047)	(0.065)	(0.549)	(-0.368, -0.129)	
Commute3	-0.536***	-0.730***	-0.162	-0.675	-93.734
	(0.045)	(0.077)	(0.595)	(-0.871, -0.478)	
Dest1	-0.072	-0.098	-0.009	-0.090	-12.520
	(0.053)	(0.068)	(0.729)	(-0.214, 0.034)	
Dest2	-0.319***	-0.433***	0.063	-0.400	-55.558
	(0.050)	(0.070)	(0.418)	(-0.555, -0.245)	
Dest3	-0.659***	-0.928***	1.299***	-0.858	-119.168
	(0.048)	(0.094)	(0.227)	(-1.110, -0.606)	
House1	0.154***	0.197***	-0.401	0.182	25.263
	(0.040)	(0.054)	(0.348)	(0.076, 0.288)	
House2	0.509***	0.622***	0.397	0.575	79.861
	(0.046)	(0.071)	(0.315)	(0.394, 0.756)	
House3	0.418***	0.579***	1.031***	0.535	74.294
	(0.047)	(0.076)	(0.247)	(0.358, 0.712)	
Park1	-1.047***	-1.403***	-0.641***	-1.297	-180.120
	(0.038)	(0.108)	(0.242)	(-1.637, -0.957)	
Park2	-1.255***	-1.673***	0.508**	-1.547	-214.822
	(0.049)	(0.131)	(0.257)	(-1.962, -1.132)	
Street1	0.383***	0.515***	0.554***	0.476	66.173
	(0.033)	(0.055)	(0.200)	(0.325, 0.628)	
Transit1	0.054	0.088	-0.462*	0.082	11.336
	(0.051)	(0.067)	(0.246)	(-0.044, 0.207)	
Transit2	-0.245***	-0.318***	-0.469*	-0.294	-40.837
	(0.050)	(0.068)	(0.266)	(-0.426, -0.162)	
Transit3	-0.357***	-0.464***	0.357	-0.429	-59.604
	(0.052)	(0.071)	(0.350)	(-0.586, -0.272)	
Cost	-0.764***	-1.082***	—	—	—
	(0.110)	(0.161)	—	—	
Observations	9,740	9,740		—	—
AIC	10,867.373	10,866.555		—	—
BIC	10,989.501	11,096.443		—	—
McFadden R^2	0.197	0.200		—	—
Log Likelihood	-5,416.687	-5,401.278		—	—
LR Test	2,665.269*** (df = 17)	2,696.087*** (df = 32)		—	—

Notes: Estimation by maximum likelihood of the multinomial logit (MNL) and mixed logit (ML) models using the first-five choice situations per respondent. Heteroskedasticity-robust standard errors in parenthesis. Marginal rate of substitution (MRS) and marginal willingness to pay (MWTP) estimates are computed from ML model. The 95% confidence intervals of MRS estimates are obtained using delta method. The MWTP estimates are converted from one-time payments to their monthly equivalents by first applying Moon and Miller (2018)'s estimate of the median number of years a Wasatch Front homeowner remains in his/her home and then converting from years to months. *p<0.1; **p<0.05; ***p<0.01.