Foye, C. (2021) Social construction of house size expectations: testing the positional good theory and aspiration spiral theory using UK and German panel data. *Housing Studies*, 36(9), pp. 1513-1532.

(doi: 10.1080/02673037.2020.1795086)

Social construction of house size expectations: testing the positional good theory and aspiration spiral theory using UK and German panel data

Chris Foye, University of Glasgow (chris.foye@glasgow.ac.uk)

Abstract

This paper examines the social construction of house size expectations in two national panel datasets: German Socio Economic Panel Study (GSOEP) and the British Household Panel Study (BHPS). More specifically, it tests the aspiration spiral theory and positional good theory using data on housing/life satisfaction and house size judgements. In both countries, it finds substantial evidence that the current space expectations of individuals who have 'upsized' depends on the level of living space they experienced in the past year. For downsizers, however, the evidence in support of the aspiration spiral theory is weaker. In terms of the positional good theory, this paper finds no consistent evidence that an individual's space expectations are influenced by those around them. In both countries, the paper tests for two reference groups – the average level of living space in the region, and the mean size of the largest decile of houses in the region – and neither are found to be significant.

Accepted for publication in Housing Studies in July 2020

1. INTRODUCTION

This paper is concerned with the social construction of house size expectations in two countries: UK and Germany. In particular, we test the extent to which the level of living space an individual considers adequate – their current space expectations – are shaped by the levels of living space they have experienced in the past (adaptation), and the levels of living space of those around them (social comparisons).

Sociologists and anthropologists have long argued that space expectations are moulded by an individual's cultural upbringing and class, with Karl Marx making reference to the importance of social context in determining house size expectations (Marx and Engels, 1845). More recently, Pader (1994) has demonstrated that attitudes towards space vary across communities, describing how children in a small town in Mexico preferred to share the same bed as their siblings, regardless of economic constraints. And in the British context, Silva and Wright (2009) found people with lower levels of cultural capital consistently emphasised space and privacy more than other groups when describing their dream home.

The economics literature also suggests that space preferences vary significantly from country to country with significant implications for public policy. A major reason why house prices and rents are so much less affordable in the UK than in Germany is that demand for space is more income elastic in the former (Meen, 2018). Even if the UK built the same number of homes pro-rata as Germany, house prices would still be comparatively higher because Germans opt to spend a much higher proportion of any income increase on a bigger home.

As well as aiding our understanding of international housing markets, examining where space preferences or expectations originate can also help us understand the relationship between living space and societal well-being. Neo-classical economics tells us that if people prefer more living space, and if these preferences are satisfied, then society will become happier as a result. However, if people partly adapt to changes in living space over time, or ratchet up their house size expectations to keep up with those around them, it implies that the relationship between average living spaces will be more complex, and weaker.

Having highlighted the significance of this issue, the next section of the paper briefly reviews the existing behavioural economics literature on the social construction of space preferences. Section 3 of the paper then introduces the data and methodology; Section 4 presents the results; and Section 5 concludes.

1. LITERATURE REVIEW

The phenomenon with which this paper is concerned can be seen in the two grey lines in Graphs 1, 2 and 3, below, which show the average[i] level of living space (grey solid line), and the average level of living space for *those reporting a space shortage* (grey dotted line) for the UK, East Germany and West Germany. All show a similar pattern over time: as the national median level of living space increases, so do expected levels of living space, and hence, so does the average level of living space of those reporting a space shortage. Behavioural economics advances two theories to explain why societal space expectations increase in-tow with average levels of living space.

Figure 1. Graph tracking life and housing satisfaction (right axis) and size of living space (left axis) over time for UK (Source: BHPS).

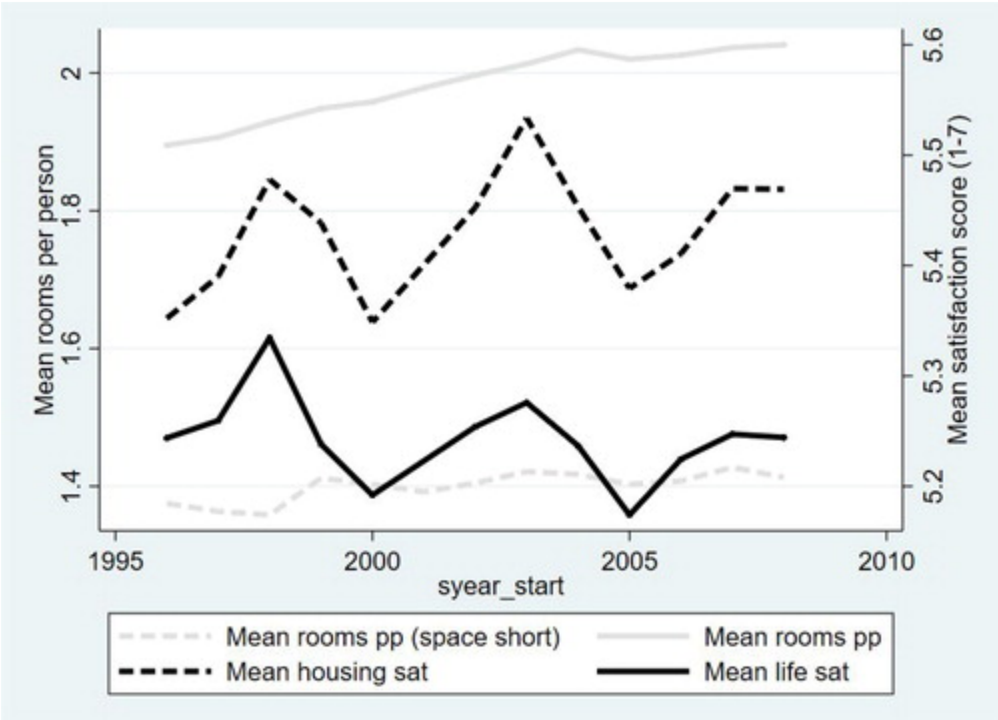


Figure 2. Graph tracking life and housing satisfaction (right axis) and size of living space (left axis) over time for East Germany (Source: GSOEP).

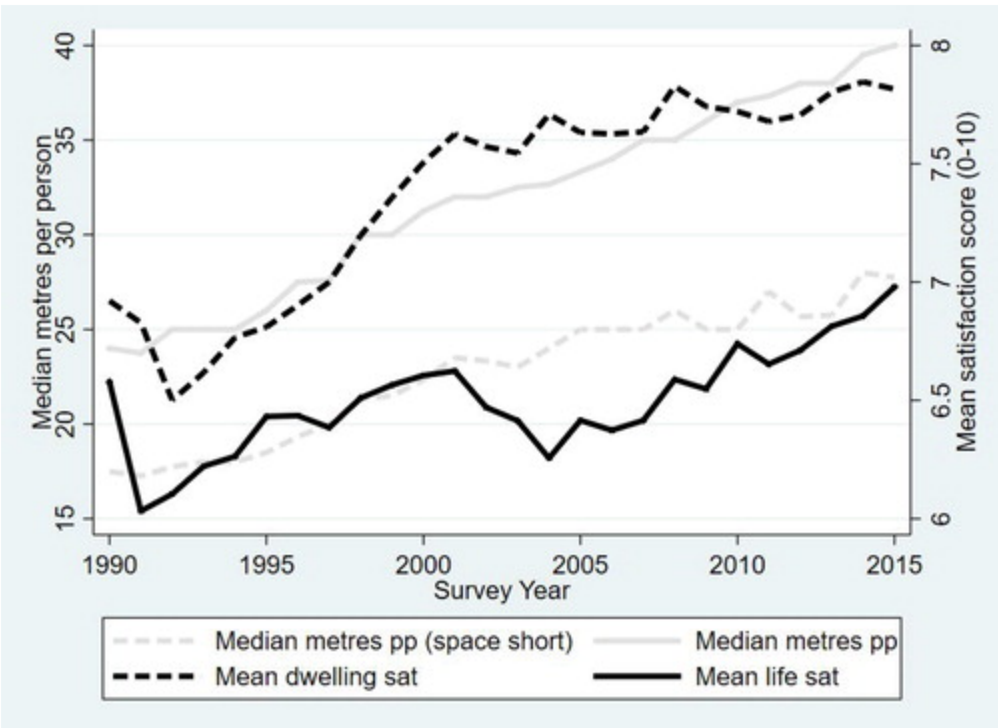
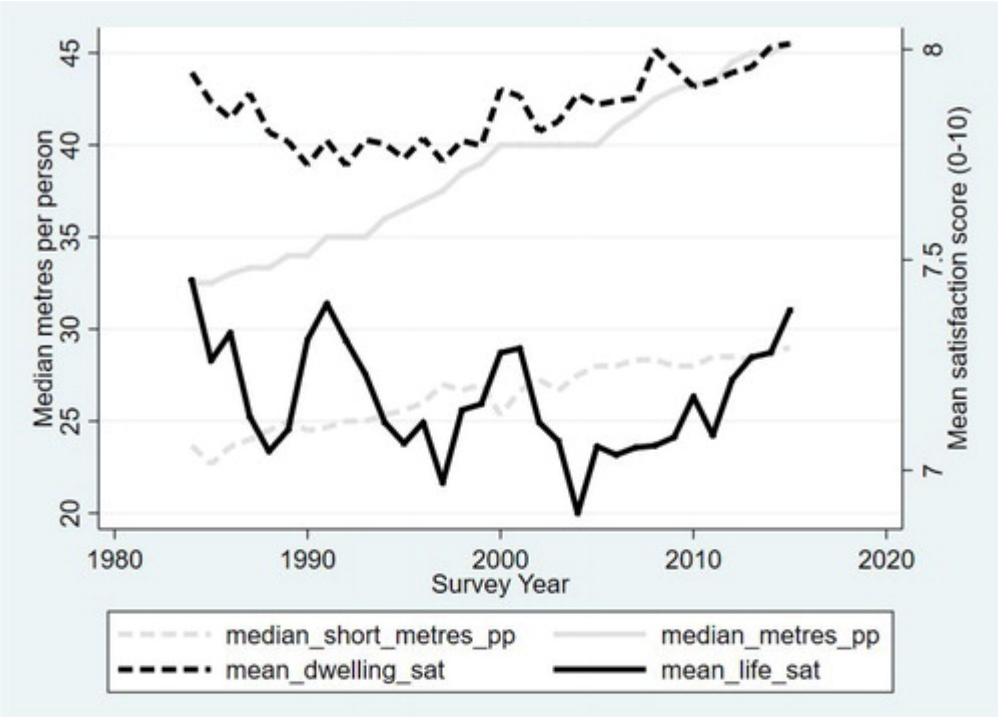


Figure 3. Graph tracking life and housing satisfaction (right axis) and size of living space (left axis) over time for West Germany (Source: GSOEP).



2.1 Aspiration Spiral Theory

The first explanation is that individuals *adapt* to increases in house size through shifting their housing aspirations upwards. There are two methodologies used to test for adaptation. The first is to track people's subjective well-being before and after a major life event. This is the methodology adopted by the fexisting studies on housing and adaptation which tracked people before and after they moved house 'for any reason' (Frijters et al., 2011 and Nowok et al, 2013); moved to a subjectively "better house" (Nakazato et al., 2011); and moved to subjectively "larger accommodation" (Foye, 2017). All found evidence of adaptation in terms of housing satisfaction and/or life satisfaction apart from Nowok et al. who found that moving house (for any reason) led to a sustained increase in life satisfaction (relative to the year before the move).

The second way of testing for adaptation is to test directly for the relationship between an individual's current satisfaction and their past living conditions. This model is most commonly used to test for adaptation to income, with the hypothesis that the higher an individual's income the previous year, the higher their current income expectations will be (e.g. Stutzer, 2004). But it has not yet been used to test for adaptation to house size. This paper addresses this gap by testing for the effect of an individual's past living space on their current space expectations and housing/life satisfaction. Adopting this methodology, which is novel in the context of housing, also allows us to test for 'asymmetric' adaptation. The existing literature suggests that individuals adapt to increases in living space (e.g. Foye, 2018) but tells us nothing about whether the space expectations of *downsizers* are influenced by the level of living space they experienced in the past[ii].

2.2 Positional Good Theory

The second explanation for the phenomenon in Graphs 1, 2 and 3 above is that house size is a positional good: individuals are not only concerned with absolute house size but also *relative* house size. The positional good theory (Frank, 2007) contends that social status is determined by one's relative wealth which can be signalled through the consumption of conspicuous positional goods. The problem with positional goods is that their utility is negatively related to the consumption of others: buying a larger house boosts an individual's social status through signalling a higher level of relative wealth but, by definition, it simultaneously lowers the social status of 'others' who must therefore upsize in response if they are to maintain the same social status. If everyone upsizes to larger accommodation collectively then it maybe no-one better off. Indeed, it maybe that society is worse off, having relied on debt and/or compromised on other non-positional goods, such as proximity to place of work or leisure, in order to afford the larger house (Frank, 2007; Bellet, 2019).

Existing evidence from experimental surveys indicates that individuals care, in theory, about relative house size (Solnick and Hemenway, 2005; Solnick et al. 2007), and there is some evidence that having a small house relative to others in the neighbourhood negatively affects house value (Leguizamon, 2010; Leguizamon and Ross, 2012). The most comprehensive study to date on the positionality of house size though was conducted by Bellet (2019). Using 18 waves of the American Housing Survey from 1984 to 2009 combined with an original sample of more than three million suburban houses built between 1920 and 2009, Bellet tested for four different definitions of 'reference group' at the county-level – top ten percent of house sizes, average house size above and below an individual's house size, and median house size – but only found the first to be consistently significant. More specifically, the average size of top ten percent of houses in a county was negatively related to individual housing satisfaction and self-reported house value, and positively related to the likelihood of an individual upsizing or subscribing to a new loan.

If it is those at the top of the space spectrum that play a disproportionately large role in shaping our space expectations, then there is a clear utilitarian rationale for bringing about a more equal distribution of space, as this would reduce the average person's space expectations while simultaneously increasing their objective levels of living space, thus squeezing the 'housing aspirations gap'(Crawford and McKee, 2018) from both sides. But it is far from clear that people always look upwards when making social comparisons. For example, neither of the income reference group definitions adopted by Ferrer-i-Carbonell (2005) and Luttmer (2005) were upward looking, yet both were found to be statistically significant and of a substantial magnitude. Because reference groups are likely to vary on a case-by-case basis, and because the policy implications of any social comparisons effect hinge on composition of the reference group, it is important that we test for other reference group effects in other international contexts. In this paper, we therefore examine the positionality of house size in two countries, UK and Germany, where there is no existing empirical literature on this topic.

3 DATA AND METHODOLOGY

3.1 Data

Throughout this paper, we draw on data from two datasets: the German Socio-Economic Panel Study (GSOEP) and the British Household Panel Study (BHPS). The GSOEP is an ongoing panel survey with yearly re-interviews. The starting sample in 1984 was almost 6,000 households, and the sample has since been boosted, meaning that in 2015, about 27,000 individuals aged over 16 were interviewed. The BHPS is designed similarly. Starting in 1991, it interviewed a nationally representative sample of 5,500 private households, and after boosters had been added, the sample expanded to 9000 households by 2008[iii]. The space shortage variables – see below – were only included in BHPS from 1996 onwards, so the sample excludes the first five years of the BHPS.

Germany and UK were chosen largely because of their data: these are the only two countries with large and longstanding national panel datasets which include questions on subjective well-being and space judgements. They also make an interesting contrast. The UK has significantly lower levels of living space than Germany. In 2015, the median level of living space in England was 35.5 metres per person (based on the author's calculations using the 2015 English Housing Survey – results not shown) while this number was 40 metres per person in East Germany and 46 metres person in West Germany (see Graphs 2 and 3 above, respectively).

There is also evidence to suggest that demand for space is more income elastic in the UK than Germany (Meen, 2018).This resonates with the argument advanced from a more sociological perspective, that the high levels of home-ownership , house price growth and re-mortgaging observed in the UK over recent decades have been part of a broader neoliberal current promoting 'over-consumption' and housing speculation, turning homes into "a hybrid of money and materials" (Smith, 2008: 521). Contrastingly, in Germany, historically more ordo-liberal than neo-liberal (Kemeny, 1995), real house prices have declined in real terms since 1980's, and its relatively secure and stable (mostly private) rental sector is one of the few in Western Europe to have fended off the rise in home-ownership (Voigtlander, 2009). Taken together, these evidences hint that house size (and housing more generally) may be viewed as more of a positional good in the UK than Germany.

In both East and West Germany, increases in living space (which have been particularly dramatic in the East, post re-unification) have translated into increases in housing satisfaction (see Graphs 2 and 3), but not so in the UK (see Graph 1). Differences in the positionality of house size or adaptation may explain this divergence, but housing satisfaction indicators are influenced by a host of other variables apart from house size judgements (e.g. house conditions, neighbourhoods, overall life satisfaction), so we cannot draw any conclusions from these descriptive statistics alone. We therefore must therefore turn our attention to the regression analysis.

Three main dependent variables are used in this paper's regression analysis. The first two are life satisfaction[iv] and housing satisfaction. In both the BHPS and GSOEP, every individual was asked how satisfied they were with i) their housing or dwelling and ii) their life overall. Both measures were on a scale of 1-7 for the BHPS and 0-10 for the GSOEP. As shown in the graphs above, both these indicators are highly correlated.

The third dependent variable, and a more direct measure of an individual's house size expectations, is 'reported space shortage'. In both the BHPS and GSOEP, the 'main respondent[v]' in the household was asked to rate the size of their living space. In BHPS, they were presented with a series of housing problems, and asked which ones they are experiencing. One of these problems is *"shortage of space"*. If the individual responds *"yes"* ("*no*") then the dependent variable takes on a value of 1 (0). In the GSOEP, the corresponding question is *"What do you think about the total size of your dwelling? For the size of your household, is it…"* to which the 'main respondent' must choose from five options; *"much too small"; "a bit too small"; "just right"; "a bit too large"; "much too large"*. We either collapse this into a three-category 'space adequacy' variable- 0 if response suggests space is adequate or more than adequate, 1 if the response is "*a bit too small"*, and 2 if the response is "*much too small"* – or into a binary 'space shortage' variable by merging responses 1 and 2.

To calculate the size of living space that an individual occupies, for the GSOEP we use responses to the question, *"How large is the total living area of this dwelling?"* where the answer is in metres squared. We then divide the size of the dwelling (in m2) by the number of people in the household (including children[vi]), to give the 'metres per person'. For the BHPS, we calculate 'rooms per person[vii]' using responses to the question *"How many rooms are there here, including bedrooms but excluding kitchens, bathrooms, and any rooms you may let or sublet?"*.

Both BHPS and GSOEP allow us to control for a wide range of other socio-economic variables. In both datasets, we control for age, number of children and adults in the household, household income, housing costs, subjective health status (which we transform into a binary variable), dummy variables for employment and marital status, the presence of a garden, and housing tenure. In the BHPS, we are also able to control for self-reported housing problems such as rot, condensation, street noise and damp, but in the SOEP we can only control for the presence of a terrace/balcony. Where appropriate, we also include year and region dummy variables (the tables below state which dummies were included for each regression).

As noted above, one of the major decisions when testing the positional good theory revolves around defining the reference group – the people with whom an individual compares their house size. In this paper, for both BHPS and GSOEP, we test for two different reference groups at the regional level. The first type of social comparison we tested for was 'upward looking': when an individual sees the homes of the (super-)rich around them getting larger they raise their own space expectations upwards (Bellet, 2019). To capture this, we define the first reference group as the mean[viii] *total size* of the largest ten percent of houses in the region which Bellet found to be so important in the USA context[ix], and which are calculated at the household level (e.g. if all 5 individuals all lived in one house, that house would count for only one observation, not five).

The second type of social comparison we tested for was 'sidewards looking'. When an individual's friends, family and colleagues increase their living space then that individual will increase their own expectations of what is 'normal' in tow. To capture this, we calculate the regional average space per person at the individual level (e.g. the house above would count for five separate observations). We look at average space *per person* (as opposed to average house size) because when an individual makes a sidewards social comparison – through talking to their colleague about their children having to share a bedroom, or being invited over to a friend's house for tea - they are more likely to be aware of how many people live in that home.

In the German sample we use the same GSOEP dataset to generate the reference groups, calculating the median metres per person for every region in every year to give the regional metres per person, then calculating the mean of the largest ten percent of houses to give the 'upwards-looking' reference group. We also merge three of the smaller German regions with three adjoining regions[x] to increase the sample size for calculating the 'upward-looking' reference group.

We use a similar methodology to calculate the two regional reference group variables for the BHPS sample but using number of rooms[xi] instead of metres as a measure for house size. For the BHPS analysis we use the *mean* regional metres per person as the median does not vary much within regions over time[xii]. When calculating the upwards-looking reference group (but not the sidewards reference group), we collapse the 19 EU NUTS regions or 'metropolitan areas' into 9 'supra-regions'; London (Inner and Outer), South East, West, North West, Rest of North, East, NI, Scotland and Wales. Descriptive statistics for each of the (supra-) regions are shown in Appendix 1 (BHPS) and Appendix 2 (GSOEP).

The regression analysis includes respondents from all housing tenures[xiii] but to keep the sample compositions as constant over time as possible, minority booster samples[xiv] in the BHPS/GSOEP are excluded from both the reference group calculations and regression analysis.

In terms of sample selection, to test the positional good hypothesis we narrow the sample down to those observations which relate to an individual while at their most recently reported address, the 'stayers'. This sample is useful for testing the positional good theory as it allows us to ensure an individual's housing conditions are (mostly) kept constant. By excluding those who move house, we minimise the risk of omitted variables bias (e.g. individuals may move to a house that is objectively smaller, but feels more spacious) and self-selection bias (e.g. individuals who come to feel their living space is inadequate, may be more likely to move to a region with higher absolute levels of living space).

In order to test the adaptation hypothesis, we use the 'movers' sample, which includes all those observations which relate to an individual the year before and after they changed address (this is reported in both the GSOEP and BHPS). If an individual did not move during the sample period, they are excluded from this sample.

3.2 Regression models

Throughout this paper, we use a range of regression models. When adopting **housing or life satisfaction** as a dependent variable, we generally use OLS with fixed effects. The model for testing adaptation is shown below in equation (1) where for each individual *i,* life/housing satisfaction at time *t* is labelled by HS, and is considered to be a function of an individual's current living space (Sit) their living space in the previous year ($Sit-1$) and a range of socio-demographic control variables, X. When testing for the positional good effect, we switch $Sit-1$ with the 'upward' and 'sideward' looking reference group space variables. If the adaptation (or positional good) hypotheses hold, then we would expect coefficient $\theta 1$ on Sit to be positive but the coefficient $\theta 2$ on $Sit-1$ (or the respective reference group variable) to be negative. We generally adopt a fixed-effects regression analysis, thus controlling for all time invariant and individual-specific unobservables ($\propto i$) .

$$HSit= \propto i+\beta'Xit+ \theta 1'Sit+ \theta 2'Sit-1 + \varepsilon it \quad (1)$$

This model is commonly adopted among subjective well-being researchers (Schroeder and Yitzkahi, 2017; Nowok et al., 2013; Clark, 2003; Foye, 2017) and valued for its simplicity and adaptability. It does rely, however, on the assumption that the dependent variable is cardinal (not ordinal). Making this assumption is often unproblematic (Ferrer-i-Carbonell and Frijters, 2004) but in some cases empirical results can vary significantly depending upon whether we use OLS fixed effects or an alternative (less efficient) ordinal model (Schroeder and Yitzkahi, 2017). As a robustness check, this paper therefore ran all of the key OLS fixed effect regressions (i.e. those containing statistically significant variables in line with hypotheses) using a logit model and binary version of the dependent variable (e.g. in the BHPS, life/housing satisfaction scores of 1-5 were converted to 0, and 6/7 to 1). The results (available upon request) were broadly similar, providing justification for the OLS model and assumption of cardinality.

When adopting reported **space shortage** as a binary dependent variable, we use a simple logit model (no fixed effects) for the adaptation regressions. For the social comparison regressions, things are more complicated. We start initially with a fixed-effects logit model (equation 2), as shown in in equation 2 below, where the probability of the individual *i,* reporting a space shortage ($y=1$) at time *t* is a function of the same independent variables as equation (1), this time subsumed under x

$$\Pr(yit=1) =\exp(xit\beta+ \propto i)1+\exp(xit\beta+ \propto i) \quad (2)$$

However, there are two limitations with the fixed effect logit model (equation 2, above) when it comes to testing for social comparisons . First, it is inefficient as a large number of individuals are excluded from the ‘stayers’ sample as their response does not vary over time (i.e. they always or never report a space shortage). Second, and more worryingly, the fixed effect logit model does not allow us to cluster standard errors at the regional (or individual) level which means that the standard errors on the regional reference group coefficients are likely to be underestimated.

When testing for social comparisons, we therefore supplement the fixed effect logit model with a ‘mundlak hybrid logit model’ (Allison 2009) which addresses both of the limitations above, and can be expressed as follows;

$$\Pr(y_{it}=1) = \frac{\exp(x_{it} - x_i + x_i + c_i + u_i)}{1+\exp(x_{it} - x_i + x_i + c_i + u_i)} . \quad (3)$$

The model (equation 3) splits within- and between-cluster effects for all time-variant covariates. This is accomplished by including both the deviation from the cluster-specific mean $x_{it} - x_i$ and the cluster-specific mean x_i among the model covariates. It is the coefficients on the former in which we are interested, and which are reported in the results below. This model allows us to look at the ‘stayers’ sample as a whole whilst controlling for all time invariant variables (c_i) and clustering standard errors (u_i) at the regional level.

RESULTS

3.2 Positional good hypothesis

In both UK and Germany, there is very little evidence to suggest that individual space expectations are shaped either by ‘sidewards-looking’ or ‘upward looking’ social comparisons.

We start with Table 1, below, which shows the results for BHPS stayers. Across all the regressions, the effect of mean regional rooms per person is statistically insignificant, providing no support for the positional good theory. The only evidence of a social comparison effect arises in columns 3 and 4, when we adopt space shortage as a dependent variable. In both these regressions (column 3, a fixed effect logit and column 4, a mundlak hybrid logit) the upward looking reference group is statistically significant, but the effect goes in the opposite direction to what the positional good theory predicts.

When we run a similar set of regressions on the GSOEP ‘stayers’ sample (Table 2, below) the results are similar unsupportive of the positional good hypothesis. When we adopt life satisfaction and housing satisfaction as dependent variables (columns 1 and 2, respectively) there is a negative coefficient on the ‘upward-looking’ reference group which is consistent with the positional good theory. However, when we introduce ‘adequacy of living space’ as an independent variable (results not shown), this effect hardly changes implying that it is likely to be driven by unobservables. The coefficients on the ‘sideward-looking’ reference group are similarly unsupportive, taking the opposite sign to what the positional good theory predicts. When we adopt space shortage as a binary variable (columns 3 and 4), any statistically significant reference group coefficients are negative (i.e. <1) which again contradicts the positional good theory.

Table 1: Positional good regressions - BHPS

VARIABLES	Life Sat	Housing sat	Space short	Space short
Rooms per person	0.0181*	0.0786***	0.284***	0.428***
	(0.00933)	(0.00771)	(0.0133)	(0.0210)
Regional mean rooms per person	0.0155	0.0519	1.377	1.063
	(0.0959)	(0.0991)	(0.594)	(0.428)
Regional mean rooms of top 10%	0.000653	0.0369*	0.847***	0.884**
	(0.0139)	(0.0193)	(0.0423)	(0.0517)
Regional mean income of top 10%	4.44e-07	6.64e-08	1.000***	1.000**
	(5.03e-07)	(1.09e-06)	(3.58e-06)	(2.75e-06)
Regional median income	2.99e-07	1.63e-06	1.000	1.000
	(3.81e-06)	(3.18e-06)	(1.17e-05)	(1.08e-05)
Age	-0.0369***	-5.00e-05	1.040	0.991
	(0.0118)	(0.0211)	(0.0499)	(0.0291)
Own outright	0.0822***	0.0990***	0.680***	0.815***
	(0.0165)	(0.0226)	(0.0524)	(0.0408)
Private renter	0.103**	0.0953	0.736	0.864
	(0.0405)	(0.0815)	(0.139)	(0.160)
Social renter	0.0626	-0.170***	0.573***	0.721***
	(0.0402)	(0.0499)	(0.0774)	(0.0777)
Garden	0.0448*	0.0700*	0.912	0.947
	(0.0241)	(0.0370)	(0.0780)	(0.0623)
Housing costs (mortgage or rent)	-5.80e-05*	1.00e-06	0.999***	1.000***
	(2.79e-05)	(9.31e-06)	(0.000127)	(0.000142)
Annual household income	3.28e-07	-2.11e-07	1.000***	1.000***
	(3.51e-07)	(2.36e-07)	(1.12e-06)	(1.19e-06)
Number of children in household	-0.00357	-0.0535***	1.455***	1.244***
	(0.00777)	(0.0111)	(0.0440)	(0.0284)
In relationship	1.112*	-0.455	0.421	0.580
	(0.564)	(0.343)	(0.313)	(0.225)
Single	0.950	-0.347	0.297*	0.440**
	(0.573)	(0.330)	(0.218)	(0.184)
Divorced or separated	0.808	-0.529	0.296	0.492*
	(0.594)	(0.340)	(0.221)	(0.202)
Widowed	0.712	-0.543	0.470	0.655
	(0.559)	(0.342)	(0.355)	(0.273)
Employed	0.153***	-0.0262	1.189***	1.105**
	(0.0166)	(0.0173)	(0.0673)	(0.0474)
Retired	0.202***	0.0382**	0.968	0.981
	(0.0239)	(0.0169)	(0.0845)	(0.0542)
In full time education	0.215***	0.0424	1.111	1.032
	(0.0323)	(0.0519)	(0.118)	(0.0464)
Subjective health status	-0.408***	-0.0774***	0.940	0.972
	(0.0145)	(0.0134)	(0.0503)	(0.0361)
Individual Fixed Effects	Yes	Yes	Yes	Mundlak
Level of SE clusters?	Region	Region	None	Region
Year/Region Dummies?	Year	Year	Year	Both

Observations	100,834	101,056	41,422	118,270
R-squared	0.023	0.017		

VARIABLES	**Life sat**	**Dwelling sat**	**Space short**	**Space short**
Metres per person	0.000472	0.00579***	0.887***	0.924***
	(0.000347)	(0.000595)	(0.00194)	(0.00258)
Regional median metres per person	0.0189**	0.0224***	0.976**	0.991
	(0.00644)	(0.00507)	(0.0109)	(0.0158)
Regional mean house size top 10%	-0.00146*	-0.00193***	0.996**	0.998*
	(0.000736)	(0.000611)	(0.00157)	(0.00112)
Regional mean income of top 10%	4.84e-06	1.20e-05	1.000	1.000
	(1.82e-05)	(1.02e-05)	(3.33e-05)	(2.66e-05)
Regional median household income	-0.00023**	-0.000209**	1.000	1.000
	(9.23e-05)	(7.50e-05)	(0.000133)	(0.000114)
Age	-0.0126*	-0.0161***	1.032***	0.976
	(0.00700)	(0.00510)	(0.00930)	(0.0170)
Married	0.00187	-0.251***	1.687***	1.554***
	(0.0415)	(0.0357)	(0.159)	(0.161)
Divorced	0.0878	-0.244***	2.145***	1.663***
	(0.0589)	(0.0587)	(0.294)	(0.223)
Widowed	-0.263***	-0.319***	2.011***	2.417***
	(0.0597)	(0.0683)	(0.489)	(0.454)
Not employed	-0.201***	-0.0375	1.058	1.033
	(0.0333)	(0.0487)	(0.0988)	(0.0494)
Part time	-0.144***	-0.105*	1.138	1.052
	(0.0297)	(0.0518)	(0.112)	(0.0607)
Full time	-0.0637*	-0.123**	1.172*	1.085
	(0.0323)	(0.0443)	(0.111)	(0.0749)
Household income	5.8e-05***	2.76e-05***	1.000***	1.000***
	(7.14e-06)	(6.29e-06)	(1.46e-05)	(5.37e-06)
Children in household	0.0439**	0.0279*	1.345***	1.169***
	(0.0172)	(0.0136)	(0.0327)	(0.0347)
Garden	-0.0389**	-0.258***	1.494***	1.354***
	(0.0180)	(0.0179)	(0.0721)	(0.0537)
Rental value	6.43e-06	9.66e-05	0.999***	0.999***
	(4.94e-05)	(8.03e-05)	(0.000127)	(0.000190)
Homeowner	-0.0148	0.696***	0.206***	0.333***
	(0.0355)	(0.0459)	(0.0155)	(0.0261)
Individual Fixed Effects	Yes	Yes	Yes	Mundlak
At which level are SE's clustered?	Region	Region	None	Region
Year or Region Dummy Variables?	Year	Year	None	Both
Observations	246,607	245,989	70,924	249,305
R-squared	0.056	0.021		
Number of indivduals	42,835	42,773	8,646	
Number of individuals	22,383	22,367	5,827	

Note 1: *** p<0.01, ** p<0.05, * p<0.1

Table 2: Positional good regressions - GSOEP

Note 1: *P<0.1 **p<0.05 ***p<0.01
Note 2: In columns 1 and 2 region dummy variables were excluded because they were causing multi-collinearity. For the same reason, year and region dummy variables were excluded in column 3.
Note 3: Results in columns 3 and 4 are expressed as odds ratios

3.3 The aspiration spiral theory

By contrast, there is substantial evidence from both the UK and Germany that space expectations, and those of upsizers in particular, are shaped by their past experience.

To distinguish between upsizers and downsizers , we include an interaction term between lag living space, and an 'upsized' dummy variable[xv]. In both the UK and German 'stayers' samples, we started by adopting life satisfaction as a dependent variable but the relevant coefficients were either statistically insignificant, or statistically significant in the 'wrong' direction implying unobservable variable bias. Therefore, Tables 3 and 4 only show the results when we adopt housing satisfaction or 'reported space shortage' as a dependent variable.

Starting with the BHPS, Columns 1 and 2 of Table 3 provide the most clear-cut evidence of adaptation. They examine the housing satisfaction of movers only *after* they have moved house (i.e. no fixed effects). The negative coefficient on lag rooms per person in Column 1 implies that for downsizers, space expectations are significantly affected by the level of living space experienced in the previous year. That the interaction term is statistically insignificant implies that the relationship is similar for upsizers. Thus, an individual upsizing from, say, a two room flat to a three room flat will report -.03 lower housing satisfaction than an individual upsizing from a one room flat to a three room flat. Although this coefficient magnitude is small in absolute terms, it is substantial in relative terms when considers that an increase in the size of one's *present* accommodation by one room per person is only associated with a +.9 increase in housing satisfaction (see the coefficient on 'rooms per person'). Moreover, when we introduce 'space shortage' as a binary independent variable in column 2, the coefficient on lag rooms per person turns insignificant implying that, as hypothesised, this relationship is mediated by a perceived shortage of space

When we introduce fixed effects in columns, 3 and 4 there remains evidence of adaptation but only for upsizers. In column 3, the coefficient on lag rooms per person turns statistically insignificant while the interaction term turns statistically significant, albeit only at $p<0.1$. Thus, according to column 3, the effect of lag rooms per person on an *upsizers's* current housing satisfaction is -.13 (-.0119 – .121), over four times larger than the -.03 recorded in column 1. And as hypothesised, when we introduce 'space shortage' as an independent variable (Column 4) this shrinks to -.07 and turns statistically insignificant.

Finally, the results from column 5 imply that having experienced an extra room the previous year makes upsizers and downsizers both more likely to report a space shortage but, consistent with the above, this effect is larger for upsizers. That same individual upsizing from a two-room flat to a three-room flat will be 4.2% (.017+.025) more likely to report a space shortage than someone who upsized from a one-room flat. Again, this is a substantial effect given an increase in the size of one's *present* accommodation by one room per person is only associated with a 7% decrease in the likelihood of reporting a space shortage (see column 5). For downsizers, however, the effect of lag rooms per person is much smaller at 1.7%.

In Germany, there is even stronger evidence that the space expectations of upsizers are influenced by the level of living space they have experienced in the past. Table 4 presents the same regressions as Table 3 but this time using GSOEP instead of BHPS. Column 1 – a cross-sectional OLS regression - shows us that having experienced an extra metre the previous year will reduce an upsizer's satisfaction with their current dwelling by -.005 (an effect which diminishes dramatically when we control for perceived space shortage -see column 2). Again, these effects are substantial, roughly equivalent in magnitude to the effect of one's *present* metres per person (+.006). When we introduce fixed effects (columns 3 and 4) the effect on upsizers stay roughly constant. Finally, column 5 demonstrates that having had an extra metre per person the previous year makes an upsizer 2.8% more likely to report a space shortage in their current accommodation.

For downsizers in Germany, however, the evidence of adaptation is much more limited. Across columns 1-4 of Table 4, the coefficient on lag rooms per person is positive which contradicts the aspiration spiral theory. Column 5 provides the only supporting evidence of adaptation among downsizers, but the magnitude of this effect (.5%) is much smaller than that for upsizers (2.8%).

For both GSOEP and BHPS, we also re-ran regressions including an extra lag, S_{it-2} , indicating the individual's living space *two* years prior to the move (results not shown). Generally speaking, the coefficient on this second lag took on the same sign as predicted by the aspiration spiral theory, but was statistically insignificant and/or of a much smaller magnitude than the first lag. This implies the space one experienced in the year immediately prior to moving has a much greater influence on one's space expectations than that experienced two years prior to moving.

In sum, there is substantial evidence that in both UK and Germany, the space expectations and housing satisfaction (but not life satisfaction) of upsizers are influenced by the level of living space they experienced in the previous year. But there is weaker evidence of the aspiration spiral theory among downsizers. The absence of any consistent, substantial adaptation effect for downsizers is probably due to the fact that some people are downsizing out of choice, and some out of economic necessity, and these two groups effectively cancel each other out. For those who have had to downsize out of economic necessity the aspiration spiral theory is likely to apply: a family will find it more difficult move to cramped accommodation if they are used to living in a mansion. However, for those downsizing out of choice, the effect of lag space per person is likely to run in the opposite direction: the relief of moving into an easily-maintained one bedroom flat will be greater for an older person who was previously left stranded in their old 5-bedroom family home.

Table 3: Adaptation regressions - BHPS

VARIABLES	Housing sat	Housing sat	Housing sat	Housing sat	Space short
Rooms per person	0.0943***	0.0466***	0.108***	0.0526***	0.930***
	(0.0157)	(0.0154)	(0.0170)	(0.0169)	(0.00534)
Lag rooms per person	-0.0281**	-0.0159	-0.0119	-0.00845	1.017***
	(0.0143)	(0.0141)	(0.0172)	(0.0170)	(0.00362)
Upsized # lag rooms pp	-0.0491	-0.0332	-0.121*	-0.0627	1.025**
	(0.0459)	(0.0450)	(0.0665)	(0.0631)	(0.0103)
Space shortage		-0.636***		-0.606***	
		(0.0429)		(0.0404)	
Age	0.00978***	0.0100***	0.0313	0.0349	1.000
	(0.00165)	(0.00162)	(0.0512)	(0.0507)	(0.000401)
Own outright	-0.207***	-0.195***	-0.0604	-0.0776	1.035**
	(0.0613)	(0.0599)	(0.0673)	(0.0660)	(0.0162)
Private renter	-0.494***	-0.467***	-0.361***	-0.342***	1.044***
	(0.0392)	(0.0387)	(0.0470)	(0.0463)	(0.0103)
Social renter	-0.308***	-0.277***	-0.308***	-0.277***	1.044***
	(0.0533)	(0.0526)	(0.0756)	(0.0746)	(0.0137)
Garden	0.111**	0.0857*	0.172***	0.163***	0.967**
	(0.0519)	(0.0505)	(0.0534)	(0.0525)	(0.0134)
Housing costs (mortg./ rent)	0.000295***	0.000249***	0.000605***	0.000500***	1.000***
	(5.43e-05)	(5.16e-05)	(6.69e-05)	(6.39e-05)	(1.58e-05)
Annual household income	-3.1e-06***	-2.9e-06***	-2.5e-06***	-2.6e-06***	1.000
	(7.98e-07)	(7.92e-07)	(9.35e-07)	(9.07e-07)	(1.88e-07)
Number of children in hh	-0.0506***	-0.0467**	-0.0430	-0.0301	1.009*
	(0.0191)	(0.0186)	(0.0315)	(0.0309)	(0.00499)
In relationship	0.648	0.788	-0.419	-0.409	1.153*
	(1.382)	(1.381)	(1.560)	(1.489)	(0.0938)
Single	0.519	0.662	-0.486	-0.491	1.162*
	(1.382)	(1.382)	(1.561)	(1.489)	(0.0946)
Divorced or separated	0.220	0.387	-0.761	-0.743	1.191**
	(1.385)	(1.384)	(1.561)	(1.489)	(0.0977)
Widowed	0.559	0.699	-0.282	-0.289	1.170*
	(1.387)	(1.386)	(1.584)	(1.514)	(0.0979)
Individual Fixed Effects	No	No	Yes	Yes	No
Level of SE clusters?	Individual	Individual	Individual	Individual	Individual
Year/Region Dummies?	Both	Both	Both	Both	Both
Observations	9,963	9,963	15,775	15,775	11,386
R-squared	0.169	0.193	0.179	0.204	0.142
Number of individuals			7,133	7,133	

Note 1: *** p<0.01, ** p<0.05, * p<0.1

Note 2: Reported housing problem dummy variables (e.g. 'damp' or 'neighbour noise') were included in all regression but are not shown because of space limitations

Note 3: We have omitted the irrelevant 'upsizer' dummy variable from the table to ease interpretation

Note 4: Results in column 5 are expressed as odds ratios

Table 4: Adaptation regressions - GSOEP

VARIABLES	Dwelling sat	Dwelling sat	Dwelling sat	Dwelling sat	Space short
Metres per person	0.00601***	1.00e-04	0.00141	-0.00623***	0.945***
	(0.000954)	(0.000888)	(0.00109)	(0.00102)	(0.00324)
Lag metres per person	0.00371***	0.00147	0.0194***	0.0133***	1.005**
	(0.00116)	(0.00105)	(0.00128)	(0.00116)	(0.00200)
Upsize#lag metres pp	-0.00895***	-0.00270*	-0.0232***	-0.00987***	1.023***
	(0.00169)	(0.00159)	(0.00167)	(0.00160)	(0.00441)
Space adequacy		-1.625***		-1.361***	
		(0.0406)		(0.0304)	
Age	0.00568***	0.00198	0.0382***	0.0434***	0.985***
	(0.00149)	(0.00140)	(0.00688)	(0.00661)	(0.00240)
Married	0.153***	0.0905**	-0.180***	-0.0716	0.748***
	(0.0435)	(0.0403)	(0.0653)	(0.0615)	(0.0509)
Divorced	-0.0971	-0.0848	-0.229**	-0.0995	1.180*
	(0.0604)	(0.0564)	(0.103)	(0.0976)	(0.108)
Widowed	0.238**	0.198**	-0.305	0.0216	0.719*
	(0.0986)	(0.0934)	(0.239)	(0.232)	(0.132)
Not employed	-0.0145	0.0689	-0.0378	0.0439	1.263**
	(0.0869)	(0.0836)	(0.0944)	(0.0908)	(0.147)
Part time	0.136	0.214**	-0.00386	0.0524	1.397***
	(0.0890)	(0.0852)	(0.1000)	(0.0958)	(0.173)
Full time	-0.0105	0.0986	0.0326	0.137	1.603***
	(0.0834)	(0.0802)	(0.0911)	(0.0877)	(0.183)
Household income	6.82e-05***	7.84e-05***	-2.18e-05	-2.36e-05	1.000
	(1.29e-05)	(1.22e-05)	(1.55e-05)	(1.46e-05)	(2.93e-05)
Children in household	-0.0656***	-0.0632***	-0.0350	-0.0268	0.942*
	(0.0209)	(0.0198)	(0.0291)	(0.0281)	(0.0307)
Garden	-0.352***	-0.301***	-0.296***	-0.203***	1.286***
	(0.0317)	(0.0297)	(0.0366)	(0.0346)	(0.0659)
Rental value	0.000696***	0.000383***	0.00117***	0.000549***	0.999***
	(7.68e-05)	(6.91e-05)	(9.41e-05)	(8.74e-05)	(0.000169)
Homeowner	0.800***	0.603***	1.293***	0.800***	0.366***
	(0.0554)	(0.0514)	(0.0633)	(0.0604)	(0.0430)
Individual Fixed Effects	No	No	Yes	Yes	No
Level of SE clusters?	Individual	Individual	Individual	Individual	Individual
Year/Region Dummies?	Both	Both	Both	Both	Both
Observations	19,402	19,383	34,014	33,948	19,434
R-squared	0.120	0.223	0.187	0.269	
Number of individuals			12,228	12,223	

Note 1: *** p<0.01, ** p<0.05, * p<0.1
Note 2: We have omitted the irrelevant 'upsizer' dummy variable from the table to ease interpretation
Note 3: Results in column 5 are expressed as odds rati

4 DISCUSSION AND CONCLUSION

This paper has tested how space expectations are socially constructed, operationalising two theories from behavioural economics – aspiration spiral theory and positional good theory – on two national panel datasets, UK and Germany.

According to the aspiration spiral theory, the level of living space that people are happy with, expect, or consider adequate, depends on the level of living space that they have experienced in the past. In both UK and Germany, we found substantial evidence to suggest that upsizers who experienced more space in the previous year were more likely to report lower housing satisfaction (but not lower life satisfaction). The evidence can be summarised as follows: i) in cross-sectional regressions lag rooms per person exhibits a statistically significant negative effect on the housing satisfaction of upsizers; ii) this effect holds for both UK and Germany; iii) it also holds for both countries when we introduce fixed effects (although only at $p<0.1$ for BHPS – see Table 3, Column 3); iv) crucially, it diminishes or disappears when we introduce 'space shortage' as a control variable, strongly implying that the adaptation effect is *not* just being driven by unobservable variable bias; v) it also holds when we adopt 'space shortage' as a dependent variable.

The strength of the adaptation effect is also substantial : the coefficient on lagged living space is generally about two-thirds of the magnitude of the coefficient on current living space. When read alongside the existing evidence base, it is clear that in both countries, upsizers adapt to increases in living space. In terms of policy implications, whilst there remains an overwhelming case for providing more housing for those in the most cramped and unaffordable housing, if societies adapt to increases in living space – as our findings imply - then it is not obvious the extent to which continuous increases in average levels of living space will lead to continuous increases in societal well-being.

Amongst downsizers, by contrast, evidence of an adaptation effect was weaker, which is probably because our sample conflated 'voluntary' downsizers with 'forced' downsizers. As well as differentiating between these two types of downsizing, future research should explore the extent to which individuals adapt to other housing characteristics, and especially those which are traded-off with house size. There is evidence, for example, that individuals do not adapt to time spent commuting (Stutzer and Frey, 2008), implying that moving further away from work to afford a larger house could be detrimental to individual well-being.

Our paper provides very little evidence to support the positional good theory. In neither country was there any substantial evidence that living space expectations are influenced by the two hypothesised references groups. Indeed, there was more evidence to suggest the opposite relationship: that an individual's housing satisfaction increases with the living space of their reference group. Does this mean that house size is not a positional good in the UK and Germany? We would caution against such an interpretation for several methodological reasons. First, the data used to calculate our reference groups was much smaller, and spread over a much larger spatial scale, than that used by Bellet. This is particularly true of the upwards looking comparison group, which were based on small sample sizes. For example, in 2015, the upward looking reference group for Mecklenburg-West Pomerania (the smallest of our 'supra-regions' in Germany -see appendix 2) was based on observations of only 26 households. Future research could use web-scraped data or larger datasets[xvi] in order to calculate the living space of reference groups more accurately, and at smaller spatial scales. Second, we only tested for two reference groups – it may be that other reference groups (e.g. the average size of *new* homes) are more significant in shaping one's space expectations. Third, although our 'stayers' sample controlled for a substantial number of variables (including all time-invariant ones), the inconsistency of the reference group coefficients suggest that there is still some unobservable variable bias at work .

In addition to addressing the three limitations above, future research should also adopt qualitative methods to examine the social construction of house size preferences. This would allow us to develop a more sophisticated understanding of how the relationship between social status and house size varies according to the social, cultural and economic capital of a social group; what role discourse has in shaping this relationship; and what this relationship means for a society characterised by high levels of living space inequality (Tunstall, 2015; Bellet, 2019).

Appendix 1: Summary Statistics for UK regions or 'metropolitan areas'

		Regional mean rooms per person		Mean house size of top 10% (rooms)	
Region / Metropolitan area	Obs in 2008	Mean	S.D	Mean	S.D.
Inner London	192	1.8	0.07	7.89	0.58
Outer London	419	2	0.05	8.08	0.48
R. of South East	1,593	2.02	0.05	9.02	0.14
South West	804	2.03	0.04	8.47	0.43
West Midlands Conurbation	259	1.92	0.06	7.7	0.68
R. of West Midlands	444	1.93	0.05	8.52	0.41
Wales	2,543	2.11	0.04	8.7	0.27
East Anglia	399	2.1	0.02	9.08	0.21
East Midlands	719	1.93	0.06	8.06	0.44
Scotland	2,455	1.81	0.05	7.71	0.36
Greater Manchester	299	2.07	0.04	8.16	0.28
Merseyside	203	1.89	0.09	7.46	0.19
R. of North West	400	2.12	0.07	8.82	0.64
Northern Ireland	2,237	2.07	0.03	8.64	0.1
South Yorkshire	256	1.95	0.07	7.76	0.57
West Yorkshire	277	2.05	0.06	9.33	0.64
R. of Yorks & Humberside	294	1.97	0.05	9.02	0.65
Tyne & Wear	173	2.08	0.06	7.86	0.54
R. of North	317	1.94	0.11	8.18	0.51

Note 1: Means and standard deviations are within-region scores
Note 2: Combined regions (for calculation of upward looking reference group) are shaded in grey

Appendix 2: Summary Statistics for German Federal States

Region	Obs. in 2015	Regional median metres per person Mean	St. dev	Regional mean house size of top ten percent (metres) Mean	St.dev
Baden-Wuerttemberg	1,511	44.9	5.1	190	12.4
Bavaria	2,317	45.6	4.2	207	11.1
Berlin	592	40.3	3.8	146	11.1
Brandenburg	685	37.8	6.1	165	14.3
Schleswig-Holstein	459	45.1	3.8	184	13.4
Hamburg	231	42.4	2.4	145	26
Hesse	932	46.4	4.6	209	13.7
Mecklenburg-West Pom.	402	36.4	6.3	162	9.3
Lower Saxony	1,436	48.7	5.7	216	15.5
Bremen	81	46.2	4.3	177	28.3
North Rhine-Westphalia	2,788	43.6	4.2	187	10.1
Rhineland-Palatinate	713	47.6	5.8	196	14.6
Saarland	140	52.9	2.7	222	7.75
Saxony	1,142	34.8	5.3	154	12.3
Saxony-Anhalt	655	37.1	6.2	160	14
Thuringia	706	36.9	5.3	169	10.6

Note 1: Means and standard deviations are within-region scores

Note 2: Combined regions (for calculation of upward looking reference group) are shaded in grey

REFERENCES

Allison, P. D. (2009). *Fixed effects regression models* (Vol. 160). SAGE publications.

Bellet, C (2019) , The McMansion Effect: Top House Size and Positional Externalities in U.S. Suburbs. Available at: http://dx.doi.org/10.2139/ssrn.3378131

Clark, A. E. (2003). Unemployment as a social norm: Psychological evidence from panel data. *Journal of Labor Economics*, *21*(2), 323-351.

Clark, A. E., & Georgellis, Y. (2013). Back to baseline in Britain: adaptation in the British household panel survey. *Economica*, *80*(319), 496-512.

Crawford, J., & McKee, K. (2018). Hysteresis: understanding the housing aspirations gap. *Sociology*, *52*(1), 182-197.

Ferrer-i-Carbonell, A. (2005). Income and well-being: an empirical analysis of the comparison income effect. *Journal of Public Economics*, *89*(5), 997-1019.

Ferrer‐i‐Carbonell, A., & Frijters, P. (2004). How Important is Methodology for the estimates of the determinants of Happiness?*. *The Economic Journal*, *114*(497), 641-659

Foye, C. (2017). The Relationship Between Size of Living Space and Subjective Well-Being. *Journal of Happiness Studies*, 1-35.

Frank, R. H. (2007). Falling Behind: How Income Inequality Harms the Middle Class.

Frijters, P., Johnston, D. W., & Shields, M. A. (2011). Life satisfaction dynamics with quarterly life event data. The Scandinavian Journal of Economics, 113(1), 190–211.

Kemeny, J (1995). From Public Housing to the Social Market: Rental Policy Strategies in Comparative Perspective. London: Routledge

Leguizamon, S. (2010). The influence of reference group house size on house price. *Real Estate Economics*, *38*(3), 507-527.

Leguizamon, S. J., & Ross, J. M. (2012). Revealed preference for relative status: Evidence from the housing market. *Journal of Housing Economics*, *21*(1), 55-65.

Luttmer, E. F. (2005). Neighbors as negatives: Relative earnings and well-being. *The Quarterly journal of economics*, *120*(3), 963-1002.

Marx, K., & Engels, F. (1965). *The German Ideology (1845)*. London.

Meen, G. (2018). Policy Approaches to Improving Affordability. Available online at http://housingevidence.ac.uk/wp-content/uploads/2018/09/R2018_02_02_policy-approaches-for-improving-affordability.pdf

Nakazato, N., Schimmack, U., & Oishi, S. (2011). Effect of Changes in Living Conditions on subjective well-being: A Prospective Top–Down Bottom–Up Model. *Social indicators research*, *100*(1), 115-135.

Nowok, B., van Ham, M., Findlay, A. M., & Gayle, V. (2013). Does migration make you happy? A longitudinal study of internal migration and subjective well-being. Environment and Planning A, 45(4), 986–1002.

Pader, E. J. (1994). Spatial relations and housing policy: Regulations that discriminate against Mexican-origin households. *Journal of Planning Education and Research*, *13*(2), 119-135.

Schroeder, C., & Yitzhaki, S. (2017). Revisiting the evidence for cardinal treatment of ordinal variables. *European Economic Review*, *92*, 337-358.

Socio-Economic Panel (SOEP), data for years 1984-2017, version 34, SOEP, 2019, doi: 10.5684/soep.v34

Smith, S. J. (2008). Owner-occupation: at home with a hybrid of money and materials. *Environment and Planning A*, *40*(3), 520-535.

Silva, E. B., & Wright, D. (2009). Displaying desire and distinction in housing. *Cultural Sociology*, *3*(1), 31-50.

Solnick, S. J., & Hemenway, D. (2005). Are positional concerns stronger in some domains than in others?. *The American Economic Review*, *95*(2), 147-151.

Solnick, S. J., Hong, L., & Hemenway, D. (2007). Positional goods in the United States and China. *The Journal of Socio-Economics*, *36*(4), 537-545.

Stutzer, A. (2004). The role of income aspirations in individual happiness. *Journal of Economic Behavior & Organization*, *54*(1), 89-109.

Stutzer, A., & Frey, B. S. (2008). Stress that doesn't pay: The commuting paradox. *Scandinavian Journal of Economics*, *110*(2), 339-366.

Tunstall, B. (2015) *Relative housing space inequality in England and Wales, and its recent rapid resurgence,* Taylor and Francis

University of Essex. Institute for Social and Economic Research. (2018). *British Household Panel Survey:* Waves 1-18, 1991-2009. [data collection]. *8th Edition*. UK Data Service. SN:5151, http://doi.org/10.5255/UKDA-SN-5151-2

Voigtländer, M. (2009). Why is the German homeownership rate so low?. *Housing Studies*, *24*(3), 355-372.

---

[i] We use the median metres per person for East and West Germany but the mean rooms per person for the UK (as the median only changes twice over this time period, making it difficult to discern any pattern)**.**
[ii] Thanks to Referee 2 for suggesting we distinguish between upsizer and downsizers.
[iii] From 2008 onwards the BHPS sample was subsumed into the (larger) Understanding Society sample, but unfortunately many of the housing variables were dropped in the process, making Understanding Society relatively useless for the purposes of this paper.
[iv] Life satisfaction has been used as a direct proxy for utility by a host of empirical studies (e.g. Clark, 2003; Clark and Georgellis, 2013).
[v] In both the BHPS and GSOEP, the space shortage question was only asked in household questionnaire (as opposed to the individual questionnaire). This poses something of a dilemma later on when selecting adopting 'reported space shortage' as a dependent variable. On one hand, it makes sense to limit the sample to those respondents in the household who were the 'main contributors' to the household questionnaire (this is recorded by the interviewer). On the other hand, it maybe that multiple respondents answered the questionnaire, or that the main contributor answered on behalf of the household as a whole, suggesting we should include all members of the household. We ran the 'space shortage' regressions using both sample selection criteria but there were no meaningful differences in the findings. To ensure consistency, we therefore opt for the larger sample size and include all adult household members in our analysis.
[vi] Ideally, we would adjust the space per person measure to account for local norms around space usage. For example, in some regions in might be more socially acceptable to have children sharing a bedroom than others, thus implying a lower space requirement. In practice, however, it is impractical to accurately compute such a number.
[vii] Rooms per person is obviously a less accurate indicator of space than metres per person but in the GSOEP the two measures are strongly correlated (coefficient =0.79) and separate analysis of the 2008 English Housing Survey indicate that the *bedrooms* per person and metres per person are also strongly correlated (coefficient=0.77).
[viii] We use the mean because we include all of the upper decile distribution. If, for example, only the size of the top *one* percent of largest houses increased then the mean would capture this but the median would not.
[ix] Note though that Bellet was able to estimate this figure at the county-level, a much smaller spatial scale
[x] I merge Saarland with Rhineland; Bremen with Lower Saxony; and Hamburg with Schweslig Holstein
[xi] I exclude houses over 20 rooms from these calculations to avoid outliers that result from survey error
[xii] As a robustness check, we also re-run the BHPS-regressions using the median regional metres per person and the results were broadly similar.
[xiii] In Germany and the UK, where housing is overwhelmingly provided by the market, there is no obvious reason why the positional good theory would not apply to some extent across all tenures. Even social renters – for whom house size will not necessarily be positively related to relative wealth – are still likely to want a 'normal' size of living space, and their house size is still likely to contribute to what is seen as 'normal' level of living space.
[xiv] In BHPS, we exclude the Former European Community Household Panel survey low-income sub-sample from 1997 to 2001. In the GSOEP, we exclude: 1984, 1994, 2013, and 2015 migration (over-)sample; 2002 high income sample; 2010 and 2011 'family types' booster

[xv] To calculate the effect of lag living space on upsizers in Columns 1-5, we take the sum of the coefficients on 'lag rooms per person' and 'lag rooms per person#upsizer'. For downsizers, the adaptation effect simply equals the coefficient on 'lag rooms per person'.

[xvi] In the UK, for example, from 2008-onwards the size of all new homes has been recorded in the Energy Performance Certificate dataset.