

Buy-to-let gentrification – Online Appendices

Identifying social upscaling and downscaling in ordinary Output Areas

The identification of the Output Areas (OAs) in which there has been a social upscaling trajectory between 2001 and 2011 relied on the analysis of the datasets *CAS045 NS-SeC of Household Reference Person (HRP) by age (of HRP)* from the 2001 UK Census and *LC6101EW - NS-SeC by sex by age - Household Reference Persons* from the 2011 UK Census.

The NS-SeC dataset allocates individuals aged 16-74 to eight major occupational categories on the basis of their occupation title and of information on their employment status, whether they are employed or self-employed and whether or not they supervise other employees. These eight categories are:

1. Higher managerial, administrative and professional occupations;
2. Lower managerial, administrative and professional occupations;
3. Intermediate occupations;
4. Small employers and own account workers;
5. Lower supervisory and technical occupations;
6. Semi-routine occupations;
7. Routine occupations; and
8. Never worked and long-term unemployed.

According to the ONS' 2011 Census Glossary of Terms (ONS, 2014), a Household Reference Person (HRP) is an individual within a household chosen to characterise the whole household. If the person lives alone, then it is the HRP. If a household contains only one family, then the HRP is the Family Reference Person (FRP). In a lone parent family, the lone parent is the FRP. In a couple family, the *"FRP is chosen from the two people in the couple on the basis of their economic activity (in the priority order: full-time job, part-time job, unemployed, retired, other). If both people have the same economic activity, the FRP is identified as the elder of the two or, if they are the same age, the first member of the couple on the form"* (ONS, 2014, 18). In the case of multi-family households, the HRP is chosen among the FRPs using the same criteria as in the case of the selection of the FRP in a couple family. The same goes for a household with ungrouped individuals. As described in the body of the text, only HRPs aged between 16 and 64 were included in the analysis (thus excluding those 65-74). This decision was motivated by two reasons:

- an error in ONS' processing of the 2001 Census which under-estimated the number of economically inactive individuals aged 65-74 who had never worked. ONS estimates the shortfall to be in the region of 150,000-200,000 for England and Wales.
- the large proportion (21.1%) of individuals in the category 'CS0450055 Not classifiable for other reasons : ALL HRPs' in the 2001 NS-SeC dataset, a category which does not exist for the 2011 NS-SeC dataset. Given that the analysis uses absolute changes in the numbers of HRPs to measure upscaling, such a large loss of data for 2001 could have an influence on local OA trajectories. For example, it is possible that 20 high NS-SeC HRPs categorised as 'Not classifiable for other reasons' in 2001 are then categorised correctly in 2011. This would appear in the analysis as a significant increase in the number of high NS-SeC HRPs in the OA without any actual social change. As 89.3% of HRPs aged 65-74 were in this 'Not classifiable for other reasons' category in 2001, it was decided to exclude this age range from the analysis to minimise this issue. Without this age range, the proportion of 'Not classifiable for other reasons' in the 2001 data falls to 8.3%.

Using only the age range 16 to 64 thus alleviates some of the issues with the 2001 NS-SeC dataset. The decision to use HRPs instead of usual residents is motivated by the same attempt to reduce the influence of the 'Not classifiable for other reasons' category to a minimum. If usual residents are used instead of HRPs, the proportion of 'Not classifiable for other reasons' moves back to 16% of all values in the 2001 NS-SeC dataset.

For social upscaling to occur between 2001 and 2011, the two first NS-SeC categories (Higher (1) and Lower (2) managerial, administrative and professional occupations) had to feature among the arrivals into the OA and the groups (5) Lower supervisory and technical occupations, (6) Semi-routine occupations and (7) Routine occupations had to feature among the departures. As presented in the table 6 below, groups 3 and 4 could either be attached to the arrival of higher NS-SeC HRPs or to the departure of the lower NS-SeC HRPs. Students, those who never worked and the long-term unemployed were excluded from the analysis.

Table 6 below presents the 11,859 OAs (or 7.35% of all ordinary OAs, those whose boundaries have remained unchanged between 2001 and 2011) where social changes have been considered as upscaling. As discussed in the body of the paper, an OA was deemed to have experienced social upscaling if the absolute number of both arrivals and departures was larger than a certain threshold. For the purpose of the analysis this threshold was set at 7% of the total number of HRPs aged 16-64 in the OA in 2001, but with a minimum value of 5 for OAs with less than 71 HRPs (one standard deviation below the mean 2001 OA total HRP population) and with a maximum value of 7.8 for OAs with over 111 HRPs (one standard deviation above the mean 2001 OA total HRP population). The minimum and maximum values are there to ensure that variations in OA HRP population are taken into

account without nonetheless enabling thresholds that are either very small (less than 3.5 for an OA with less than 50 HRPs) or very large (over 14 for OAs with more than 200 HRPs).

While this method may potentially capture some generalised in situ upward shifts in the NS-SeC distribution – in other words upscaling without residential movement – this seems quite unlikely given the strict criteria used here. Indeed, a significant number of HRPs would have had to shift from NS-SeC categories 5,6&7 to categories 1&2 within a 10 year period. There is also some numerical evidence that this has not occurred on a large scale in England between 2001 and 2011. Among the 11,859 OAs defined as upscaling, only 136 OAs (or 1.2% of all upscaling OAs) had not experienced any significant change in either their age structure, ethnic structure or country of birth profile. More precisely, these 136 OAs were the only upscaling OAs with a relatively similar mean age in 2001 and 2011 (with an increase of more than 5 years – an increase of 10 years being the expected outcome in the case of a perfectly stable population) and limited changes in ethnic terms (with changes in both those of White British and non-White British ethnicity contained between -10 and 10 individuals between 2001 and 2011) and in terms of country of birth (with changes in both those born in and outside of the UK contained between -10 and 10 individuals between 2001 and 2011).

Social change 2001-2011	Selection criteria	Number of OAs with 7% std. dev. threshold x
4567 down, 123 up	4<0 & 567<0 & 12>0 & 3>0 & 4567<-x & 123>x	4,949
3567 down, 124 up	3<0 & 567<0 & 12>0 & 4>0 & 3567<-x & 124>x	3,327
34567 down, 12 up	3<0 & 4<0 & 567<0 & 12>0 & 34567<-x & 12>x	1,520
567 down, 123 up	567<0 & 3>0 & 12>0 & 567<-x & 123>x	765
567 down, 124 up	567<0 & 4>0 & 12>0 & 567<-x & 124>x	591
4567 down, 12 up	4<0 & 567<0 & 12>0 & 4567<-x & 12>x	359
3567 down, 12 up	3<0 & 567<0 & 12>0 & 3567<-x & 12>x	295
567 down, 12 up	567<0 & 12>0 & 567<-x & 12>x	53

Table 6: Criteria used to identify upscaling social changes in OAs between 2001 and 2011

To ensure that the figures in the table above are not too sensitive to the criteria and threshold chosen, a number of robustness tests were conducted. First, a number of different criteria were tested at the 7% specification described above.

The broadest one included all OAs in which there was a shift upwards in the NS-SeC composition of the OA. In addition to the eight trajectories in Table 6, this meant including

trajectories such as '567 down, 1234 up' (6,226 OAs, the largest category) or '567 down, 34 up' (462 OAs) and yielded 18,865 upscaling OAs. As can be expected, this specification produced large numbers of potential 'gentrifiers' and 'displaced' but groups 3 and 4 play a large role in these movements. For example, in these upscaling OAs, there were 71,373 arrivals of HRPs from groups 1 and 2 combined as compared to 46,474 for groups 3 and 4 combined.

In contrast, the strictest specification entailed using only those trajectories where groups 1 and 2 alone increased. From Table 6 above, it can be seen that this yielded 2,227 OAs (or about 1.4% of all upscaling ordinary OAs in England). This has the advantage of completely taking out the influence of groups 3 and 4 but produces the very small figure of an arrival of 11,023 HRPs from groups 1 and 2 combined.

In between these two extremes, two other specifications were tested. The first only allowed increases to group 123 and yielded 8,104 upscaling OAs. The other is the one finally chosen in which the central criteria is that any upscaling OA included the arrival of groups 1 and 2 and the departure of groups 5, 6 and 7, yielding 11,859 upscaling OAs (or 7.35% of all ordinary OAs in England). This method was found to be preferable as it takes into account both arrivals and departures. In any case, both of these produced similar results: 2.6 times more arrivals of 12 than 34 and 2.3 more departures of 567 than 34 for upscaling only to 123 and 2.4 and 2.5 respectively for the chosen specification.

The idea here is that some degree of flexibility regarding the presence of 3 and 4 as arrivals in gentrifying areas seems realistic given the number of OAs which have seen an arrival of a majority of groups 1 and 2, accompanied by some 3 or 4. This can be linked to the fact that groups 3 and 4 were those which increased the most between 2001 and 2011 – it is thus to be expected that they co-vary to some extent with both high and low NS-SeC groups. However, the important point is that tenure trajectories to the PRS always outnumber those to ownership in upscaling OAs, whatever the specification discussed here is chosen. The gap is narrowest for the strictest criteria (the 2,227 OAs where upscaling is only to groups 12) – 418 vs 396 OAs. It is widest for the broadest criteria (the 18,865 OAs with any upward shift in NS-SeC composition) – 4,272 vs 2,860. It falls somewhere in the middle for the chosen specification (the 11,859 OAs in which arrivals had to include groups 1 and 2 and departures groups 5, 6 and 7) – 2,651 vs 1,881. This indicates that trajectories to the PRS (and thus BTL investors) have indeed played an important role in gentrification in England during the first decade of the 21st century.

As concerns the threshold used to determine what population movements were significant enough to count as upscaling, four strategies were tested for the broadest specification presented above (and which yielded 18,865 upscaling OAs at the 7% threshold). The first used an absolute number threshold to determine which changes were significant – thresholds of 0, 5 and 10 were tested, yielding 40,634, 22,522 and 7,090 upscaling OAs respectively. The second used a percentage of the total HRP population as an absolute threshold. This yielded 26,678 upscaling OAs at a 5% threshold and 10,607 at a 10%

threshold. A third method used the change in the share of the NS-SeC groups to determine which changes were significant. A requirement of a 1% change in the share of the groups yielded 34,724 upscaling OAs. This dropped to 14,779 for a 2.5% change in the shares and to 2,519 for a 5% change in the shares. The fourth method is the one outlined above (absolute threshold set at 7% of the HRP population with minimum and maximum thresholds based on +/- one standard deviation from the average 2001 HRP population at OA level), and which is a combination of the absolute and percentage methods. In general, it yields a number of upscaling OAs (18,865) in the middle of the distribution.

Social downscaling trajectories were identified using the same criteria as upscaling: both arrivals and departures had to be above a threshold set at 7% of the total number of HRPs aged 16-64 in the OA in 2001, but with a minimum value of 5 for OAs with less than 71 HRPs (one standard deviation below the mean 2001 OA total HRP population) and with a maximum value of 7.8 for OAs with over 111 HRPs (one standard deviation above the mean 2001 OA total HRP population). Students, those who never worked and the long-term unemployed were likewise excluded from the analysis and NS-SeC groups 3 and 4 could also be attached to the arrival of higher NS-SeC HRPs or to the departure of the lower NS-SeC HRPs. However, this time the two first NS-SeC categories (Higher (1) and Lower (2) managerial, administrative and professional occupations) had to feature among the departures from the OA and the groups (5) Lower supervisory and technical occupations, (6) Semi-routine occupations and (7) Routine occupations had to feature among the arrivals. The social trajectories linked to social downscaling are listed in table 7 below. To maintain a symmetry with social upscaling, trajectory 12->34567 was not considered as downscaling. This yields a total of 10,397 ordinary OAs with social downscaling trajectories in England between 2001 and 2011, as compared to the 11,859 OAs with upscaling trajectories.

Social change 2001-2011	Selection criteria	Number of OAs with 7% std. dev. threshold x
123 down, 4567 up	12<0 & 3<0 & 4>0 & 567>0 & 123<-x & 4567>x	3,845
124 down, 3567 up	12<0 & 4<0 & 3>0 & 567>0 & 124<-x & 3567>x	4,069
1234 down, 567 up	12<0 & 3<0 & 4<0 & 567>0 & 1234<-x & 567>x	1,033
123 down, 567 up	12<0 & 3<0 & 567>0 & 123<-x & 567>x	235
124 down, 567 up	12<0 & 4<0 & 567>0 & 124<-x & 567>x	239
12 down, 4567 up	12<0 & 4>0 & 567>0 & 12<-x & 4567>x	635
12 down, 3567 up	12<0 & 3>0 & 567>0 & 12<-x & 3567>x	651
12 down, 567 up	12<0 & 567>0 & 12<-x & 567>x	50

Table 7: Criteria used to identify downscaling social changes in OAs between 2001 and 2011

Identifying tenure change in ordinary Output Areas

Table 8 below lists the criteria used to identify the tenure trajectories derived from the analysis of the datasets Tenure - People, 2001 (UV43) and Tenure - People, 2011 (QS403EW) from the 2001 and 2011 UK Censuses respectively. The symbols SR, PR and O in table 8 below represent the change in the number of residents within the tenure categories 'social renting', 'private renting' and 'owning' respectively between 2001 and 2011.

Tenure change 2001-2011	Selection criteria (based on the 2001-2011 change in O, PR and SR)	Number of OAs with 7% std. dev. threshold x
Increase in all three tenure types	$O > x \ \& \ SR > x \ \& \ PR > x$	1,689
Decrease in all three tenure types	$O < -x \ \& \ SR < -x \ \& \ PR < -x$	20
PR up	$PR > x \ \& \ -x < SR < x \ \& \ -x < O < x \ \& \ PR > 2 * (O + SR) \ \& \ PR > -2 * (O + SR) \ \& \ PR > 2 * \max(O \ \& \ SR) \ \& \ PR > -2 * \min(O \ \& \ SR)$	14,589
O up	$O > x \ \& \ -x < SR < x \ \& \ -x < PR < x \ \& \ O > 2 * (SR + PR) \ \& \ O > -2 * (SR + PR) \ \& \ O > 2 * \max(SR \ \& \ PR) \ \& \ O > -2 * \min(SR \ \& \ PR)$	7,036
SR up	$SR > x \ \& \ -x < O < x \ \& \ -x < PR < x \ \& \ SR > 2 * (O + PR) \ \& \ SR > -2 * (O + PR) \ \& \ SR > 2 * \max(O \ \& \ PR) \ \& \ SR > -2 * \min(O \ \& \ PR)$	2,022
PR down	$PR < -x \ \& \ -x < SR < x \ \& \ -x < O < x \ \& \ PR < 2 * (O + SR) \ \& \ PR < -2 * (O + SR) \ \& \ PR < 2 * \min(O \ \& \ SR) \ \& \ PR < -2 * \max(O \ \& \ SR)$	212
O down	$O < -x \ \& \ -x < SR < x \ \& \ -x < PR < x \ \& \ O < 2 * (SR + PR) \ \& \ O < -2 * (SR + PR) \ \& \ O < 2 * \min(SR \ \& \ PR) \ \& \ O < -2 * \max(SR \ \& \ PR)$	16,207
SR down	$SR < -x \ \& \ -x < O < x \ \& \ -x < PR < x \ \& \ SR < 2 * (O + PR) \ \& \ SR < -2 * (O + PR) \ \& \ SR < 2 * \min(O \ \& \ PR) \ \& \ SR < -2 * \max(O \ \& \ PR)$	2,927
O and SR up	$O > x \ \& \ SR > x \ \& \ -x < PR < x \ \& \ O > 2 * PR \ \& \ O > -2 * PR \ \& \ SR > 2 * PR \ \& \ SR > -2 * PR$	596
O and PR up	$O > x \ \& \ PR > x \ \& \ -x < SR < x \ \& \ O > 2 * SR \ \& \ O > -2 * SR \ \& \ PR > 2 * SR \ \& \ PR > -2 * SR$	5,774
PR and SR up	$PR > x \ \& \ SR > x \ \& \ -x < O < x \ \& \ PR > 2 * O \ \& \ PR > -2 * O \ \& \ SR > 2 * O \ \& \ SR > -2 * O$	2,267
O and SR down	$O < x \ \& \ SR < x \ \& \ -x < PR < x \ \& \ O < 2 * PR \ \& \ O < -2 * PR \ \& \ SR < 2 * PR \ \& \ SR < -2 * PR$	383
O and PR down	$O < x \ \& \ PR < x \ \& \ -x < SR < x \ \& \ O < 2 * SR \ \& \ O < -2 * SR \ \& \ PR < 2 * SR \ \& \ PR < -2 * SR$	100
PR and SR down	$PR < x \ \& \ SR < x \ \& \ -x < O < x \ \& \ PR < 2 * O \ \& \ PR < -2 * O \ \& \ SR < 2 * O \ \& \ SR < -2 * O$	26
O & SR down, PR up	$O < -x \ \& \ SR < -x \ \& \ PR > x$	1,362
PR & SR down, O up	$PR < -x \ \& \ SR < -x \ \& \ O > x$	20
O & PR down, SR up	$O < -x \ \& \ PR < -x \ \& \ SR > x$	16
PR down, O & SR up	$PR < -x \ \& \ O > x \ \& \ SR > x$	15
O down, PR & SR up	$O < -x \ \& \ PR > x \ \& \ SR > x$	2,043
SR down, O & PR up	$SR < -x \ \& \ O > x \ \& \ PR > x$	1,968
SR down, PR up	$SR < -x \ \& \ SR < 2 * O \ \& \ PR > x \ \& \ PR > 2 * O \ \& \ -x < O < x$	3,537
SR down, O up	$SR < -x \ \& \ SR < 2 * PR \ \& \ O > x \ \& \ O > 2 * PR \ \& \ -x < PR < x$	2,918
O down, PR up	$O < -x \ \& \ O < 2 * SR \ \& \ PR > x \ \& \ PR > 2 * SR \ \& \ -x < SR < x$	20,721
O down, SR up	$O < -x \ \& \ O < 2 * PR \ \& \ SR > x \ \& \ SR > 2 * PR \ \& \ -x < PR < x$	715
PR down, O up	$PR < -x \ \& \ PR < 2 * SR \ \& \ O > x \ \& \ O > 2 * SR \ \& \ -x < SR < x$	201
PR down, SR up	$PR < -x \ \& \ PR < 2 * O \ \& \ SR > x \ \& \ SR > 2 * O \ \& \ -x < O < x$	43
Minimal tenure change in O majority areas in 2001	$-(x/2) < O < (x/2) \ \& \ -(x/2) < SR < (x/2) \ \& \ -(x/2) < PR < (x/2) \ \& \ O_{2001} > 2 * (SR_{2001} + PR_{2001})$	9,442
Minimal tenure change in SR minority areas in 2001	$-(x/2) < O < (x/2) \ \& \ -(x/2) < SR < (x/2) \ \& \ -(x/2) < PR < (x/2) \ \& \ SR_{2001} > 2 * (O_{2001} + PR_{2001})$	564
Minimal tenure change in PR minority areas in 2001	$-(x/2) < O < (x/2) \ \& \ -(x/2) < SR < (x/2) \ \& \ -(x/2) < PR < (x/2) \ \& \ PR_{2001} > 2 * (O_{2001} + SR_{2001})$	23
Unidentifiable tenure change	All remaining OAs	63,860

Table 8: Criteria used to identify tenure changes in OAs between 2001 and 2011

In the same way as for the identification of social change, the threshold was set at 7% of the total population of the OA in 2001 but with a minimum value of 16.4 for OAs with less than 234 residents (one standard deviation below the mean 2001 OA total population) and with a maximum value of 24.4 for OAs with over 347 residents (one standard deviation above the mean 2001 OA total population). As for the social change, this is to ensure that variations in OA population are taken into account without nonetheless producing thresholds that are either very small (less than 10 for an OA with less than 140 residents) or very large (over 35 for OAs with more than 500 residents).

As can be seen in Table 8, the criteria chosen to identify tenure changes is based on two main ideas. First, for any change in the tenure categories to be significant, the departures and arrivals that constitute it have to be larger/smaller than the chosen threshold. This is similar to the criteria used to identify social upscaling above. The difference lies in the second criteria which is that in any movement which does not involve all three tenure types (either through the replacement by one type by another or through the sole increase in one tenure category), the tenure types not concerned should always be half as large (or small) as those which underwent change. This can be illustrated by comparing two OAs. In the first (E0000028) there has been an increase of 36 private renters alongside a decrease of 6 social renters and of 40 owners. There is no doubt that the trajectory O->PR best describes this tenure trajectory. This can be contrasted to the case of OA E00082917 in which there was an increase of 78 private renters in parallel to a decrease of 33 owners and 19 social renters. In this case there is also a similarity to the O->PR trajectory but the large loss of social renters also makes it possible that the trajectory is closer to O&SR->PR. Neither of these can be chosen with any certainty however: O->PR because owners are clearly not the only type of residents leaving the OA and O&SR->PR because the departure of social renters is below the threshold of 7% of the OA population (21.8 for this particular OA). Together, these two criteria thus ensure that the tenure trajectories identified are robust.

The downside to this approach is the high number of OAs in which a tenure trajectory cannot be identified with enough certainty. The close to 40% of all OAs in England in this situation can thus be thought of as 'incomplete' or 'hybrid' tenure trajectories. But it is still possible to say something about the general trends in these 'unidentifiable' OAs. Indeed, they show a similar broad movement towards the private rental sector: between 2001 and 2011, these 'unidentifiable' OAs saw the arrival of 872,309 private renters, alongside the departure of 293,090 owners and 116,175 social renters. It is thus likely that many of these take incomplete forms of the tenure trajectories O->PR, SR->PR or PR+. The high number of O- trajectories (16,207) is also noteworthy in this context. Together, they represent the departure of 644,386 owners. At the same time, these OAs have seen the arrival of 116,429 private renters (and only 8,867 social renters) and 37.4% of them have increases of over 10 private renters. Again, some of these O- may be incomplete O->PR trajectories.

The criteria chosen to identify tenure change trajectories from this census dataset thus produce a high number of OAs which cannot be precisely allocated to the 'pure' tenure trajectories in Table 8. But they ensure that the tenure trajectories that are identified are

unique and clearly distinguished. As for the identification of social upscaling, a number of robustness tests have been carried out as concerns the threshold used to separate out significant changes in the tenure categories.

Table 8 below shows the figures obtained for the tenure trajectories discussed in the body of the text for the same four methods used to define the threshold as were presented in the section above on social change. What is immediately clear is that the ratio between tenure trajectories to the PRS and to ownership is high for low thresholds but decreases in line with increases in the threshold. This can be explained by looking at the tenure trajectory 'MTC, O majority' more carefully. This category is responsible for all of the increase in the number of tenure trajectories to ownership when the thresholds get stricter. The reason for this is simple: this trajectory is defined as those OAs in which home-owners were the majority in 2001 (twice as numerous as social and private renters combined) and where there was no major disruption in the tenure mix. It thus follows that a higher threshold for disruption in the tenure mix will, in a context such as England where ownership is the majority tenure, naturally produce more such OAs at the expense of the other tenure trajectories.

	Abs. 15	Abs. 25	Abs., 35	Pct. 5%	Pct. 10%	Pct. 15%	Share, 5%	Share 10%	Share 15%	Pct. Std. dev. 5%	Pct. Std. dev. 7%	Pct. Std. dev. 9%
O->PR	29337	15836	7902	28958	11714	4226	44715	21738	9447	28962	20721	14118
PR+	13929	14378	12314	13378	13707	10823	2297	594	188	13541	14589	14209
SR->PR	5309	2560	1026	5429	1649	403	8504	3128	996	5384	3537	2124
MTC, O majority	18761	43589	64913	18598	54574	80043	37644	75109	91984	18819	33630	48399
O+	6790	6487	5069	6853	6191	4224	1109	332	103	6914	7036	6425
SR->O	3576	2321	1224	3724	1756	579	5514	2794	1039	3671	2918	2084
UTC	26057	27727	21208	26592	26116	15323	31664	25918	14220	26528	29321	27348
PRS / O	1.8	0.6	0.3	1.7	0.4	0.2	1.3	0.3	0.1	1.7	0.9	0.5
MTC, O majority as % of O trajecto ries	34.0	54.4	70.2	33.3	61.6	79.9	49.6	72.1	85.7	33.6	46.1	57.4

Table 8: Number of OAs per tenure trajectory to ownership or the PRS for four types of thresholds.

The easiest way out of this situation would be to select a high threshold while taking out the trajectory 'MTC, O majority' from the analysis. This would however cause a serious bias by focusing only on tenure disruptions and ignoring the social changes that occur within the ranks of homeowners. The solution chosen here is to define the lack of disruption in the tenure mix more strictly by using half the threshold value. An example is illustrative here. If the full value of the threshold x were taken, an OA in which there were over 60 movements in or out of tenure categories would still be categorised as having experienced a minimal tenure change. This would be the case for OA E00054149 in Bradford with a total population of 379 in 2001 and thus a threshold $x=24.4$ having seen the departure of 23 owners and the arrival of 22 social renters and 24 private renters between 2001 and 2011. With $x/2$, the most 'extreme' OA categorised as a minimal tenure change is OA E00078518 in Swindon which had a population of 375 in 2001, $x=24.4$ and experienced 34 movements in or out of tenure categories: a departure of 10 owners and 12 social renters alongside an arrival of 12 private renters. Overall, the average number of movements in tenure categories drops from 24.1 to 13.7 with only $x/2$ as a threshold for minimal tenure change. This approach shifts a large percentage of the formerly 'MTC, O majority' OAs to the category 'unidentifiable' but ensures that this category is meaningful and not just a residual.

As in the case of social change, the choice of the specification of a change larger than 7% of the 2001 OA population bounded by a standard deviation on either side is motivated by the search for a compromise between the absolute number and the pure percentage approach. But it also emerges from a downside of the change in shares approach. Table 8 shows that the number of OAs categorised as PR+ and O+ remain relatively constant across all specifications except those that are based on the change in shares. The stability can be explained by the fact that in the case of O+ and PR+ all the change is concentrated in one category and is thus likely to be more robust to changes in the threshold than for tenure changes where large changes are needed in two or more of the categories. The near disappearance of these two tenure trajectories with the use of shares can be linked to the fact that these tenure trajectories involve by definition only marginal decreases, if any, changes in the other two tenure categories. To effect a change in the shares thus requires very large arrivals of either private renters or owners. For example, in a hypothetical OA with a hundred residents of each tenure type in 2001, and assuming two out of the three remain constant, an arrival of 90 residents is necessary to effect a 15% change in the shares. This is a much larger OA level change that required by any other of the specifications and this specification was thus considered as sub-optimal as compared to the other specifications.