Data and methods required to explore housing space inequality in England and Wales, 1911-2011

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This paper aimed to explore whether relative, as well as absolute, low consumption of housing space has reduced in England and Wales over the twentieth century, and whether the distribution of housing space has become more or less equal over that time. Measuring relative consumption demands continuous concepts and data. However, most studies of housing inequality have been restricted to counting numbers and proportions meeting or failing absolute minima, or to contrasting the proportions of poor and non-poor meeting minima. This has been partly due to the absence of the required data (eg. Dorling *et al*., 2005). For example, Holmans recently examined housing space inequality by considering proportions of people and households who were overcrowded, who were at or above the bedroom standard, and who were in large homes (2005). He was able to deduce an increase in interregional inequality (as London gained crowded households 1991-2011 while other parts of England lost them, given population increase in London above the national average, and greater gains for owner occupiers). On this basis, Holmans argued that inequality in housing space increased in general 1991-2011 (2005). However, data limitations meant that he was not able to demonstrate this directly, or to quantify the change.

To remedy these problems, this analysis is based on the creation of a new quasi-continuous data set for housing space consumption in England and Wales. It uses data on the number of private households with different combinations of numbers of rooms and numbers of people. This is available decennially for England and Wales from the census of population for 1911-2011, with the exception of 1941 when the census was suspended due to war. No other source provides such a long run of comparable data on housing space.

Census 1891 and 1901 included data on the size and number of residents of homes with up to four rooms; but Census 1911 was the first to report on the size of all private households and the homes they lived in. Data for 1911 to 1971 were taken from General Register Office census reports (GRO 1913, 1925, 1935, 1956, 1964, OPCS, 1974). Data for 1981 to 2001 were extracted from the online source www.caswe.mimas.ac.uk, and for 2011 from www.nomisweb.co.uk. The relevant tables were Table 2 (GRO 1913), the unnumbered table on page 85 (GRO 1925), Table 5

(GRO 1935), Table 2 (GRO 1956), Table 4 (GRO, 1964), and Table 1 (OPCS 1974). Data for 1981 to 2001 were extracted from the online source www.casweb.mimas.ac.uk. The tables used were Table SAS81 14 (1981), Table SAS91 14 (1991) and Table ST051 (2001). Data for 2011 were extracted from www.nomisweb.co.uk (Table DC4404EW). Census output is Crown copyright and is reproduced with the permission of the Controller of HMSO and the Queen's Printer for Scotland.

Data are for England and Wales because it was not possible to establish a comparable run of data for the whole of Great Britain or the UK. The population was divided up into groups who were members of households living at particular average rooms per person; for example one person households living in two rooms and two person households living in four rooms were combined as a group living at two rooms per person. Groups were ordered from low to high rooms per person, creating quasi-continuous data to which a range of different definitions of inequality could be applied.

The data set is necessarily based on rooms per person rather than square metres per person. At the time of Census 1901 government statisticians noted, *'the word 'Room'… is very elastic and can be stretched'* (GRO, 1904, p. 39). In 1911 a 'room' was defined formally: *'count the kitchen as a room, but do not count scullery, landing, lobby, closet, bathroom, nor warehouse, office, shop'* (GRO, 1913, p. 2). Very similar definitions remained in use for the period 1911-2011 (in 1951 'kitchenettes' or kitchens too small to eat in were excluded (GRO, 1956)). Thus the 'rooms' reported here include bedrooms, living rooms and kitchens, although all provide different amounts and types of space within homes. At the start of the twentieth century, statisticians bemoaned the lack of data on the 'cubic capacity' of homes (1904), and noted that the size of rooms '*obviously has a considerable bearing on the heath and comfort of the inhabitants'* (GRO, 1913, p. 2). However, little progress was made on this issue in the UK over the course of the century, so as Holmans said, *'the only way to assess inequality in accommodation space is to look at the number of rooms a household occupied'* (2005, p. 58). Rooms may vary in size (eg. GRO, 1904, Dwyer, 2009), and counting rooms *'can be misleading'* (Williams, 2009, p. S84). In fact, homes in the UK are distinguished amongst others in Europe for their small internal floorspace, and Gallent *et al*. noted that, *'private builders tend to squeeze more rooms into the same space'* (2010, pp. 17-18). However, the number of distinct internal spaces in a home remains the main measure used in the sale and purchase of private housing in the UK, and provides some guide of the ability of a home to provide privacy and to accommodate varied uses and users, as well as a proxy for overall space.

This analysis reports people rather than households living at different numbers of people per room, in order to reflect the numbers of people affected by different circumstances. It assumes that rooms are shared equally between household members, and that all people in a single household are living at the same number of rooms per person. The measure also necessarily equivalised space within the household without taking account of potential differences in space needs between people of different ages, physical ability or other characteristics, unlike the official room and bedroom standards.

Data includes only households with members present on census night, and includes both households with their own dwelling and households sharing with others. By 2008/09, 566,000 households in England owned or rented a second home, and thus had access to additional rooms not included in census data or this analysis (CLG, 2009). Finally, the data exclude the 'non-household' population, including homeless people, who have no space they have a legal right to, and people in institutions, who may have no space they have sole rights to.

Given these inevitable data limitations, this analysis may tend to underestimate inequality in housing space between people. Results will be an underestimate if any of the following are true: if homes with fewer rooms tend to have smaller rooms, if space inside homes is not equally distributed between household members, if second homes tended to be owned by those with higher numbers of rooms per person in their first homes, and if the non-household population have less than average rooms per person.

Another point is that some inaccuracy is introduced because in each census the final category of number of people in the household or numbers of rooms occupied by the household is open-ended. For example, in 1911 the maximum recorded rooms per household was 10, but the group included homes with 10 or more rooms. From 1921-1961, the maximum recorded rooms per household was 15, in 1971 it was 10, in 1981 and 1991 it was 7 and in 2001 and 2011 it was 8. From 1911-1931, the maximum household size reported was 13 people, in 1951 and 1961 it was 13, in 1971 it was 10, 1981-2001 it was 7 and in 2011 it was 6.

Calculations presented here assume that all the members of the 'x plus' terminal categories had only x rooms or people. This will have lead to some under- and over-estimation of rooms per person, and of inequality in rooms per person. In almost every case, the proportion of homes and rooms included in these open-ended categories are below 1% of the total. The main exceptions are for 1911, 1971 and 2001 and 2011. In 1911, the '10 or more' rooms category included 5% of all people and 8% of all rooms. In all other cases the unspecified groups were 2% of people or rooms or less. By 2001 14% and by 2011, 16% of people lived in homes with 8+ rooms. The vast majority of these were in the better housed half of the population, so this is unlikely to have led to underestimates of the population with low numbers of rooms per person, but may have lead to underestimates of inequality. However, it should be noted that Atkinson *et al*. have pointed out that the situation of the top 1% by income can affect overall trends and distribution in income inequality (2011). However, sensitivity tests were carried out to explore this question of truncated categories, re-running calculations to assume firstly that all the members of the 'x plus rooms' categories had x+0.5/1 rooms or people, and secondly, that all members of the 'x plus people' categories had x+0.5 people. These suggested the truncation would not affect the overall results significantly.

The quasi-continuous data created for each census year 1911-2011 were then subject to three measures of inequality. Those exploring income inequality have noted that no one measure of inequality is entirely comprehensive or 'neutral', and some measures allow (and some purposes require) more sensitivity to certain parts of the distribution

than to others (Atkinson, 1970, Hills *et al*., 2010, Atkinson, Piketty & Saez**,** 2011). All three definitions used here have been widely used in the study of income and other social inequalities (eg. Hills et al., 2010). The first definition is the Gini coefficient, which measures how far the whole distribution departs from equality. The second and third measures are more sensitive to the lower end of the distribution. The second definition is the ratio between the incomes or housing space of those at the 90th and 10th percentile of the distribution (and other similar ratios). The distribution of the population by housing space per person was divided into ten 'deciles', which vary slightly in size between deciles and years. The '90th percentile' figure, for example is for people on the boundary between the 9th and 10th decile. The identity of the individuals making up each decile are likely to change substantially between censuses The third definition of inequality is the proportion of the population below 60% of the median number of rooms per person. This is a measure of low relative housing space consumption, and forms a potential new 'relative housing space poverty' line.