Plenty More Room Inside?
Public transportation, public housing, and declining overcrowding: Evidence from early-twentieth century London

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Abstract:

This paper examines overcrowding, an indicator of low quality of life. We use household-level data from the 1929-31 *New Survey of London Life and Labour* to construct new estimates of overcrowding and analyze its geographic and economic determinants. We then examine how interwar public policy contributed to declining overcrowding. Improvements to public transportation led to increased worker earnings and housing expenditure. More importantly, public transport allowed workers to live in outer areas with lower overcrowding rates and commute inwards. Housing legislation reduced overcrowding by subsidizing new home construction, thereby increasing dwelling size, reducing rents, and improving housing quality.

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Overcrowding – defined as more people living in a dwelling of a given size than is socially or medically acceptable – has long been viewed as one of the great social ills of the industrial revolution (Malthus 1826; Engels 1872; Booth 1889-1903; Unwin 1912). Studies have concluded that high urban population density and widespread overcrowding in the nineteenth and early-twentieth century contributed to stunting and the spread of infectious diseases such as whooping cough, measles, scarlet fever, smallpox, and tuberculosis (Wilson 1905; Mackenzie and Foster 1907; Szreter 1997; Hatton and Martin 2010). Overcrowding continues to have serious health consequences. During the Covid-19 pandemic, the disease spread more rapidly and had higher fatality rates in localities with a high incidence of overcrowding (Aldridge, et. al. 2021; Kamis, et, al, 2021). In addition to its effects on physical health, overcrowding results in a lack of privacy, impairing mental health and educational attainment (Goux and Maurin 2005). It also causes the deterioration of dwellings through increased wear and tear and build-up of moisture (National Claims 2023). Because of these effects, overcrowding has been used as an indicator of low quality of life. It is one of five characteristics used by the United Nations to define slum housing and one of three characteristics used by the UK Census to define housing deprivation (Census 2021 2023; UN-HABITAT 2007).

We examine the extent, geographic distribution, and decline of overcrowding in early-twentieth century London. The problem of severe overcrowding in London arose during the early to mid-nineteenth century because of widespread rural-to-urban migration following the industrial revolution. Neither the supply of inner-city housing nor urban infrastructure kept pace with population growth. However, toward the end of the century, overcrowding first peaked and then slowly declined, despite continued population growth for the metropolis. It is likely that several factors contributed to this decline, including rising incomes, declining home construction costs, demographic change, and a variety of public policies. Our focus in this

paper is heretofore unexplored role of policy, specifically concerning the extent to which public transportation and public housing provision reduced overcrowding.

We explore these issues using microdata from the *New Survey of London Life and Labour* (henceforth *New Survey*), a household survey conducted from 1928-32 (Johnson, et. al. 1999). The information contained in the *New Survey* is considerably more detailed than what is available from alternative contemporary micro-data sets, such as the *Census*. The *New Survey* contains a near-random sample of about 27,000 households and 94,000 individuals, approximately 2 percent of working-class households in inner-London. It provides background information on all household members, employment information for all workers, and rent paid and the number and type of rooms for all dwellings. It also contains the home address, place of work, and birthplace of adults. We have extended the original Johnson, et. al. (1999) data by GIS-coding all geographic information, which we use to create a series of distance variables to enable us to estimate the effects of distance from the center, migration within the metropolis, and commuting on overcrowding.

Using a comprehensive set of overcrowding indicators that we construct from the *New Survey* data, we show that overcrowding was still prevalent circa 1930, although somewhat lower than it had been in the late-nineteenth century. Approximately 16.3 percent of working-class Londoners lived in dwellings with over two people per room. Almost a third lived in dwellings that would have been deemed overcrowded under the *Housing Act, 1935*. Children under age 14 were much more likely than adults to live in overcrowded housing, with 29.9 percent living in dwellings with over two people per room. Overcrowding was most prevalent near the city center, with central boroughs having overcrowding rates over double those of further out.

Census figures show that overcrowding declined by about a third between 1891 and 1931, from 18.7 percent of residents of the County of London to 13.1 percent. We show that improvements to public transportation contributed to this decline through two separate mechanisms. First, public transport increased income and thus induced additional housing expenditures. Previous work has shown that commuting induced by public transportation improved employer-employee matching and thereby increased earnings (Seltzer and Wadsworth 2024). However, we argue that, because the income elasticity of housing demand was fairly low, the income effect was small, accounting for less than 10 percent of the overall decline in overcrowding between 1891 and 1931. Secondly, public transportation may have broken the geographic link between workplace and residence, allowing employment to concentrate in the center and workers to live further out, where dwellings were on average larger, higher quality, and less expensive (Hebblich, et. al. 2020). We estimate that spatial reallocation of the population from central boroughs to outer areas accounts for about 40 percent of the overall decline.

Finally, we show that interwar housing policy also contributed to declining overcrowding. A series of *Housing Acts* mandated slum clearances and subsidized the construction of new public housing. Council housing was typically larger and higher quality than comparable private housing. Moreover, the rent on council housing was about 9-10 percent less than that on comparable private housing because of public subsidies. We show that these factors resulted in lower overcrowding rates in council housing than in the private sector, particularly for children. Large-scale construction of council housing probably also had a second-order effect of increasing the overall housing supply, although we are unable to quantify this effect.

The findings of this paper contribute to our understanding of improving quality of life in the late-nineteenth and early-twentieth centuries. Declining overcrowding has been largely

overlooked in this literature; which has instead focused on incomes (Crafts 1997; Clark 2005), nutrition (Steckel 1995), water and sewerage infrastructure (Chapman 2019; Hanlon 2024), cleaner air (Zivin and Neidell 2013; Beach and Hanlon 2018), disease and medical care (Crafts 1997; Costa 2015), and working hours (Crafts 1997; Huberman and Minns 2007). A potential justification for this omission is that overcrowding may simply proxy poverty. However, we show that the relationship between overcrowding and income was nonlinear and fairly weak. Our findings also stress the importance of public policy in reducing overcrowding. The importance of public transport for improved quality of life has hitherto been largely overlooked by economic historians; indeed Chapman (2019, p. 240) states that investment in public transportation systems "would not have contributed to mortality declines." Similarly, although much has been written about the *Housing Acts*, this literature has generally not focused on overcrowding. Finally, although our findings directly pertain only to London, it is likely that the main conclusions of this paper are more general, as overcrowding was widespread in other British cities (Census of England and Wales 1904 and 1934) and other cities in the United Kingdom also constructed public transportation networks and publicly owned housing (Simon 1933; Seltzer and Wadsworth 2024.

THE OVERCROWDING PROBLEM

In 1750, the London metropolis contained approximately 650,000 people. The industrial revolution created new manufacturing jobs and increased urban wages. Large-scale rural to urban migration followed. The population of London surged to 1.1 million in 1801, 2.6 million in 1851, 6.5 million in 1901, and 8.1 million in 1931 (Visions of Britain 2026). This pattern was repeated across other British industrial cities, with the population of the next five largest cities (Glasgow, Liverpool, Manchester, Birmingham, and Leeds) all increasing at least seven-fold between 1801 and 1901 (Visions of Britain 2026). Nineteenth century manufacturing was characterized by substantial economies of scale and agglomeration and thus

tended to cluster near city centers. Prior to the mid-nineteenth century, almost all urban residents lived near their workplace and so housing was also concentrated in the centers (Ponsonby and Ruck 1930; Heblich, et. al. 2020). In 1851, about 89 percent of Londoners lived in the central area and about 55 percent lived in the inner ring of boroughs.[1]

This clustering of residents led to demand for inner-city housing outpacing supply (Hollinghead 1861; Engels 1872). This, in turn, led to increasing rents, subdivision of properties into tenements, and ultimately the genesis of the overcrowding problem. In the evocatively titled *Ragged London*, a typical tenement building is described as "[an old] family mansion that [was] once inhabited by city merchants, or the leading clerks and managers in banks or offices [which had] sunk gradually" (Hollingshead 1861). Within tenements overcrowding was rife; in one case, "[an] old mansion, faded and dilapidated, … [was] let out to a dozen or fifteen families. … [There were] seven persons in one room – father, mother, grownup children, and infants." (Hollingshead 1861). Hollingshead argues that the broader problem of overcrowding sometimes characterized entire neighborhoods. For example, the parish of St Bartholomew, Moorfields, Cripplegate had an average of over three people per room, the level designated as "acute overcrowding" in Llewellyn Smith and Bowley (1932) and the United Nations' designation of slum housing (UN-HABITAT 2007).

Nineteenth century commentators considered overcrowding to be one of the great social ills of the time. Malthus (1826) argued that sterilizing the poor would be a better alternative to "mak[ing] the streets [in our towns] narrower, crowd[ing] more people into the houses, and court[ing] the return of the plague." Engels (1872) argued that one of the worst consequences of industrial capitalism had been the "peculiar intensification of the bad housing conditions of

[1] "Central London" comprised the City of London plus the County of London, which together were about 27 percent of the total metropolitan area. The inner ring of boroughs comprised about 18 percent of the total area of central London. See Appendix I for definitions and locations.

the workers [following] the sudden rush of population to the big towns; a colossal increase in rents, a still further aggravation of overcrowding in the individual houses" (Engels 1872, p. 14). An 1885 Royal Commission concluded that overcrowding contributed to poor health and vice among the working-class (Great Britain 1885).

As public information increased, Victorian-era Britain became increasingly shocked by the poverty, squalor, and overcrowding of urban working-class areas (Booth 1889-1903). This led to attempts to understand the causes and consequences of poverty. Towards the end of the century, large-scale inquiries were launched in London and York to examine working-class lives (Booth 1889-1903; Rowntree 1901). Smaller surveys of Reading, Warrington, Northampton, Bolton and Stanley followed in the early-twentieth century (Thane 2025). Overcrowding was a prominent theme of these inquiries. Charles Booth's *The Life and Labour of the People of London*, the most famous inquiry, concluded that overcrowding was highly prevalent among, but not limited to, the 30 percent of working-class Londoners who lived in poverty (Booth 1889-1903). The 17 companion volumes to *Life and Labour* contain three chapters specifically dedicated to overcrowding and further discuss the problem in chapters on poverty and individual trades (Booth 1889-1903). The volumes summarized the extent of overcrowding; for example, stating about the district of Whitechapel, "Overcrowding in all its forms, whether in the close packing of human beings within four walls, or in the filling up of every available building space in dwellings and workshops, is [its] distinguishing mark." (Booth, 1889-1903, IV, 46).

Some forty years later, the *New Survey*, which was intended as a follow-up to *Life and Labour*, interviewed approximately 2 percent of the working-class population (Bowley 1932). Although formal analysis of the resulting data was at the time limited by budgetary considerations, the authors of the companion volumes had the benefit of 40 years of evidence from the *Census*, which only began asking questions about dwellings in 1891. The companion

volumes contained three chapters specifically dedicated to overcrowding and further discussed the problem in chapters on poverty, housing, travel to work, and individual trades (Llewellyn Smith, 1930, 1934; Llewellyn Smith and Bowley 1932; Llewellyn Smith and Marsh 1930; Ponsonby and Ruck 1930). The authors concluded that overcrowding remained prevalent in 1930, but at lower levels than previously. Five years later, a nationwide study of the overcrowding problem was mandated by the *Housing Act, 1935*. The *Overcrowding Survey of England and Wales* canvassed virtually every working-class dwelling in the country between November 1935 and April 1936. The records from the from the *Overcrowding Survey* have not been digitized and surviving records are scattered across various archives throughout the country; however, in 1936, the Ministry of Health published a nearly 200-page volume summarizing the findings of the survey (Ministry of Health 1936). The *Overcrowding Survey* showed that some improvements had been made during the 1930s, as only approximately 7.0 percent of working-class London dwellings were overcrowded by 1936.

DATA

Our primary source of data is the *New Survey of London Life and Labour*, a survey of working-class households conducted between 1928 and 1932 (Johnson, et. al. 1999).[2] Like *Life and Labour*, the *New Survey* covered the 28 metropolitan boroughs of the County of London.[3] The *New Survey* also included nine adjacent municipal boroughs which had large numbers of working-class residents in 1930.[4] Appendix I shows the location of the individual boroughs and also classifies the boroughs into four "rings" (inner, middle, outer, and exterior), which we use as a shorthand way to identify centrality.

[2] Working-class was defined by the occupation of the household head. The *New Survey* data includes over 2,000 white-collar workers, mostly secondary earners in clerical positions.
[3] Neither survey included residents of the City of London. This omission is unimportant for our purposes, as the City contained only 15,758 residents in 1931, almost none of whom would have been working-class.
[4] The records for two outer boroughs, Tottenham and Walthamstow, have been lost. These boroughs comprised 5.2 percent of the total 1931 population of the *New Survey* area.

The records contain a near-random sample of approximately 2 percent of the working class population, with 26,915 households, 94,137 individuals, and 36,763 workers who reported earnings in the week prior to being surveyed.[5] There is a single record card for each household in the survey. Each card contains the address of the residence, the names of individual household members (redacted from the published data), their age, sex, relationship to the head of household, and place of birth.[6] In addition, the records report occupation, employer, place of work, earnings in the past week and in a typical week, non-wage income, hours of work in the past week and in a typical week, and transportation expenditure for each income earner. The cards also report on a variety of dwelling characteristics, including weekly rent, number of rooms of different types (bedrooms, parlors, and kitchens), number of other spaces (bathrooms, sculleries, pantries), whether the dwelling had outdoor space (yard or garden), and whether any rooms or outdoor spaces were shared with other households. Bailey and Leith (1999) provides a full description of the coding of the record cards.

In addition to the fixed questions, the cards also contained a line for additional enumerators' remarks about anything else they considered noteworthy (Bailey, et. al. 1999). The remarks covered the health or appearance of residents, their employment, the state of repair of the dwelling, the immediate neighborhood, the landlord, etc. The remarks were typically brief, and few covered more than one topic. About a quarter of cards had no remarks. We have coded remarks about dwellings, creating dummy variables for 1) small dwellings or small rooms within dwellings, 2) poor repair or undesirable attributes of dwellings or immediate neighborhoods, 3) whether the property was owned by the London County Council or a local

[5] Smaller boroughs were over-sampled and larger boroughs were under-sampled to ensure a sufficient sample for each borough for statistical reliability (Bowley 1932).

[6] An implausibly large number of individuals (8,696) have a reported age of zero. We have reclassified these individuals as adults if 1) they had an earner number or 2) their relation to the head of household implies they must have been an adult (head, father, brother-in-law). In regressions which include age as an independent variable, we also include a dummy variable for age reported as zero.

council. Appendix II outlines how we coded these remarks. The remarks did not follow a fixed pattern; thus, it is likely that these variables contain considerable measurement error. In constructing the variables, we erred on the side of minimizing type-I errors (false positives) at the cost of more type-II errors (false negatives). As we argue in Appendix II, this approach ensures that a substantial majority of both possible outcomes are correctly classified.

For our purposes, one of the most important features of the data is the geographic information about residence, workplace, and birthplace. Residence is always reported as an exact street address. Workplaces are reported as either exact addresses or placenames. Birthplaces are almost always placenames. We have extended the Johnson, et. al. (1999) data, by GIS-coding all locational information. We were able to locate over 99 percent of residential addresses and over 98 percent of meaningful responses to place of work.[7] In addition to housing locations, we have GIS-coded river crossings, public transport stops and stations, stock stations and warehouses, wholesale markets, power plants, large industrial areas, and large parks within the *New Survey* area. Seltzer and Wadsworth (2024, 2026) provide further details of our coding. We then use these GIS coordinates and the great circle distance formula to construct variables measuring the "crow flies" distance between residences and 1) workplaces, 2) the central points of Charing Cross and the Bank of England, and 3) local amenities and disamenities.

As far as we are aware, the only other large-scale micro data sets available for the period are the 1891-1921 *Censuses*. However, *Census* micro-data is less well suited to our purposes than the *New Survey*. The *Census* contains less information about dwellings, providing only the total number of rooms. It also does not provide information about earnings, rent, or workplace prior to 1921. Moreover, the *Census* is unsuitable for examining the impact of early housing policy, as the most recent available *Census* microdata is from 1921, the first year of

[7] For about 30 percent of workers, place of work was either not supplied on the original record card ("X", "refused", "-", etc.) or too vague to be meaningful ("London", East End", "various", etc.).

large-scale council house construction. Thus, we augment our findings with previously published *Census* tables but do not use *Census* micro-data.

ESTIMATING OVERCROWDING

There is no universal standard for overcrowding. Thus, we determine whether each household was overcrowded under several standards in use around the time of the *New Survey*. Each standard is based on the concept of a maximum permissible number of inhabitants given the number of rooms (bedrooms, parlors, or kitchens) or, equivalently, a minimum number of rooms given the number of occupants. Dwellings which exceeded the permissible number of occupants (contained fewer than the minimum number of rooms) were overcrowded. Most of these standards were discussed in the companion volumes to the *New Survey* (Llewellyn Smith and Marsh 1930; Llewellyn Smith and Bowley 1932; Bowley 1934). We also estimate overcrowding rates using the legal definition of overcrowding for the UK, first established in the *Housing Act, 1935*. Although this only became the official definition several years after the *New Survey* had been completed, it was already in use by government bodies from 1930 as a minimum requirement for rehousing families displaced by slum clearances.

We calculate whether each household was overcrowded under the following standards:[8]

Standard 1 ("overcrowding"): The permissible number of residents is two people per room.

Standard 1a ("acute overcrowding"): The permissible number of residents is three people per room. This standard is equivalent to the modern-day overcrowding standard in the United Nations' definition of slum housing (UN-HABITAT 2007).

[8] Our preferred definitions of overcrowding are Standards 1 and 5. Standard 1 is available from *Census* output tables and has been widely used by later scholars (Llewellyn Smith and Bowley 1932, 1934; Martin 1955; Hatton and Martin 2010). Standard 5 is our other preferred standard because it has been the legal definition of overcrowding since 1935.

Standard 2 ("reasonable standard of comfort"): There is a maximum occupancy of one weighted person per room, where the weights are: adults (female 16+ or male 18+) = 1.0, boy 14-17 = 0.75, girl 14-15 = 0.75, child 5-14 = 0.5, child 0-4 = 0.25.

Standard 3 ("bedroom standard"): The permissible number of residents is 2.5 people per *bedroom*. Couples sleep in the same room. Non-couples are segregated by sex, with no more than three people in any bedroom. Children aged 0-9 are weighted as 0.5 adults. All one-room tenements are deemed to have one bedroom. This standard was used by the Manchester Public Health Committee from 1920 (Llewellyn Smith and Bowley 1932, p. 229).

Standard 4 ("necessary bedroom standard"): Same as Standard 3, except it assumes that a parlor could be converted into a bedroom if there is at least one other room in the dwelling not used as a bedroom.

Standard 5 ("*Housing Act* standard"): The permissible number of residents is two in a one-room dwelling, three in a two-room dwelling, five in a three-room dwelling, 7.5 in a four-room dwelling, ten in a five-room dwelling, and two more for each additional room. This standard was established under the *Housing Act, 1935* and remains the official standard to this date.

Standard 5 also contained three additional conditions which we outline below. We also adjust our estimates for Standards 1, 3, and 4 by incorporating these additional conditions to estimate what we consider to be *de facto* overcrowding, independent of legal standards.[9]

Condition 1: Weighting of children – anyone over age ten counts as one person, children (age 1-10) count as 0.5 persons, infants (age 0-1) count as zero persons.

Condition 2: Separation of the sexes – couples sleep together in a room. Non-married individuals over age ten sleep in rooms segregated by sex.

Condition 3: Room size – The permitted number of occupants is two people in a room with at least 110 square feet, 1.5 people in a room with 90-110 square feet, one person in a room with

[9] We do not add these conditions when the standards already incorporate a close substitute. For example, Standards 2, 3, and 4 already convert children into adult equivalents and we rely on the weightings from these standards, rather than those from the *Housing Act*. We do not impose the additional conditions on Standard 2. Condition 3 is redundant because Standard 2 already proscribes a maximum of one adult-equivalent per room. It would be possible to impose Condition 2, but this too will be redundant, except for a few households which had both a boy and a girl between ages 11 and 14 but no other children.

70-90 square feet, and 0.5 person in a room with 50-70 square feet. Spaces less than 50 square feet are not counted as rooms.

Implementing Condition 1 is straight-forward, as our data contains the age and sex of all individuals. Implementing Condition 2 requires assumptions about relationships between household members. The *New Survey* data only provides relationship to the household head, which results in some ambiguity as to whether other members of the household were couples.[10] We assume that all plausible couples were actual couples. There are only 122 ambiguous cases in the data, thus the number of misclassifications will be small. Condition 3 is the most problematic. The *New Survey* does not contain information about room size, apart from unsystematic enumerators' remarks. In the absence of systematic information, the best we can do is to make assumptions about which rooms were likely to have been small. Our assumptions are: 1) the last bedroom in dwellings with two or more bedrooms was small (only suitable for one adult equivalent), 2) the kitchen was small, 3) both assumptions hold. Although these assumptions are somewhat arbitrary and cannot be verified in the data, small last bedrooms and narrow galley kitchens were common features of British dwellings and were part of the recommendations of the Tudor Walters Committee (1918) for new working-class housing.[11]

In Table 1 we show the population share living in overcrowded dwellings under each standard. Because the *New Survey* oversampled small boroughs, the figures are weighted by the 1931 borough population share, obtained from the *Census*. Table 1 shows the baseline rate for each standard and rates after incorporating Conditions 1-3. It also shows overcrowding (Standard 1) from *Census* data between 1891 and 1951 (Booth 1889-1903; Llewellyn Smith

[10] For example, an uncle and aunt could be either a couple or brother and sister. Similarly, a brother and sister-in-law could be married to each other or the brother of the head and the sister of the head's spouse.
[11] The Tudor Walters Committee recommended that new houses with (without) a parlor contain a scullery of 80 square feet and bedrooms of 160 (150), 120 (100), and 110 (65) square feet.

and Marsh 1932; and Martin 1955).[12] Except for Standard 5, the baseline overcrowding rates have also been calculated by Llewellyn Smith and Bowley (1932) and Hatton and Bailey (1998). In all cases, our estimates closely match theirs. Table 1 also shows the overcrowding rate (Standard 1) for the County of London in the *New Survey* to determine whether our figures are consistent with those from the *Census*. We obtain a figure of 16.9 percent, which would be very close to the *Census* figure of 13.1 percent (Martin 1955), assuming that under 5 percent of the middle-class and upper-class population lived in overcrowded households and that approximately 70 percent of the population was working class.[13]

Several conclusions can be drawn from Table 1. First, overcrowding was in decline from 1891 and particularly after 1911. Although there is no systematic data prior to 1891, it is likely that overcrowding peaked around this time, as *Census* figures show that the population of the inner-ring of boroughs (where overcrowding was most prevalent) peaked in the 1880s and slowly declined thereafter. Second, despite this decline, overcrowding remained a serious problem in 1931. Depending on assumptions about small rooms, about 10-25 percent of the working-class population lived in dwellings with more than two people per room, 17-33 percent lived in dwellings that exceeded the *Housing Act* threshold, 5-14 percent lived in "acute overcrowding" or modern slum conditions, and less than half had a "reasonable standard of comfort". Third, many non-overcrowded dwellings fell just under the overcrowding threshold. This is evident from the impact of different assumptions about small rooms on our calculated overcrowding rates and the difference between the estimates for Standards 3 and 4.

Appendix III shows the figures split by age (under 14, 14 and over) for each standard shown in Table 1. Children under age 14 were much more likely to face overcrowding than

[12] The 1891 and 1901 *Censuses* recorded the number of rooms *in dwellings with fewer than five rooms*. We adjust these figures, assuming that 2.3 percent of all overcrowding occurred in larger dwellings (a figure obtained from the *New Survey* data).
[13] Bowley (1930) calculates that 32.2 percent of male London workers held professional, clerical, or commercial occupations at the time of the *New Survey*.

adults, with 29.9 percent of children but only 11.3 percent of adults living in overcrowded dwellings (Standard 1). Part of the greater propensity of children to experience overcrowding results mechanically from the relative infrequency of children in small households. By definition, a household with one individual is not overcrowded, a household with a husband and wife would only be overcrowded in a one-room dwelling under Standard 2, and a household with two unmarried people would only be overcrowded (Standards 3, 4, and 5) if both individuals were over age nine (or ten) and of the opposite sex. In general, as household size increases, so too does the range of dwellings in which they would be classified as overcrowded. In the data, only 1.6 percent of the approximately 16,000 individuals in one-person or two-person households were under age 14. By contrast, 32.0 percent of those in three-person or larger households were under 14. Although much of the greater likelihood of children experiencing overcrowding arises mechanically from the definition, overcrowding may nevertheless have had particularly serious consequences for children. Both adults and children would have been harmed by the contagion that was facilitated by overcrowding, but only children would have experienced the second-order effect of stunting (Mackenzie and Foster 1907; Hatton and Martin 2010).

In Figure 1, we show the overcrowding rates (Standards 1 and 5) at each income decile for household heads. Figure 1 shows surprisingly little linear relationship between income and overcrowding. There were relatively low rates of overcrowding among the poorest households. Approximately 28 percent of heads did not work and hence had zero earnings. These heads were typically much older and had fewer children living at home. However, even among households with working heads, the relationship between income and overcrowding was non-linear, with overcrowding rates peaking in the middle of the income distribution. This observed relationship highlights the fact that overcrowding does not simply proxy poverty, reenforcing

that the study of overcrowding provides insights to quality of life that are not captured by income.

Overcrowding was far from uniformly distributed geographically. Figure 2 shows the location of all overcrowded and non-overcrowded households (Standard 5, Conditions 1 and 2). It is evident that overcrowding rates were substantially lower in the outer and exterior boroughs. An implication of this is that overall overcrowding rates might potentially have declined if households relocated away from the center, subject to housing availability in the outer areas. Thus, the figures from the *Census* shown in Table 1 likely understate the decline for the entire metropolis, as they cover only the central area and thus do not account for the growth of the outer areas. We return to this next section.

To further explore the relationship between these characteristics and overcrowding, Table 2 shows regressions on overcrowding under each standard. In each case, the dependent variable is a dummy for whether a household was overcrowded, incorporating the child weighting, sex separation, and small room conditions only if they are part of the original standard.[14] The explanatory variables are sets of dwelling and head of household characteristics and borough dummies.

Our main interest lies in the coefficients on centrality and head of household's income. The coefficients on centrality are significantly negative for all but Standard 2, confirming the relationship shown in Figure 2. We also note that some of the total centrality effect is subsumed within the borough fixed effects. In specifications without the borough dummies, the absolute value of the centrality coefficient is higher than reported in Table 2 (not shown). The coefficients on the income variables are strongly significant; however, as with Figure 1, the

[14] We use OLS to estimate the regressions in Table 2 and in subsequent regressions with dummy dependent variables, as the parameter estimates are consistent and the results are easy to interpret. In all cases, the results of logit regressions are very close to those reported.

relationship between income and overcrowding, although statistically significant, is fairly weak. When we rerun the regression in the first column without the income variables, the R^2 declines by only 0.008 from 0.085 to 0.077.

PUBLIC TRANSPORT, EARNINGS, AND THE DEMAND FOR HOUSING

Our second main objective is to explore the contribution of public policy to declining overcrowding. We begin by focusing on improvements to public transportation. In the late-nineteenth century, public transportation was limited to trains, which were expensive, and horsedrawn omnibuses and trams, which were slow and expensive. As a result, the working-class were generally employed "on the spot" (Ponsonby and Ruck 1930). The early twentieth century expansion and modernization of the Underground, bus, and tram networks (for example, replacing horses with motors) increased speed and capacity and lowered cost, enabling low-cost, high-speed commuting (Seltzer and Wadsworth 2024). The resulting near-universal access to public transport can be seen in the *New Survey* data. The median distance from workers' residences to the nearest public transport was 164 meters and only 1.7 percent of workers were more than 500 meters away. Approximately 59.4 percent of workers reported work-related transportation expenditures in the previous week. In this section, we focus on the implications of public transportation improvements for overcrowding.

Commuting and Income

We first consider whether public transportation reduced overcrowding through an income effect created by increased employment options.[15] Seltzer and Wadsworth (2024) estimate a causal effect on earnings of 1.5-3.3 log points per kilometer commuted. To estimate

[15] As a first approximation, the search area can be thought of as a circle with radius r, the maximum distance a worker is willing to commute. By simple geometry, the size of this area is related to the square of r. Based on the distribution of travel distances in the *New Survey* data, we assume that r equals 1.6 kilometres for walking and 8.0 kilometers for public transport. This implies that public transport expanded the search area by a factor of 25.

the effect of commuting-induced earnings on overcrowding, we need to determine if/how many marginally overcrowded households would have rented additional rooms with these additional earnings. This requires us to estimate the income-elasticity of housing demand and to make assumptions about which households made additional expenditures.

To estimate the income elasticity of housing and the cost of rooms we run hedonic regressions following Mayo (1981). The dependent variables are 1) the log of weekly rent (in hundredths of pence) and 2) the log of the number of rooms. The independent variables are log (income); distance from the center; and vectors of family, dwelling, and neighborhood characteristics. Appendix IV provides a list of variables from our regressions, their definitions, and some summary statistics.

The main regression results are presented in Table 3.[16] For the purpose of estimating commuting-induced housing expenditure, the main variable of interest is log (income).[17] We also report coefficients on centrality, number of rooms, and the interaction of number of rooms and centrality, whether the dwelling was small or contained small rooms, and whether the dwelling was council owned, which we return to later. To ensure the robustness of our results, we have run multiple specifications, beginning with only log (income) and centrality as right-hand-side variables and progressively adding family, neighborhood, and dwelling characteristics. The coefficient on log (income), which gives the estimated income elasticity of housing demand, is well below one in all specifications. In specification 1 (with no controls), the income coefficient is 0.317. This result is little changed by the addition of controls for family and location characteristics (specifications 2 and 3). In columns 4-6, we add controls

[16] Full results are in Seltzer and Wadsworth (2026).

[17] Results are shown for regressions which exclude observations with income reported as zero. The results of similar regressions with log (income) set to zero for these observations and adding a dummy variable for zero income are very similar to those shown. Following Mayo (1981), who argues that housing demand derives from the permanent income of the household, we only consider the income of the household head. Replacing head of household's earnings with the total household earnings has very little effect on the regression results.

for dwelling characteristics. The income coefficient drops sharply to about 0.13, which is robust to the inclusion of additional control variables. This can be thought of as the elasticity of demand, holding constant observable dwelling characteristics, or as the elasticity of demand for housing quality. In columns 7-9, we run regressions using log (rooms) as the dependent variable. The estimated income elasticity is about 0.22-0.27. The low estimated elasticities are consistent with the literature on more recent housing markets, which has shown that renters' demand for housing is income-inelastic (Mayo 1981). It is also consistent with "Schwabe's Law of Rent" which states that there is an inverse relationship between household income and the proportion of income spent on rent.

The results from Table 3 allow us to perform a back-of-the-envelope calculation of the total effect of commuting-induced income gains on overcrowding. We make the upper-bound assumption that public transport increased the average commute by 3.0 kilometers between 1890 and 1930, based on the mean commute of 3.05 kilometers in our data and a literal interpretation of the statement that "in [the 1890s] workmen travelled but little, being generally employed on the spot" (Ponsonby and Ruck 1930). Our highest estimated return to commuting is 3.3 percent per kilometer. We use the income elasticity of the demand for rooms of 0.22, from Table 3, column 9. Multiplying these three values implies that commuting-induced income gains led to about a 2.2 percent increase in the demand for rooms. Finally, we multiply this by the mean number of rooms (2.95) to obtain 0.065 additional rooms per dwelling or about one additional room per 15.5 households.

As a final step, we need to make assumptions about the nature of these induced expenditures, as additional rooms would only reduce overcrowding for households that were previously only slightly above the overcrowding threshold. The figure of one additional room per 15.5 households would account for the entire 5.6 percentage point decline in overcrowding between 1891 and 1931 shown in Table 1 if 86 percent of the additional rooms were acquired

by the 6.6 percent of households which would have fallen below the overcrowding threshold with one additional room.[18] More realistically, most commuting-induced spending likely occurred in infra-marginal households. If we assume that households just over the overcrowding threshold would have been equally likely as others to rent an additional room, the share of households which would have fallen below the overcrowding threshold due to commuting-induced income gains is only about 0.43 percent or 7.5 percent of the total decline.[19] This strongly suggests that, while commuting-induced income gains contributed to declining overcrowding, this contribution was fairly small relative to the total early-twentieth century decline.

Public Transportation and Migration from the Center

Public transport also reduced overcrowding through the geographic distribution of residences. In the early-nineteenth century, employment was heavily concentrated near the center. This resulted in a similar concentration of residences (Heblich et. al. 2020). However, the development of public transportation networks broke the link between residence and workplace. Following the construction of the railways in the mid- to late-nineteenth century, many middle and upper-class families migrated outward. They were increasingly joined by working-class families following expansion of the other networks in the early-twentieth century. As we will show, dwellings in outer areas were larger, higher quality, and less expensive all else equal. Thus, outwards migration made it feasible for some families to rent larger dwellings.

[18] Ideally, we would compare our figures to the decline in the share of *dwelling*s which 1) were overcrowded and 2) would have ceased to be overcrowded with one additional room. However, the output tables from 1891 and 1931 *Censuses* only provide overcrowding rates for individuals.

[19] We have examined whether households with exactly enough rooms to avoid overcrowding (Standard 1) rented more rooms than others, all else equal. After controlling for income and household size, we find that these households rented an extra 0.09 rooms. Although this figure is statistically significant, it is not large enough to substantively affect the conclusions above.

Although the cross-sectional nature of the *New Survey* data prevents us from examining whether the timing of migration followed changes in access to public transport, we can examine other key predictions related to the moving to larger dwellings hypothesis. Specifically, we test whether 1) there was migration away from the center, 2) this migration followed an outwards movement of jobs and 3) larger dwellings were more affordable away from the center. Outwards migration would likely also have had a second-order effect of reducing housing demand in the central areas, although we are unable to directly test this effect.

We begin by using *Census* data to examine borough-level changes in the geographic distribution of population between 1891 and 1931. Figure 3 shows the relationship between centrality and borough-level population growth for the periods 1851-91 (panel A) and 1891-1931 (panel B). For the earlier period, which had limited public transportation, there was essentially no relationship between distance from the center and growth. For the later period, outer and exterior boroughs experienced strong population growth and inner boroughs experienced decline.

We further examine patterns of working-class migration using the *New Survey* data on birthplace and residential centrality. We calculate net migration towards the center, defined as birthplace distance to the center minus residential distance from the center. A negative value indicates outwards migration. We restrict the sample to those born and residing in the *New Survey* area to mitigate against selection bias.[20]

Figure 4, panel A shows the distribution of net migration distances.[21] There was net migration away from the center, with a mean outward movement of 0.81 kilometers. The

[20] By construction, the data only contains residents of the *New Survey* area. Thus, we observe migration into but not out of the area. Including inwards migrants in our calculations would thus impart an inwards movement bias.
[21] There is some measurement error in Figure 4, panel A due to birthplace only being reported at the borough level. As a robustness check, we have constructed net migration using borough centroids, instead of home addresses, to introduce the same measurement error to residence. The results are similar to those presented.

distribution of net distances is skewed left, with far more moves of at least three kilometers away from center (13.4 percent of observations) than towards the center (3.0 percent). The difference between rates of inwards and outwards migration does not arise mechanically from more individuals being born in the inner boroughs, as 17.2 percent of those born in the inner-ring of boroughs moved at least three kilometers outwards, whereas only 5.2 percent of those born in the outer and exterior rings moved at least three kilometers inwards.

The outward movement of residents alone is not sufficient to confirm the "live out, work in" hypothesis, as migration could have simply been following jobs. However, contrary to this hypothesis, employment in the center increased substantially from the late-nineteenth century. The daytime population of the City of London, the commercial center of the metropolis, hovered at about 100,000, prior to the construction of the railways (Heblich, et. al. 2020). This increased to about 160,00 in 1866, 261,061 in 1881, 301,384 in 1891, 364,061 in 1911, and 436,721 in 1921, despite a sharp drop in the residential population over the same period (City of London, 1866-1911 and Visions of Britain 2026).[22] Similarly, figures from the *1921 Census* and the *New Survey* show employment concentration in the inner boroughs. In 1921, the inner boroughs had a daytime population of 1,796,306, about a third more than their residential population (Visions of Britain 2026). Employment remained highly centralised a decade later; in the *New Survey* data the employment (residential) shares within 1, 3, and 5 kilometers of the center were 12.7 (0.9), 46.1 (25.1), and 63.3 (49.0) percent, respectively.

As a second test of the "live out, work in" hypothesis, we examine commuting patterns. Figure 4, panel B shows the distribution of net commutes towards the center, calculated in an analogous manner to net migration. Apart from having more observations near zero, the distribution of net commutes is roughly the mirror image of that of net migration. Over twice

[22] *Census* figures show that the residential population of the City of London declined about 88 percent from 132,734 to 15,758 between 1851 and 1931 (Visions of Britain 2026).

as many workers commuted inwards at least one kilometer (38.8 percent) as outwards (16.4). The mean net commute was 0.59 kilometers inwards. Contrary to what one would expect if outwards migration was in search of jobs, workers who migrated outwards had a longer average net commute inwards (1.42 vs. 0.95 kilometers) and were more likely to commute at least one kilometer inwards (46.7 percent vs 37.9 percent) than workers born and living in the outer areas. Table 2 provides further evidence that families were moving outwards and commuting inwards to avoid overcrowding, as there is some evidence that households with a head who commuted at least one kilometer inwards were less likely to be overcrowded.[23]

Rents and Distance from the Centre

Next, we examine whether there were larger dwellings and lower like-for-like rents further from the center. In Table 3, columns 7-9, we have shown that houses away from the center had more rooms. In Table 4, we show regressions estimating the effect of distance from the center on various other housing attributes. The dependent variables are the number of other spaces (pantries, sculleries, bathrooms), whether there was a private bathroom, whether there was a private yard or garden, whether the dwelling was in poor condition, and the household size. Although only household size directly affects overcrowding, the other characteristics mitigate against its consequences.[24] The main explanatory variable of interest is distance from the center. We also include controls for head of household's income, weighted household size, head's commuting distance, and borough. In the regression on poor conditions, we also include enumerator fixed effects, as this variable is constructed from subjective observations of the individual enumerators. The first two rows show the means of the dependent variables for the

[23] As noted in Section III, about 30 percent of workers did not provide a useable response to place of employment. In Table 2, these observations have been assigned a value of zero for *Commute Inwards*. If instead, we drop these observations altogether, the coefficient on *Commute Inwards* increases somewhat in all specifications.

[24] Private bathrooms improved sanitation and reduced contagion between families in the same building. Private outdoor space allowed children to play outside and may have reduced contagion within households. Sculleries and pantries increased effective living space because food or household goods do not need to be stored in the living/sleeping rooms. Poor housing conditions likely worsened disease environment.

inner-ring and for the outer/exterior rings of boroughs. Dwellings in the outer/exterior rings had more pantries and sculleries, were more likely to have a private bathroom or outdoor space, and were less likely to be in poor condition. By contrast, the difference in the number of occupants was small and statistically insignificant. The remaining rows show the results of OLS regressions. These confirm the impression from the difference in means; housing was larger and of better quality away from the center but there was no difference in household size.

To examine whether the outer areas were more affordable than the center, we return to the results from Table 3, columns 4-6. The relevant coefficients for this discussion are those on centrality, rooms, and the interaction of rooms and centrality. These coefficients give the price of dwellings of a given size at different distances from the center. From Table 3, column 6, the coefficients on bedrooms, parlors, and kitchens are 0.229, 0.352, and 0.330, respectively. The coefficient on centrality is 0.023, indicating that a hypothetical dwelling with no rooms would have been more expensive further from the center. However, the coefficients on interactions of bedrooms, parlors, kitchens and centrality are -0.012, -0.018, and -0.010, respectively, implying that the marginal cost of additional rooms was lower away from the center. To provide a clearer picture of the net distance effect, we use these results to calculate the discount/premium for different sized dwellings at various distances from the center. Specifically, we make these calculations for one, two, three, five, and seven room dwellings at two, five, eight, ten, and thirteen kilometers from the center. Table 5 shows the estimated difference in log points between the rental cost at each distance and at the center. In constructing these estimates, we use the results from Table 3, column 6, holding individual characteristics constant at their mean (modal) value for continuous (discrete) variables. We also assume values of zero for sculleries, pantries, bathrooms, and private outdoor spaces. One-room dwellings were less expensive in central areas and there was little geographic price variation for two-room dwellings. However, dwellings with three or more rooms were substantially less

expensive further from the center. This would have been the minimum size needed to avoid overcrowding for a moderate sized family, for example two parents and a son and a daughter over age 10. These estimates likely understate the geographic price gradient because Table 3 does not control for housing quality, which, as shown in Table 4, increased with distance from the center.

To understand the implications of these results for actual overcrowding rates, we calculate the share of households (individuals) who had *potentially* avoided overcrowding by renting a cheaper dwelling away from the center. We create a dummy variable (AVOID) equal to one if a dwelling met the following conditions: 1) it was at least five kilometers from the center, 2) it contained at least three sleeping rooms, and 3) it had exactly enough rooms to avoid overcrowding. We calculate this as 5.9 percent of all sample individuals and 3.4 percent of all sample households, using the Standard 1 definition of overcrowding or 8.3 and 5.3 percent using the Standard 5 definition. These estimates are sufficiently large to potentially explain the total decline in overcrowding prior to 1931. However, the actual effect on overcrowding would have been considerably smaller, as most individuals (76 percent) for whom AVOID=1 were born in the outer or exterior boroughs.

Mobility and Overcrowding

The results above suggest that the development of public transport played an important role in the spatial reallocation of the population. To quantify the impact of out-migration, we construct a simple counterfactual of overcrowding assuming there was no net movement between boroughs from 1891 to 1931. We begin by observing that the overall overcrowding rate for 1931 can be written as follows:

$$1.\ OC_{1931} = \sum_{B=1}^{35} POPSHARE_{B,1931} * OC_{B,1931}$$

where the subscript B denotes borough, OC denotes the overcrowding rate, POPSHARE denotes the population share of borough B.

We then re-weight the population shares to 1891 values. In other words, we ask the simple question, what would the overall overcrowding rate have been if there had been no net migration between boroughs, but the overcrowding rate in each borough was at its actual 1931 level. To do this, we estimate:

$$2.\quad OC^{*}_{1931} = \sum_{B=1}^{35} POPSHARE_{B,1891} * OC_{B,1931}$$

We use overcrowding rates from the *New Survey* (Standards 1-5, no adjustments for room size) and the *Census* (Standard 1).[25] We construct POPSHARE for each borough using population data from the 1891 and 1931 *Censuses*. Table 6 shows OC and OC* for each overcrowding standard. In the absence of migration outwards, the overcrowding rate under the six standards would have been 14.5, 17.0, 7.1, 6.7, 14.3, and 15.4 percent higher than their actual values. Similarly, we obtain a figure of 15.1 percent using overcrowding rates from the *Census*. This accounts for about 41 percent of the total decline in overcrowding (Standard 1); as from Table 1, we see that the total decline between 1891 and 1931 was 5.6 percentage points and from Table 6, we see that spatial reallocation of the population accounted for 2.3 percentage points.

Although public transportation undoubtedly was essential for spatial reallocation, we note that 1) changes in the labor and housing markets were also essential for outwards movement, thus the figure of 41 percent may overstate the effect of public transportation alone and 2) spatial reallocation of the population likely had a general equilibrium effect on within-

[25] *Census of England and Wales* (1934) reports overcrowding for East Ham and West Ham, but not the other exterior boroughs. To generate estimates for the other boroughs, we regressed the *1931 Census* overcrowding rate on the *New Survey* overcrowding rate and used the fitted values for boroughs with missing data.

borough overcrowding rates through housing prices, thus the figure of 41 percent may understate the effect of public transport-led migration. The general equilibrium effect results from asymmetries in the housing supply response to migration. The long-lived nature of housing suggests there would have been an inelastic supply in inner-city areas with declining populations. By contrast, the availability of land and low borrowing costs during the interwar period implies an elastic supply-side construction response in the outer areas. The resulting interwar housing construction boom is well documented, with much of the housing stock of outer London being built at this time (Becker 1951).

INTERWAR HOUSING POLICY

From the late-nineteenth century, decent housing increasingly came to be viewed as a merit good and political debates began to focus on how the government could improve the housing of the working class (Hansard 1900). The early-twentieth century "Garden City" movement provided specific recommendations on the design of new council-built homes and neighborhoods to promote a healthier population. In a series of works culminating with the influential "Nothing Gained by Overcrowding", the prominent architect Raymond Unwin proposed minimum standards for the number and size of rooms in new homes that would be publicly built and owned (Unwin 1912; Park 2017).

These discussions gradually worked their way into public policy. Public provision of housing began with 1890 and 1894 amendments to the *Housing of the Working Classes Act 1885* (henceforth *Housing Act*), which gave local authorities in rural areas the power to buy land and construct housing estates. In 1900, a further amendment extended this power to urban authorities. However, slum clearances and construction of new housing were costly. Thus, there was limited public housing before the First World War. Prior to 1914, the London County Council (LCC), the largest provider of council housing in the country, built only about 10,000

homes which housed about 47,000 people, less than 1 percent of the London population (Swenarton 1981a and Swenarton 1981b). Over the same period, only about 2 percent of new home construction nationwide was built by local authorities (Swenarton 1981a).

The First World War brought working-class housing to the political front-burner. As had been the case a generation earlier with the Boer War, many working-class men were deemed medically unfit for military service (Park 2017; Hanlon 2024). The poor standard of working-class housing was widely blamed (Park 2017). Following the War, Prime Minister David Lloyd George promised returning soldiers "homes fit for heroes" (Swenarton 1981b; Park 2017). After his re-election in 1918, he appointed the Tudor Walters Committee to examine public provision of new-build working-class homes. The Committee's report adopted several recommendations from "Nothing Gained by Overcrowding", proposing government investment in homes, with most having "a minimum of three rooms on the ground floor (living-room, parlor and scullery), three bedrooms above, two of these capable of containing two beds, and a larder and a bathroom." (Tudor Walters Committee 1918; Swenarton 1981a; Park 2017).

From 1919, a series of laws incorporated many of Tudor Walters Committee's recommendations into public policy. The *Housing and Town Planning Act* 1919 authorized finances to support the construction of 500,000 homes, although ultimately only about 213,000 were ultimately built (Parliament of the United Kingdom 2025). In 1923, an amended *Housing Act* mandated that local councils construct additional homes and provided a subsidy of £6 per home. The nature of the subsidy meant that rents were based on amortized construction costs minus a fixed discount, rather than being means-based (Simon 1933). Future Health Minister John Wheatley believed that this subsidy was sufficiently low that only the "working-class aristocracy" could afford new-build council houses. When Wheatley became Health Minister in 1924, an amended *Housing Act* increased the subsidy to £9 in urban areas (Simon 1933). A 1930 amendment accelerated slum clearances and the building of new council houses, further

increased the state subsidy, introduced means-testing for council houses, and increased the minimum standards for rehoused tenants displaced by slum clearances. The *Housing Act, 1935* mandated the *Overcrowding Survey*, set a formal definition for overcrowding (Standard 5), established elimination of overcrowding as an official policy objective, and further increased the rate at which local councils were required to clear slums and rehouse former tenants.

The *Housing Acts* collectively resulted in a sharp increase in the construction of council housing. Approximately 1.2 million council homes were constructed in England and Wales between 1921 and 1939, about 29.3 percent of total construction over the period (Great Britain 1920-1940). The LCC alone built over 89,000 homes (Municipal Dreams in Housing 2016). By 1939, approximately 10 percent of the population of England and Wales lived in social housing (Office of National Statistics 2012).

The effects of council home building probably differed substantially across London areas. Construction in the inner and middle rings of boroughs consisted of scattered and relatively small estates which replaced cleared tenements and slums (Municipal Dreams in Housing 2016). These estates were comprised primarily of mid-rise apartment complexes, which housed at least as many residents as the cleared tenements that previously occupied the same area, although some were low-rise cottages with a larger footprint than the dwellings they replaced. The net effect of these estates on the housing supply was probably fairly small. By contrast, council estates further out were much larger and were often built in places with little or no previous housing. Although these estates initially were primarily comprised of the cottages favored by the Garden City movement, from 1931 onwards, most new construction was flats (Swenarton 1981b). The largest estate, the Beacontree Estate, just east of the *New Survey* area, contained about 26,000 dwellings and over 100,000 residents by the time of its completion in 1935. This construction probably had a large effect on the housing supply for the metropolis, although we cannot measure this in our data.

To examine the likely impact of council house construction on overcrowding, we return to the *New Survey* data. Table 7 compares the characteristics of the approximately 2 percent of dwellings that can be identified as council-owned to others in the data. The first three rows show differences in rents. Average rent was considerably higher in council housing, confirming contemporary views about unaffordability. This was particularly true at the bottom of the distribution; the tenth percentile of council rent was 110d per week, 52.8 percent above the tenth percentile of non-council housing rent. The next four rows show differences in household heads' income. As a result of higher rents and the absence of means testing, a typical family in council housing had an income above the working-class average.[26] Residents in the bottom income decile were least likely to be in council housing. This regressivity in council housing allocation likely lessened the effectiveness of these programs at reducing overcrowding, which, as shown in Figure 1, was more prevalent in the bottom half of the income distribution.

The next six rows of Table 7 show differences in dwelling characteristics. Council housing was on average considerably higher quality than that of the private sector. Council homes had more rooms; were less likely to have small rooms; were less likely to be in bad condition; were more likely to have a private bathroom and outdoor space; and were less likely to have a shared bathroom, pantry, kitchen, parlor, or scullery. In all cases, the differences between council and non-council homes are large and statistically significant. The larger size of council homes suggests that some families may have been able to escape overcrowding by moving from private to public housing. The evidence on bathrooms, outdoor space, and shared facilities implies that even in cases where council houses were overcrowded, the consequences of this may have been less than in the private sector.

[26] Approximately 44.5 percent of households in council housing in our data were interviewed before the introduction of means testing on August 1, 1930. It is likely that most households interviewed later had been initially allocated council housing prior to the introduction of means testing.

The final six rows show the number of residents and the extent of overcrowding. Households in council housing were substantially larger than those in non-council housing and had more than double the number of children under age 14.[27] Over 65 percent of households in council homes had at least two children, compared to 40 percent in non-council homes. However, because council dwellings were much less likely than non-council homes to have only one room (1.8% vs. 13.1%) or two rooms (10.0% vs 12.9%), the share of households facing overcrowding in council homes was approximately half that of non-council homes. This gap was even larger for children. Thus, the implicit prioritization of children meant that interwar housing policies were *de facto* targeted at reducing the overcrowding problem.

Assessing the effectiveness of interwar housing policy also requires us to analyze the affordability of council dwellings. The higher rents for council housing shown in Table 7 is not based on a *ceteris paribus* comparison, as council homes were larger and higher quality. Simon (1933) argues that state subsidies meant that council homes potentially could have been rented out at much lower cost than similar homes in the private sector. He calculates that, assuming a construction cost of £300 and an interest rate of 3.5 percent, the subsidized weekly rent plus rates for a typical council dwelling would have been 6/2 per week, 42.2 percent less than the cost without subsidy. The higher subsidy under the 1930 amendment would have further reduced rent to 5/6 per week. However, Simon's calculations implicitly assume there were identical costs in the private and state sectors and that the full public subsidy was passed on to renters. To examine the actual difference in like-for-like rental costs, we return to the regressions in Table 3. Columns 1-6 include a dummy variable for council housing. In the absence of controls for number of rooms, the coefficient on council housing is positive and, in

[27] This was not due to the application process preferring children *per se*, rather because the *Housing Act* required council housing to be *sufficient*, but not *excessive*, for individual households (Llewelyn Smith 1934). Approximately 80 percent of the council homes in our sample had at least three rooms, and these would have been considered excessive for almost all households without children.

most specifications, statistically significant. This reinforces the view from contemporaries and Table 7 that council housing was unaffordable to the poorest Londoners. However, when we add these controls, this coefficient becomes significantly negative. The like-for-like difference in rents was about 9-10 log points (columns 6-8), well less than the full state subsidy, although still a substantial amount for working-class families. To put this figure in perspective, the results from column 6 imply that the discount for council housing was slightly more than the private sector discount for having at least one small room. The *Housing Act 1935* effectively discounted small rooms by 50 percent and very small rooms by 100 percent, thus the effective subsidy for council housing was equivalent to at least an extra half room.

CONCLUSIONS

Following the industrial revolution, major cities in the United Kingdom experienced dramatic population growth, with substantial resulting pressure on the housing supply. In this paper, we have documented the extent of overcrowding in London circa 1930, estimating overcrowding rates under several widely used standards. We show that about 17 percent of the working-class population lived in dwellings having more than two people per room. The overcrowding rate based on other standards was substantially higher. Overcrowding was more prevalent near the city center and among children. We have also documented the early-twentieth century decline in the population share residing in dwellings with more than two people per room from about 18.7 percent of the entire population of the County of London in 1891 to 13.1 percent in 1931.

We explore the causes of declining overcrowding, focusing on the role of public policy. We first consider the development of public transport networks. By 1930, public transport was more reliable, ran more frequently, covered a larger area, travelled faster, and cost less than had been the case 30 years earlier. Widespread use of public transport had two distinct effects on

overcrowding. First, the ability to commute meant that workers could choose between more employers, leading to better employer-employee matches and higher earnings. Higher earnings led to increased housing expenditure. However, we estimate the income elasticity of demand for additional rooms to have been only about 0.22, and thus the resulting increase in dwelling size was only about 0.065 rooms per household. We estimate that this effect likely accounted for under 10 percent of the total decline in overcrowding between 1891 and 1931. Secondly, public transport allowed workers to "live out and work in", which gave them access to the larger and lower-cost dwellings of the outer and exterior boroughs. The *New Survey* data shows there was considerable spatial reallocation of the population outwards, away from inner boroughs with high overcrowding rates. We estimate that spatial reallocation of the population accounted for about forty percent of the total decline in overcrowding between 1891 and 1931.

We also show that interwar housing policy was an important contributor to the decline of overcrowding. During the interwar period, the London County Council built about 89,000 homes. Council homes were on average larger and better quality than those in the private rental market and were rented at below-market rates. In Central London, higher quality council housing typically replaced cleared slums. It was typically built on land which previously had high density housing, and thus probably had little effect on the local housing supply. However, further from the center, large council estates were built on less-developed land and thus probably had a large effect on the housing supply. The evidence on whether early-interwar housing policy effectively targeted those most vulnerable to overcrowding is somewhat mixed. The low subsidies under the 1923 amendment to the *Housing Act* meant that families in council housing were relatively prosperous compared to the working-class population. However, increases in the subsidy from 1924, the introduction of means testing in 1930, and prioritization of flats rather than cottages from 1931 greatly increased the affordability of council housing to lower-income households. Moreover, allocation rules favoring larger households

disproportionately benefited children, who were much more likely than adults to experience overcrowding and were likely more vulnerable to its consequences.

Although our analysis narrowly concerns the London metropolis, the overcrowding problem was widespread. In 1901, 6.7 percent of the population of England and Wales outside of London lived in overcrowded dwellings and 21 county boroughs nationwide had an overcrowding rate of at least 10 percent (*Census of England and Wales* 1904). The early-twentieth century decline observed in London also occurred in other UK cities. By the time of the *New Survey*, overcrowding had abated by a similar rate both in and outside London. In 1931, the overcrowding rate was 5.9 percent of the total population outside London, and 16 county boroughs had an overcrowding rate of at least 10 percent (*Census of England and Wales* 1934).

The policies we have identified as contributing to declining overcrowding also extended well beyond London. By 1930 rail, bus, and tram systems were widespread across the United Kingdom (Seltzer and Wadsworth 2024). Commuting by public transport was probably commonplace by the time of the *New Survey*. Likewise, interwar housing policies applied throughout the UK. Indeed, the "garden city" approach preferred prior to 1931 was a low-density development model that worked best outside the major cities because of greater availability and lower prices of land. By 1939, about 10 percent of the UK population lived in council housing, with only 10 percent of this population in London.

Finally, it should be noted that public policy was not the sole cause of the decline in overcrowding. Real working-class incomes increased by about 20 percent in the 40 years to 1930, a figure about double our upper-bound estimate of the increase due to commuting (Llewellyn Smith 1930). Low interest rates in the 1930s, declining building costs, and public subsidies throughout the interwar period sparked a private sector home construction boom

which sharply increased the housing supply (Becker 1951). Across England and Wales, about 2.9 million homes were built by the private sector during the interwar period, almost 3.4 times the number built by councils (Great Britain 1920-1940). Finally, demographic factors, such as deaths in the First World War and sharp declines in total fertility from the late-nineteenth century, led to a decrease in average household size across England and Wales from 4.73 in 1891 to 4.65 in 1911 to 3.72 in 1931 (Laslett 1968).

However, the factors outlined above only resulted in a slow decline in overcrowding through 1931. It was only the catastrophic events of Second World War that brought about a near-end of the overcrowding problem, as can be seen in Table 1. London was extensively bombed during the Blitz. Working-class homes were most likely to be damaged or destroyed because they tended to be located near industrial areas (Redding and Sturm 2024). Following the War, damaged working-class housing was typically demolished and replaced with higher-density council housing. Approximately 1,013,000 new council homes being built nationwide between 1945 and 1951, nearly as many as had been built during the interwar period (Temple 2022). In addition, the Blitz led to large-scale evacuations, which, in turn, led to a permanent depopulation of Central London. *Census* figures show that the population of the County of London declined 23.9 percent from 4,399,000 to 3,348,000 between 1931 and 1951.

References

Aldridge, Robert, et. al. (2021). "Household overcrowding and risk of SARS-CoV-2: analysis of the Virus Watch prospective community cohort study in England and Wales." *Wellcome Open Research*, 6: 1-21.

Bailey, Roy, Johnson, Paul, Baines, Dudley, Raspin, Anna, Hatton, Timothy (1999). *New Survey of London Life and Labour, 1929-1931*. Memo text fields.

Bailey, Roy and Leith, Anna (1999). "*New Survey of London Life and Labour*: codebook for the data files, release 2.0." https://beta.ukdataservice.ac.uk/datacatalogue/studies/study?id=3758#!/documentation [accessed 7/7/2025].

Beach, Brian and Hanlon, Walker (2017). "Coal smoke and mortality in an early industrial economy." *Economic Journal*, 128: 2,652-75.

Becker, Peter (1951). "Housing in England and Wales during the business depression of the 1930's." *Economic History Review*, 3(3): 321-41.

Booth, Charles (1889-1903). *Life and Labour of the People of London*. (London: Macmillan).

Bowley, Arthur (1930). "Wages and Family Income." In: Llewellyn Smith, H. (ed.), *The New Survey of London Life and Labour.* (London: P. S. King), pp. 67-85.

Bowley, Arthur (1932). "Method." In: Llewellyn Smith, H. (ed.), *The New Survey of London Life and Labour.* (London: P. S. King), pp. 29-36.

Bowley, Arthur (1934). "Rent and overcrowding." In: Llewellyn Smith, H. (ed.), *The New Survey of London Life and Labour.* (London: P. S. King), pp. 143-70.

Census 2021 (2023). "Household deprivation variable: *Census 2021*." https://www.ons.gov.uk/census/census2021dictionary/variablesbytopic/demographyvariables census2021/householddeprivation [accessed 30/7/2025].

Census of England and Wales (1904). *General Report (of the 1901 Census) with Appendices*. (London: Darling & Son).

Census of England and Wales (1934). *Census of England and Wales, 1931. Housing. Report and Tables.* (London: Darling & Son).

Chapman, Jonathan (2019). "The contribution of infrastructure investment to Britain's urban mortality decline, 1861-1900." *Economic History Review*, 72(1): 233-59.

City of London (1866, 1881, 1891, 1911). *Report of the Day Census*. (London: Simpkin, Marshall, Hamilton, Kent & Co.).

Clark, Greg (2005). “The condition of the working class in England, 1209-2004.” *Journal of Political Economy*, 113(6): 1307-40.

Costa, Dora (2015). “Health and the economy in the United States from 1750 to the present.” *Journal of Economic Literature*, 53(3): 503-70.

Crafts, N. F. R. (1997). “The human development index and changes in standards of living: some historical comparisons.” *European Review of Economic History*, 1(3): 299-323.

Engels, Frederick (1872-73). “The housing question.” *Der Volksstaat*, Leipzig 1872, Nos. 51, 52, 53, 103, 104 (1872) and 2, 3, 12, 13, 15 and 16 (1873). Reprinted at https://www.marxists.org/archive/marx/works/1872/housing-question/index.htm [accessed 5/2/2025].

Goux, Dominique and Maurin, Eric (2005). “The effect of overcrowded housing on children's performance at school.” *Journal of Public Economics*, 89(5-6): 797-819.

Great Britain. Central Statistical Office. (1920-1940). *Annual Abstract of Statistics*. (London: His Majesty’s Stationary Office).

Great Britain. Royal Commission on Housing of the Working Classes. (1885). *First report of Her Majesty's Commissioners for Inquiring into the Housing of the Working Classes*. (London: Eyre and Spottiswoode).

Hanlon, W. Walker (2024). *The Laissez-Faire Experiment: Why Britain Embraced and Then Abandoned Small Government, 1800-1914*. (Princeton: Princeton University Press).

Hansard (1900). *Housing of the Working Classes Bill*, Volume 86: debated on Friday 20 July, testimony of Lord Harris and Volume 82: debated on 10 May 1900, testimony of Mr. Robson.

Hatton, Timothy and Bailey, Roy (1998). “Poverty and the welfare state in interwar London.” *Oxford Economic Papers*, 50(4): 574-606.

Hatton, Timothy and Martin, Richard (2010). “The effects on stature of poverty, family size, and birth order: British children in the 1930s.” *Oxford Economic Papers*, 62: 157-84.

Heblich, Stephan, Redding, Stephen, Sturm, Daniel (2020). “The making of the modern metropolis: evidence from London.” *The Quarterly Journal of Economics*, 135(4): 2059-133.

Hollingshead, John (1861). *Ragged London in 1861*. (London: Smith, Elder and Co.).

Huberman, Michael and Minns, Chris (2007). “The times they are not changin’: days and hours of work in old and new worlds, 1870-2000.” *Explorations in Economic History*, 44(4): 538-67.

Johnson, Paul, Bailey, Roy, Baines, Dudley, Raspin, Anna, Hatton, Timothy (1999). *New Survey of London Life and Labour, 1929-1931.* [data collection]. 2nd Edition. UK Data Service. SN: 3758, DOI: http://doi.org/10.5255/UKDA-SN-3758-1 [accessed 25/9/2020].

Kamis, Christina, et. al. (2021). “Overcrowding and COVID-19 mortality across U.S. counties: are disparities growing over time?” *SSM - Population Health*, 15: 1-12.

Laslett, Peter (1969). “Size and structure of the household in England over three centuries.” *Population Studies*, 23(2): 199-223.

Llewellyn Smith, Arthur (1934). “The London housing problem.” In: Llewellyn Smith, Herbert (ed.), *The New Survey of London Life and Labour, Volume VI, Survey of Social Conditions: the Western Area*. (London: P. S. King), pp. 155-222.

Llewellyn Smith, Herbert (1930). “Introduction.” In: Llewellyn Smith, Herbert (ed.), *The New Survey of London Life and Labour*. (London: P. S. King), pp. 1-57.

Llewellyn Smith, Herbert, Bowley, Arthur (1932). “Housing rents and overcrowding.” In: Llewellyn Smith, Herbert (ed.), *The New Survey of London Life and Labour, Volume III, the Eastern Area.* (London: P. S. King), pp. 143-69.

Llewellyn Smith, Herbert and Marsh, L. C. (1930). “House rents and overcrowding.” In: Llewellyn Smith, Herbert (ed.), *The New Survey of London Life and Labour.* (London: P. S. King), pp. 143-70.

Mackenzie, Leslie and Foster, A. (1907). *Report on a Collection of Statistics as to the Physical Condition of Children Attending the Public Schools of the School Board for Glasgow*. (Edinburgh: Wyman and Sons).

Martin, W. J. (1955). “Vital statistics of the County of London in the years 1901 to 1951.” *British Journal of Preventive and Social Medicine*, 9(3): 126-34.

Malthus, Thomas (1826). *An Essay on the Principle of Population*. (London: John Murray).

Ministry of Health (1936). *Housing Act, 1935: Report on The Overcrowding Survey in England and Wales, 1936*. (Westminster: Harland and White Trading).

Mayo, Stephen (1981). “Theory and estimation in the economics of housing demand.” *Journal of Urban Economics*, 10: 95-116.

Municipal Dreams in Housing, London (2016). “Somewhere decent to live: London County Council estates in photographs, 1895-1975.” https://municipaldreams.wordpress.com/2016/05/24/somewhere-decent-to-live-london-county-council-estates-in-photographs-1895-1975/#:~:text=This%201934%20map%20of%20LCC,1936%20(c)%20London%20Metropolitan%20Archives [accessed 30/9/2025].

National Claims (2023). “Overcrowding and its connection to social housing disrepair.” https://national-claims.co.uk/overcrowding-and-its-connection-to-social-housing-disrepair/#:~:text=Overcrowded%20homes%20experience%20greater%20wear,this%20leads%20to%20disrepair%20issues [accessed 29/1/2025].

Office of National Statistics (2012). "A century of home ownership and renting in England and Wales." https://webarchive.nationalarchives.gov.uk/ukgwa/20160107120359/http://www.ons.gov.uk/ons/rel/census/2011-census-analysis/a-century-of-home-ownership-and-renting-in-england-and-wales/short-story-on-housing.html [accessed on 30/9/2025].

Park, Julie (2017). "One hundred years of housing space standards." http://housingspacestandards.co.uk [accessed 1/7/2025].

Ponsonby, George, Ruck, S. K. (1930). "Travel and mobility." In: Llewellyn Smith, Herbert (ed.), *The New Survey of London Life and Labour*. (London: P. S. King), pp. 171-99.

Redding, Stephen, Sturm, Daniel (2024). "Neighborhood effects: evidence from war-time destruction in London." NBER Working Paper 32333.

Rowntree, Seebohm (1901). *Poverty: A Study of Town Life*. (London: Macmillan and Co.).

Seltzer, Andrew and Wadsworth, Jonathan (2024). "The impact of public transportation and commuting on urban labor markets: evidence from the *New Survey of London Life and Labour*, 1929-1932." *Explorations in Economic History*, (91): 1-39.

Seltzer, Andrew and Wadsworth, Jonathan, (2026). "The cost of modernity: evidence from 1930s London housing rents." Mimeo.

Simon, E.D. (1933). *The Anti-Slum Campaign*. (London: Longmans).

Steckel, Richard H. (1995). "Stature and the standard of living." *Journal of Economic Literature*. 33(4): 1903-40.

Swenarton, Mark (1981a). "An 'insurance against revolution': ideological objectives of the provision and design of public housing in Britain after the First World War." *Historical Research*, 54(129): 86-101.

Swenarton, Mark (1981b). *Homes Fit for Heroes: The Politics and Architecture of Early State Housing in Britain*. (London: Heinemann).

Szreter, Simon (1997). "Economic growth, disruption, deprivation, disease, and death: on the importance of the politics of public health for development." *Population and Development Review*, 23(4): 693-728.

Temple, John (2022). "A radical and progressive legacy: Labour's housing record, 1945 to 1951." *Labour History Review*, 87(1): 65-89.

Thane, Pat (2025) "Poverty in the Divided Kingdom." https://historyandpolicy.org/policy-papers/papers/poverty-in-the-divided-kingdom/ [accessed 30/8/2025).

Tudor Walters Committee (1918). *Report of the Committee Appointed to Consider Questions of Building Construction in Connection with the Provision of Dwellings for the Working Class*. (London: HMS Office)

UN-HABITAT (2007). "Enhancing urban safety and security: global report on human settlements 2007." https://unhabitat.org/enhancing-urban-safety-and-security-global-report-on-human-settlements-2007 [accessed 30/7/2025].

Unwin, Raymond (1912). *Nothing Gained by Overcrowding*. (Westminster: P.S. King & Son).

Vision of Britain (2026). "Census Reports." https://www.visionofbritain.org.uk/census/ [accessed 18/2/2026].

Wilson, George (1905). "Measles: its prevalence and mortality in Aberdeen." *Public Health*, 18: 65-82.

Zivin, Joshua¸ Neidell, Matthew (2013). "Environment, health, and human capital." *Journal of Economic Literature*, 51(3): 689-730.

TABLE 1

PERCENTAGE OF THE POPULATION LIVING IN OVERCROWDED DWELLINGS

Standard	Source	Area	Sample	No added conditions	C1	C1+C2	C1+C2+C3 (last bedroom)	C1+C2+C3 (kitchen)	C1+C2+C3 (last bed & kitchen)
1	*New Survey*	NSA	WC	16.3	10.1	10.7	17.7	20.8	24.8
1a	*New Survey*	NSA	WC	4.8	1.8	3.5	8.9	12.1	14.0
2	*New Survey*	NSA	WC		50.6				
3	*New Survey*	NSA	WC			36.2	54.3		
4	*New Survey*	NSA	WC			21.4	37.1		
5	*New Survey*	NSA	WC			16.9	22.1	25.2	32.8
1	1891 *Census*	CL	ALL	18.7					
1	1901 *Census*	CL	ALL	16.4					
1	1911 *Census*	CL	ALL	17.8					
1	1921 *Census*	CL	ALL	16.1					
1	1931 *Census*	CL	ALL	13.1					
1	1951 *Census*	CL	ALL	2.5					
1	*New Survey*	CL	WC	16.9					

Notes: Area is either CL (County of London) or NSA (*New Survey* area). Sample is either WC (working class) or ALL (all residents).

TABLE 2
DETERMINANTS OF OVERCROWDING

Standard	1	1a	2	3	4	5
Conditions	None	None	1	1 & 2	1 & 2	1, 2, 3
Log (earnings)	-0.792**	-0.195**	-1.821**	-0.874**	-0.842**	-1.179**
	(9.25)	(3.62)	(8.71)	(5.02)	(5.30)	(6.65)
Log (earnings)^2	-0.040**	-0.010**	-0.092**	-0.044**	-0.043**	-0.060**
	(9.95)	(4.13)	(9.45)	(5.42)	(5.85)	(7.20)
Centrality	-0.008**	-0.001	-0.030**	-0.011**	-0.018**	-0.022**
	(4.05)	(1.01)	(9.02)	(3.35)	(7.22)	(7.91)
Commute inwards	-0.011*	-0.008**	-0.007	-0.008	-0.009	-0.008
	(2.48)	(3.23)	(0.89)	(1.21)	(1.56)	(1.25)
Council	-0.003	0.0005	0.010	-0.046*	-0.007	0.048*
	(0.23)	(0.07)	(0.47)	(2.51)	(0.52)	(2.53)
Bad condition	0.196**	0.079**	0.251**	0.183**	0.209**	0.250**
	(12.60)	(7.43)	(16.22)	(10.81)	(12.73)	(14.92)
Constant	3.521**	0.779*	-8.103**	3.886**	3.664**	-5.355**
	(7.77)	(2.69)	(7.24)	(4.18)	(4.30)	(5.64)
Observations	19,091	19,091	19,053	19,091	19,116	19,116
F	30.93**	11.75**	72.80**	30.53**	40.81**	47.80**
R-squared	0.085	0.038	0.129	0.061	0.086	0.102

Notes: Absolute value of robust t-statistics in parentheses. ** indicates significance at a 1 percent level. * indicates significance at a 5 percent level. All regressions include controls for head of household characteristics (female, age, and place of birth dummies) and borough fixed effects.

TABLE 3
HEDONIC REGRESSIONS ON RENT AND NUMBER OF ROOMS

	1	2	3	4	5	6	7	8	9
Dependent Variable	Log (rent)	Log (rent)	Log (rent)	Log (rent)	Log (rent)	Log (rent)	Log (rooms)	Log (rooms)	Log (rooms)
Log (head's earnings)	0.316*	0.322*	0.288*	0.129*	0.132*	0.118*	0.267*	0.240*	0.221*
	(31.39)	(26.75)	(24.56)	(17.27)	(14.71)	(13.51)	(30.50)	(25.53)	(23.65)
Distance from center	0.012*	0.014*	0.006	0.018*	0.023*	0.023*	0.043*	0.042*	0.021*
	(10.00)	(11.72)	(0.72)	(5.27)	(6.87)	(3.33)	(42.54)	(44.91)	(3.23)
Bedrooms				0.197*	0.230*	0.229*			
				(16.99)	(18.52)	(18.59)			
Parlors				0.364*	0.358*	0.352*			
				(29.30)	(29.51)	(28.44)			
Kitchens				0.293*	0.312*	0.330*			
				(19.44)	(21.17)	(22.47)			
Bedrooms*$DIST_{Cent}$				-0.011*	-0.012*	-0.012*			
				(6.45)	(7.38)	(6.86)			
Parlors*$DIST_{Cent}$				-0.018*	-0.017*	-0.018*			
				(8.08)	(8.13)	(8.27)			
Kitchens*$DIST_{Cent}$				-0.007	-0.007	-0.010*			
				(2.33)	(2.32)	(3.41)			
Small rooms				-0.094*	-0.082*	-0.078*			
				(6.07)	(5.36)	(5.10)			
Council	0.091*	0.056*	0.027	-0.100*	-0.098*	-0.088*			0.028
	(6.98)	(4.11)	(1.54)	(6.96)	(6.64)	(5.39)			(1.70)
Constant	6.033*	5.651*	5.895*	7.411*	7.446*	7.509*	-2.194*	-2.586*	-2.375*
	(53.95)	(41.09)	(43.54)	(88.57)	(72.04)	(73.63)	(22.53)	(24.06)	(21.86)
Household characteristics	NO	YES	YES	NO	YES	YES	NO	YES	YES
Other dwelling characteristics	NO	NO	NO	YES	YES	YES	NO	NO	NO
Location characteristics	NO	NO	YES	NO	NO	YES	NO	NO	YES
Borough dummies	NO	NO	YES	NO	NO	YES	NO	NO	YES
R^2	0.090	0.147	0.200	0.424	0.450	0.489	0.157	0.339	0.363
F	450.65*	238.73*	70.08*	496.32*	406.17*	199.58*	1647.13*	942.17*	183.53
N	18,663	18,663	18,651	18,645	18,645	18,633	19,307	19,307	19,294

Notes: Absolute value of robust t-statistics in parentheses. * = significance at a 1% level.

TABLE 4
HOUSING QUALITY, DISTANCE FROM THE CENTER, AND COMMUTING

	Other spaces	Bathroom	Yard	Garden	Bad repair	Household size	Adj. HH size
Mean (inner-ring)	0.40	0.04	0.257	0.253	0.06	3.53	3.11
Mean (outer+exterior rings)	0.99	0.19	0.216	0.491	0.03	3.58	3.18
Distance from center	0.061*	0.035*	-0.021*	0.073*	-0.007*	-0.021	-0.014
	(13.78)	(16.06)	(8.95)	(28.62)	(5.07)	(1.866)	(1.57)
Log (head's earnings)	0.005*	0.001	-0.001	0.000	-0.0008*	0.060*	0.040*
	(5.46)	(1.98)	(2.49)	(0.29)	(2.82)	(25.02)	(19.86)
Sleeping rooms	0.286*	0.070*	0.052*	0.123*	-0.023*		
	(65.41)	(34.84)	(20.71)	(47.41)	(15.79)		
Adjusted household size	-0.014*	-0.018*	0.025*	-0.024*	0.020*		
	(4.50)	(12.94)	(12.07)	(12.27)	(16.35)		
Distance commuted	0.008*	0.004*	-0.003*	0.001	-0.0004	0.030*	0.022*
	(5.08)	(5.25)	(3.11)	(1.03)	(1.26)	(7.88)	(6.88)
Constant	-0.455*	-0.197*	0.038*	-0.081*	0.177*	3.318*	3.004*
	(21.26)	(22.95)	(2.77)	(5.22)	(8.26)	(49.15)	(53.82)
N	26,819	26,819	26,819	26,819	26,819	26,859	26,859
R^2	0.344	0.167	0.092	0.261	0.110	0.059	0.047
F	331.11*	88.98*	69.80*	362.25*	---	45.74*	35.42*

Notes: Absolute value of robust t-statistics in parentheses. * indicates significance at a 1 percent level. All regressions include borough fixed effects. The regression on bad repair also includes interviewer fixed effects.

TABLE 5
IMPACT OF DISTANCE FROM THE CENTER ON RENTS

	2 kms	5 kms	8 kms	10 kms	13 kms
Bedroom	7.0	9.2	11.1	14.7	22.5
Bedroom, Parlor	3.3	-0.0	-3.7	-3.8	-1.5
Bedroom, Parlor, Kitchen	1.4	-4.9	-11.5	-13.5	-14.1
Three Bedrooms, Parlor, Kitchen	-3.3	-16.5	-30.0	-36.7	-44.3
Four Bedrooms, Two Parlors, Kitchen	-9.2	-31.3	-53.7	-66.3	-82.8

Notes: Figures show $100(\log(\text{rent}_d) - \log(\text{rent}_0))$, where $\log(\text{rent}_d)$ and $\log(\text{rent}_0)$ are the logs of implied rent at distance d and at the center, obtained from the fitted values from Table 3, column 6. Calculations include a weighted borough fixed effect, defined as $\frac{\sum_{b=1}^{B} \gamma_b N_b}{\sum_{b=1}^{B} N_b}$ where b denotes boroughs at the relevant distance, γ is a vector of coefficients on the borough dummy variables, and N is the number of observations from each borough.

TABLE 6

OVERCROWDING RATES, 1931 AND 1891 POPULATION WEIGHTS

	Source	1931 weights	1891 weights	Difference (%)
Standard 1	*Census*	12.1	14.0	15.1
Standard 1	*New Survey*	15.3	17.5	14.5
Standard 1a	*New Survey*	4.8	5.6	17.0
Standard 2	*New Survey*	48.5	51.9	7.1
Standard 3	*New Survey*	34.7	37.1	6.7
Standard 4	*New Survey*	20.2	23.1	14.3
Standard 5	*New Survey*	15.8	18.2	15.4

TABLE 7
DIFFERENCES BETWEEN COUNCIL HOUSES AND OTHERS

	Council	Non-council
Rent (d per week)	178.86	166.72
Rent (10^{th} percentile)	110	72
Rent (25^{th} percentile)	156	105
Rent (median)	194	144
Head's Income (d per week)	788.45	713.98
Share in bottom 10% of non-council dist.	3.49%	10%
Share in bottom half of non-council dist.	25.69%	50%
Small	0.025	0.035
Bad condition	0.016	0.050
Sleeping rooms	3.716	2.933
Bathroom	0.753	0.129
Private outdoor space	0.796	0.555
Shared facilities	0.028	0.112
Household size	4.376	3.483
Number of children under 14	1.885	0.920
Crowding, Standard 1 (homes)	0.053	0.100
Crowding, Standard 5 (homes)	0.039	0.108
Crowding, Standard 1 (age<14)	0.124	0.317
Crowding, Standard 5 (age<14)	0.058	0.289

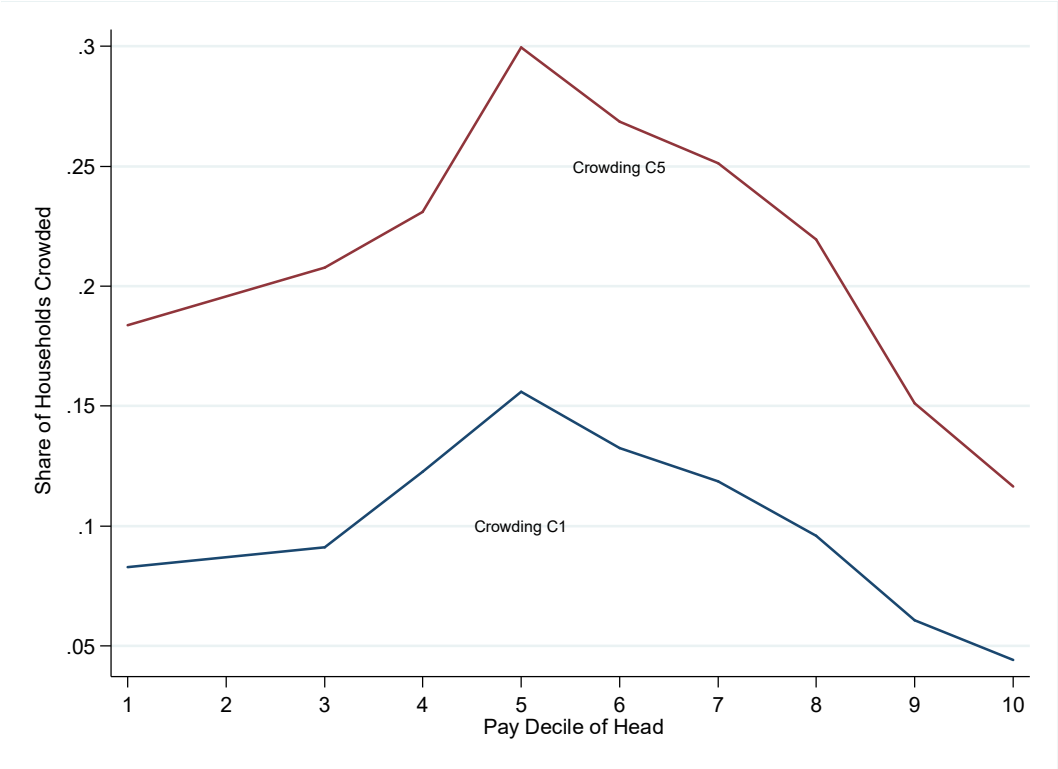


FIGURE 1
OVERCROWDING (STANDARDS 1 AND 5) BY INCOME DECILE

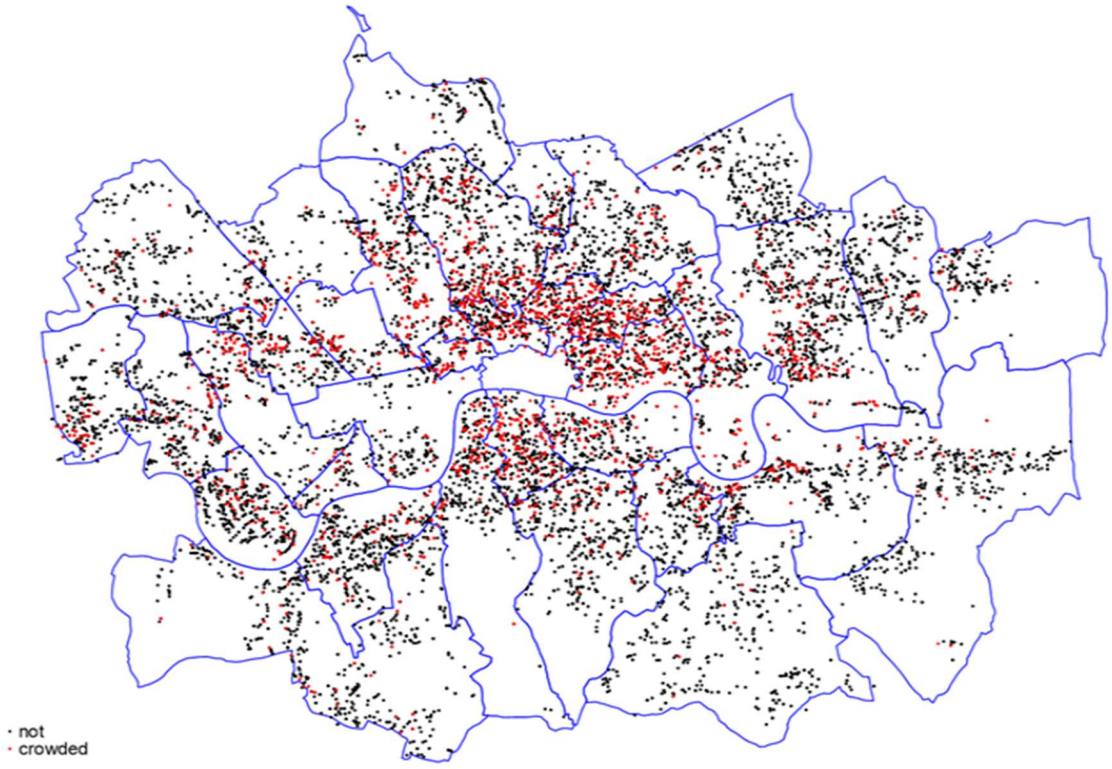
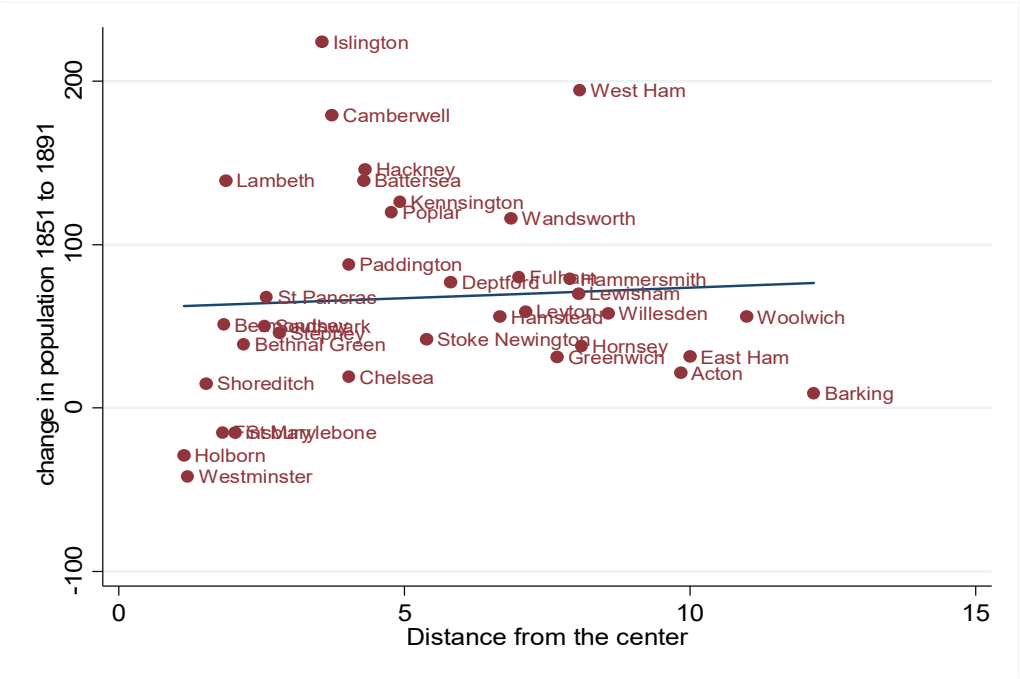
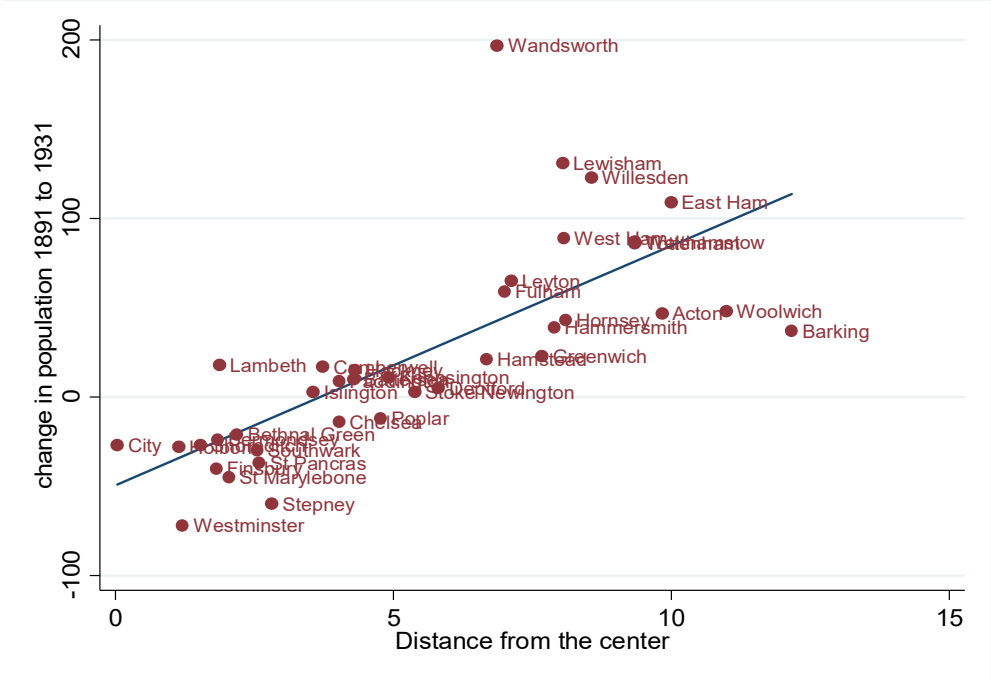


FIGURE 2
SPATIAL DISTRIBUTION OF OVERCROWDING (STANDARD 5)



A. 1851-91



B. 1891-1931

FIGURE 3
BOROUGH CENTRALITY AND POPULATION GROWTH, 1851-1891 AND 1891-1931

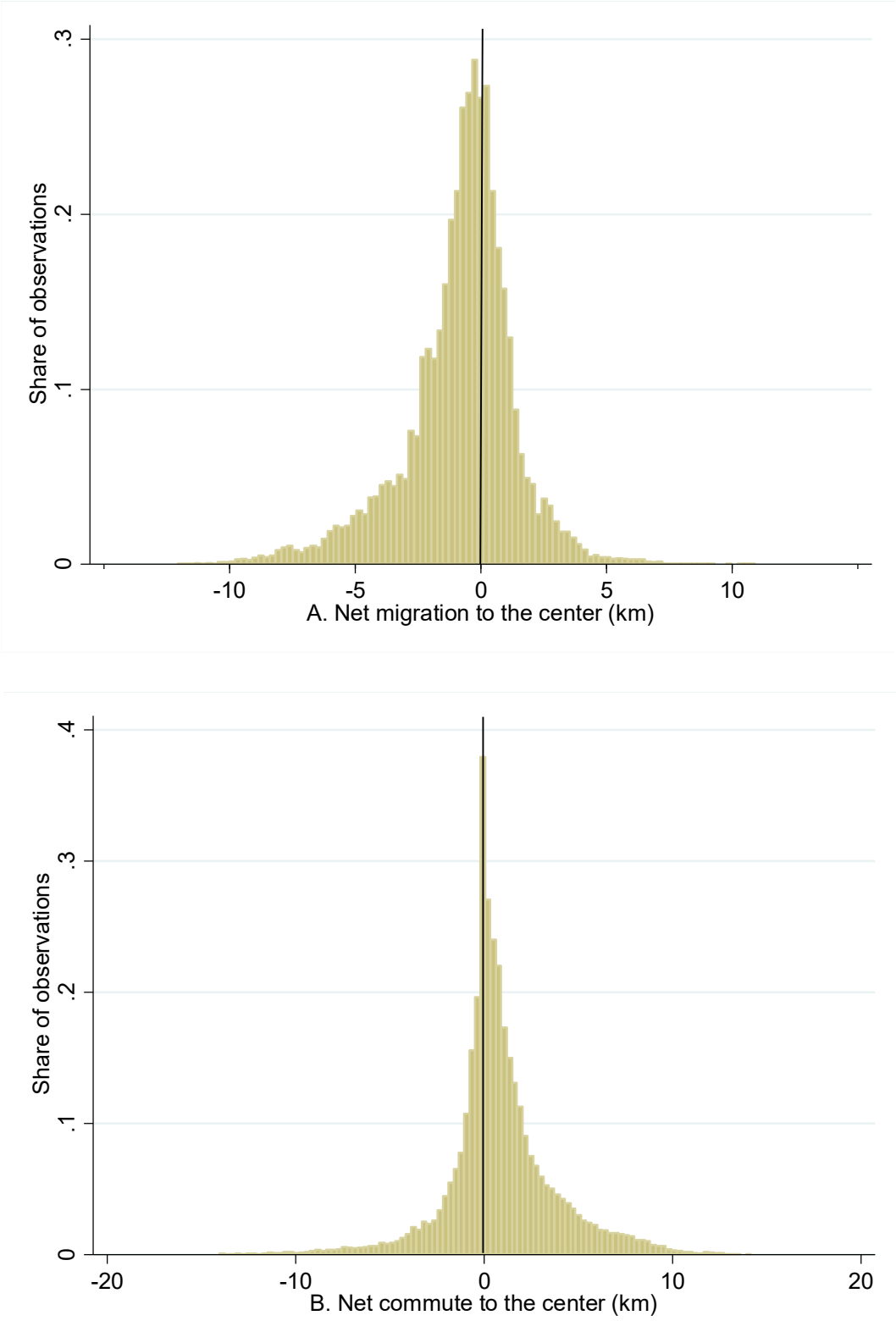


FIGURE 4
DISTRIBUTION OF NET MIGRATIONS AND COMMUTES

Appendix I Classifying the boroughs

Under the London Government Act 1899, the County of London was divided into 28 Metropolitan Boroughs. The *New Survey* also included nine additional areas (technically County Boroughs, Municipal Boroughs, and Urban Districts), which were adjacent to the County of London and contained large numbers of working-class households. The data for two outer areas (Tottenham and Walthamstow) have been lost. We have classified each of the 37 areas into four rings, which we use as a short-handed way of making simple comparisons between areas close to the center and areas away from the center. Our classification is taken directly from Ponsonby and Ruck (1930). The rings are as follows.

Inner: Bermondsey, Bethnal Green, Finsbury, Holborn, Shoreditch, Southwark, St. Marylebone, St. Pancras, Stepney, and Westminster.

Middle: Battersea, Chelsea, Islington, Kensington, Lambeth, and Paddington.

Outer: Camberwell, Deptford, Fulham, Greenwich, Hackney, Hammersmith, Hamstead, Lewisham, Poplar, Stoke Newington, Wandsworth, and Woolwich.

Exterior: Outside the County of London – Acton, Barking, East Ham, Hornsey, Leyton, West Ham, and Willesden. The two boroughs for which the data has been lost are also in this ring.

The location of the individual boroughs is shown in Figure A.1.1 below.

FIGURE A.1.1
LOCATION OF BOROUGHS IN THE *NEW SURVEY*

Appendix II Coding the enumerators' remarks

The *New Survey* record cards contain a single line for remarks.[28] Because of space limitations, enumerators typically only provided very brief comments on the residence, family, neighborhood, etc. The nature of these comments varies widely. Most only cover one or two aspects of the dwelling or household. We have coded the comments to identify 1) small rooms or small dwellings, 2) poor housing conditions, and 3) whether the dwelling was owned by the London County Council or a local council. In this appendix we outline our coding procedures. Because of the nature of the source materials, there is likely to be considerable measurement error in these variables, which we discuss below.

Coding small rooms is relatively straightforward. In about 200 observations, the remarks contained the word pair "small room" or obvious synonym, e.g. "boxroom" or "tiny room". In about 200 other cases, individual rooms were described as small, e.g. "small kitchen" or "parlour: small". In another 467 cases the dwelling was described as small. We assigned a value of one to the variable SMALL ROOM if it was clear that the card referred to all rooms or to a bedroom, parlor, or kitchen. The size of the scullery, pantry, or bathroom would not be relevant to any of the overcrowding standards. We assigned a value of zero to SMALL ROOM if the word "small" was not attached to rooms, e.g. "small" or "small cottage", as this might refer to the number of rooms rather than their size. We have also created a second variable SMALL ROOM*, which equals one if 1) SMALL ROOM equals one or 2) the notes use the term "small" or obvious synonym on its own or attached to the dwelling (but not sculleries, pantries, etc.). We have used SMALL ROOM* as an independent variable in Table 3 because

[28] Special thanks to Roy Bailey for providing us the enumerators' notes, which are not contained in the publicly available data set at UK Data Archive.

of the larger number of observations, but our results do not substantively change if we use SMALL ROOM.

Coding poor housing conditions requires considerable researcher discretion, as remarks pertaining to housing conditions varied much more than those pertaining to room size. As with beauty, poor housing conditions lay in the eye of the beholder. We coded POOR CONDITION to one if there was a negative adjective attached to any aspect of the dwelling, e.g. "poor accommodation", "exterior in bad condition", "squalid housing", etc. The use of the term "poor" creates an additional ambiguity because it was sometimes used to describe the state of accommodation and sometimes used to describe the income or wealth of the residents. We considered the context of the statement when coding; for example, "roof in poor repair" was coded to one but "poor: works only three days a week" was coded to zero. We also coded POOR CONDITION to one if the remarks mention an obviously undesirable characteristic: e.g. "rats in home", "accommodation in basement", "condemned property", "damp", "leaky roof", etc. Finally, we coded POOR CONDITION to one if the remarks indicated extensive deprivation in the immediate area: e.g. "slum neighborhood", "many houses on this street condemned", etc. Both authors independently coded POOR CONDITION to reduce the extent of misclassification.

Coding council dwellings is straightforward. If the notes mention that the dwelling was owned by the LCC or by a local council, we coded the variable COUNCIL to one and otherwise we coded it to zero.

With each of these variables, we have tried to err on the side of minimizing type-I errors (false positives) in our coding. For the variable to be coded as one, both authors had to agree that the enumerators' remarks directly stated or strongly suggested that the attribute in question was true. The cost of minimizing type-I errors is that this procedure is likely to

produce a lot of type-II errors. Enumerators' remarks were typically short, with most only commenting on one or two aspects of the family or dwelling, and thus it is likely that many did not mention small rooms, bad conditions, or council ownership even when these characterized the dwelling. It is difficult to ascertain even an approximate share of misclassification of small rooms or bad conditions. However, the evidence from the council housing variable suggests that misclassification may have been fairly common. About 1.6 percent of dwellings in the data have been coded as council housing. However, the figure of 99,000 homes being built by the LCC before 1940, suggests that a higher percentage of working-class homes were council owned. However, we note that by minimizing type-I errors, we ensure that there will be a high share of correct classifications for both zeros and ones. Even if, for example, the actual number of council-owned homes was three times that which we can identify in the data, only 3.25 percent of observations classified as zero would be misclassified.

Appendix III: Overcrowding rates by age

Standard	Source	No added conditions	C1	C1+C2	C1+C2+C3 (last bedroom)	C1+C2+C3 (kitchen)	C1+C2+C3 (last bed & kitchen)
1	*New Survey*	29.9	16.7	16.9	23.8	27.8	33.8
1a	*New Survey*	10.0	3.6	5.2	11.4	14.8	17.3
2	*New Survey*		64.5				
3	*New Survey*			50.8	69.5		
4	*New Survey*			32.7	49.1		
5	*New Survey*			27.4	34.4	38.8	47.8

A. Children under age 14

Standard	Source	No added conditions	C1	C1+C2	C1+C2+C3 (last bedroom)	C1+C2+C3 (kitchen)	C1+C2+C3 (last bed & kitchen)
1	*New Survey*	11.3	7.7	8.5	15.4	18.3	21.5
1a	*New Survey*	2.9	1.2	2.9	8.0	11.1	12.8
2	*New Survey*		45.5				
3	*New Survey*			30.9	48.8		
4	*New Survey*			17.2	32.7		
5	*New Survey*			13.1	17.6	20.2	27.3

B. Adults age 14+

Note: Area is either CL (County of London) or NSA (*New Survey* area).

Appendix IV: Variable definitions and summary statistics

Variable	Definition	Mean	Std. dev.
Log (rent)	Log of weekly rent (in hundredths of pence)	9.58	0.52
Log (income)	Log of household head's weekly income (in hundredth of pence)	11.12	0.43
Centrality	Distance from the residence to the nearer of Charing Cross or Bank of England	5.39	2.83
Household size	Number of people in the household	3.50	1.90
Born in same borough	Dummy variable for immigration status, household head born in the same borough as current residence	0.28	0.45
Born in adjacent borough	Dummy variable for immigration status, head born in adjacent borough to current residence	0.12	0.32
London born	Dummy variable for immigration status, head born in London	0.79	0.41
Foreign born	Dummy variable for immigration status, head born outside the UK	0.03	0.17
Age	Age of the household head	40.05	21.10
Age0	Dummy variable, age of the head reported as zero	0.15	0.35
Female	Dummy variable, female head of household	0.17	0.38
Bedrooms	Number of bedrooms in the dwelling	1.56	0.76
Parlors	Number of parlors in the dwelling	0.66	0.51
Kitchens	Number of kitchens in the dwelling	0.73	0.45
Pantry	Number of pantries in the dwelling	0.12	0.33
Sculleries	Number of sculleries in the dwelling	0.43	0.50
Bathroom	Dummy: one if dwelling has a private bathroom	0.12	0.33
Yard	Dummy: one if dwelling has a private yard	0.23	0.42
Garden	Dummy: one if dwelling has a private garden	0.38	0.48
Shared parlor	Dummy: one if parlor is shared with other dwellings	0.0012	0.034
Shared kitchen	Dummy: one if kitchen is shared with other dwellings	0.0115	0.106
Shared pantry	Dummy: one if pantry is shared with other dwellings	0.0014	0.0375
Shared scullery	Dummy: one if scullery is shared with other dwellings	0.0764	0.266
Shared bathroom	Dummy: one if bathroom is shared with other dwellings	0.0343	0.182
Shared outdoor space	Dummy: one if yard or garden is shared with other dwellings	0.128	0.334
Rooms (outdoor space) * Centrality	Variables for the interaction of different types of rooms (outdoor space) and Centrality	-----	-----
Longitude	Measured in radians	-0.096	0.08
Distance power plant	Distance from residence to power plant	1.703	1.387
Distance industrial	Distance from residence to large industrial complex	1.631	1.163
Distance park	Distance from residence to large public park	1.292	0.814
Distance river	Distance from residence to river crossing	3.069	4.648
Distance station	Distance from residence to goods or stock station	2.286	1.952
Distance market	Distance from residence to wholesale market	3.909	2.614
Distance train	Distance from residence to train Station	0.631	0.356
Distance Underground	Distance from residence to Underground Station	1.175	1.264
Distance bus stop	Distance from residence to bus stop	0.201	0.168
Distance tram stop	Distance from residence to tram stop	0.358	0.321
Common street	Dummy variable indicating that the data contains at least 15 households on the same street	0.06	0.25
Borough dummies		----	-----

Note: Separate summary statistics for interactions of rooms (outdoor space) and centrality are not reported in the interest of space. Details available on request from the authors.